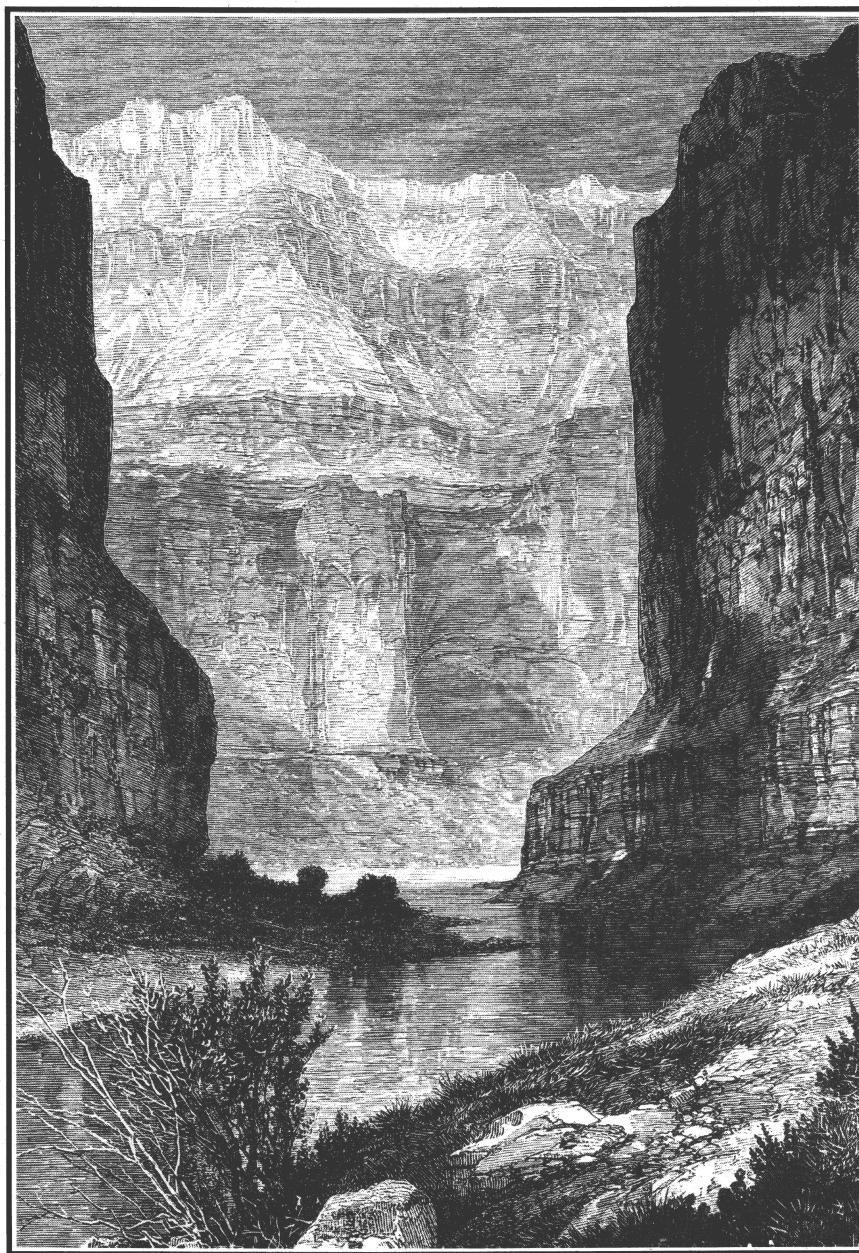


# Life History and Ecology of the Humpback Chub (Gila cypha) in the Colorado River, Grand Canyon, Arizona

## Appendix



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## **Report Citation:**

BIO/WEST, Inc. 1995. Life history and ecology of the humpback chub (Gila cypha) in the Colorado River, Grand Canyon, Arizona. Appendix for Final Report to Bureau of Reclamation, Salt Lake City, Utah. Contract No. 0-CS-40-09110.

Cover drawing from Powell (1875)

# **Life History and Ecology of the Humpback Chub (Gila cypha) in the Colorado River, Grand Canyon, Arizona**

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## **Appendix**

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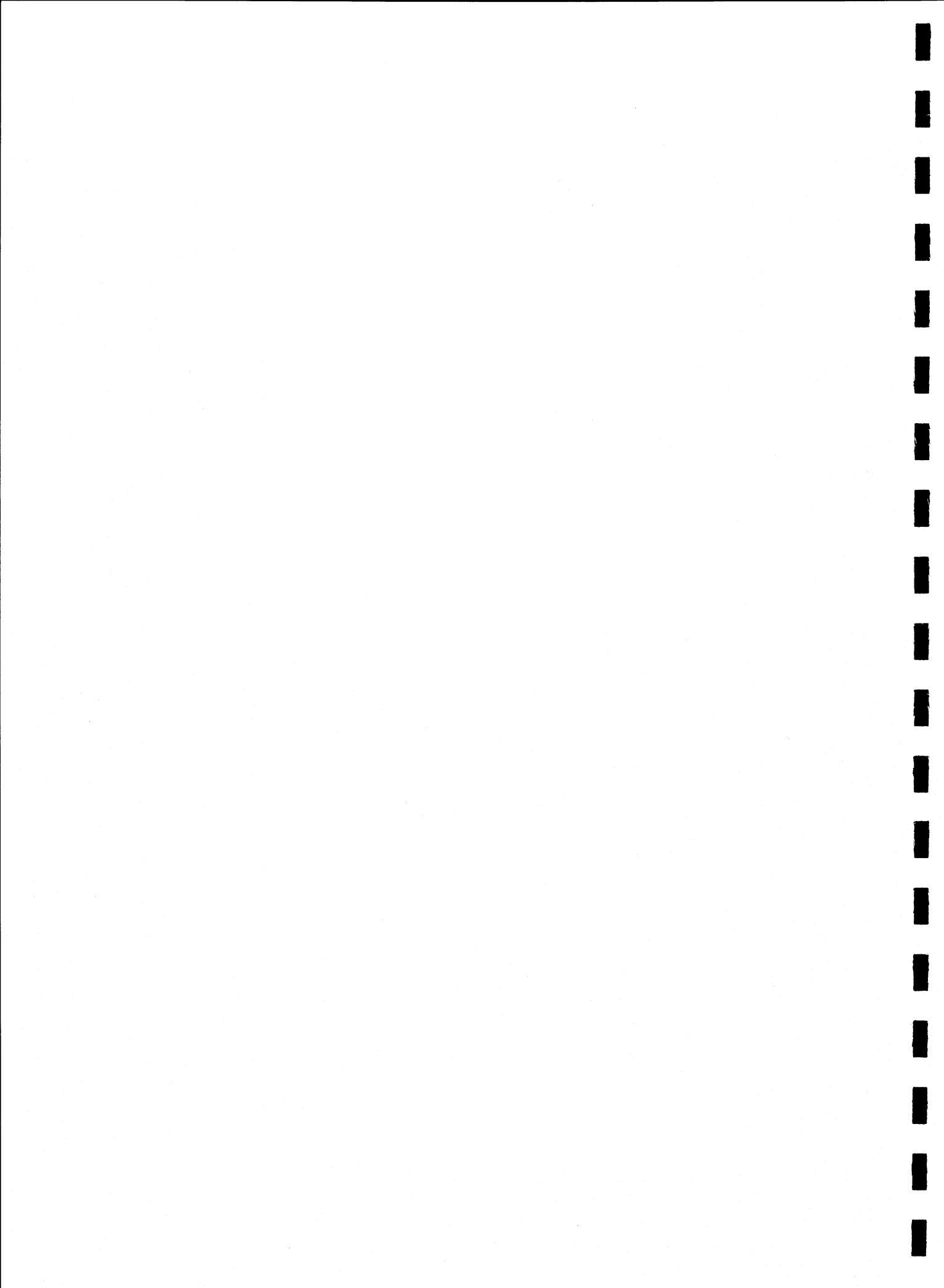


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Flagstaff, AZ 86002

## **OVERVIEW**

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This Appendix accompanies the Final Report submitted by BIO/WEST, Inc. to Bureau of Reclamation for Contract No. 0-CS-40-09110. The Final Report is entitled Life History and Ecology of the Humpback Chub (Gila cypha) in the Colorado River, Grand Canyon, Arizona. This Appendix contains tables and figures submitted by various biologists on the project during report development, and so they may vary in format. Tables and figures that were too numerous or cumbersome to include in the Final Report are provided in this Appendix. The reader is referred to the Final Report for complete analyses and presentation of this information. Also, six supplements to the Final Report are available, including a Data Collection Plan, Evaluation of Sampling Design, Photographic Record of Humpback Chub, Grand Canyon Fisheries Integrated Database, Development of a Population Model for Humpback Chub in Grand Canyon, and a Flow Routing Model. Copies of these reports can be obtained from BIO/WEST in Logan, Utah, or Glen Canyon Environmental Studies in Flagstaff, Arizona.



# **Appendix A**

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Reports, Presentations and Papers

## Trip Reports

- Valdez, R.A. and W.J. Masslich. 1990. Characterization of the Life History and Ecology of the Humpback Chub in the Grand Canyon. Trip Report No. 1, October 1990. PR-250-01.
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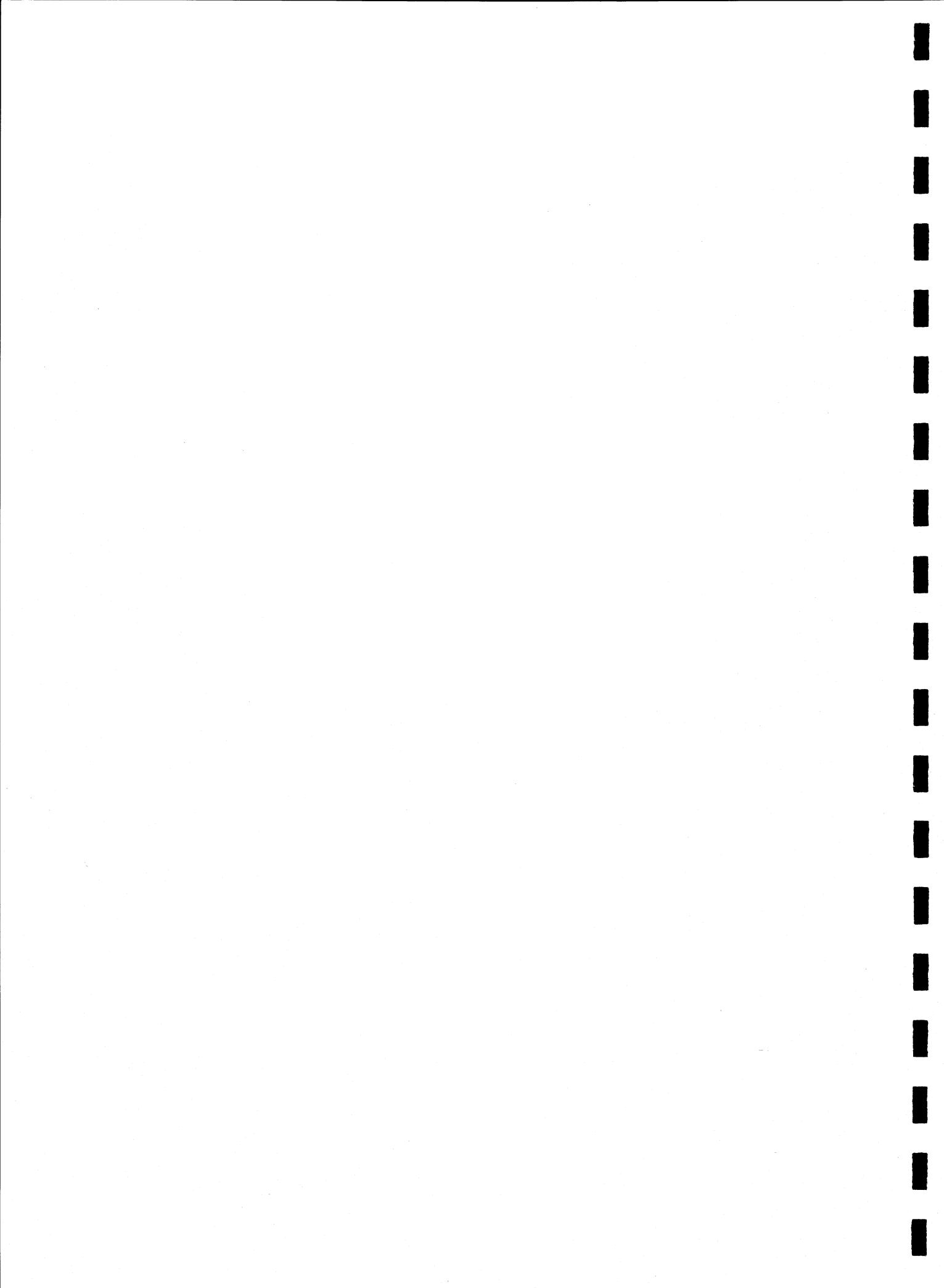
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- Prats E.E. and R.A. Valdez. (In review). Use of scales for determining age of subadult humpback chub (Gila cypha) and size at transition into the Colorado River, Grand Canyon, Arizona. The Southwestern Naturalist.
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- Valdez, R.A. and J.C. Schmidt. (In preparation). Geomorphic relationships to habitat of humpback chub (Gila cypha) in the Colorado River, Grand Canyon, Arizona. Regulated Rivers.
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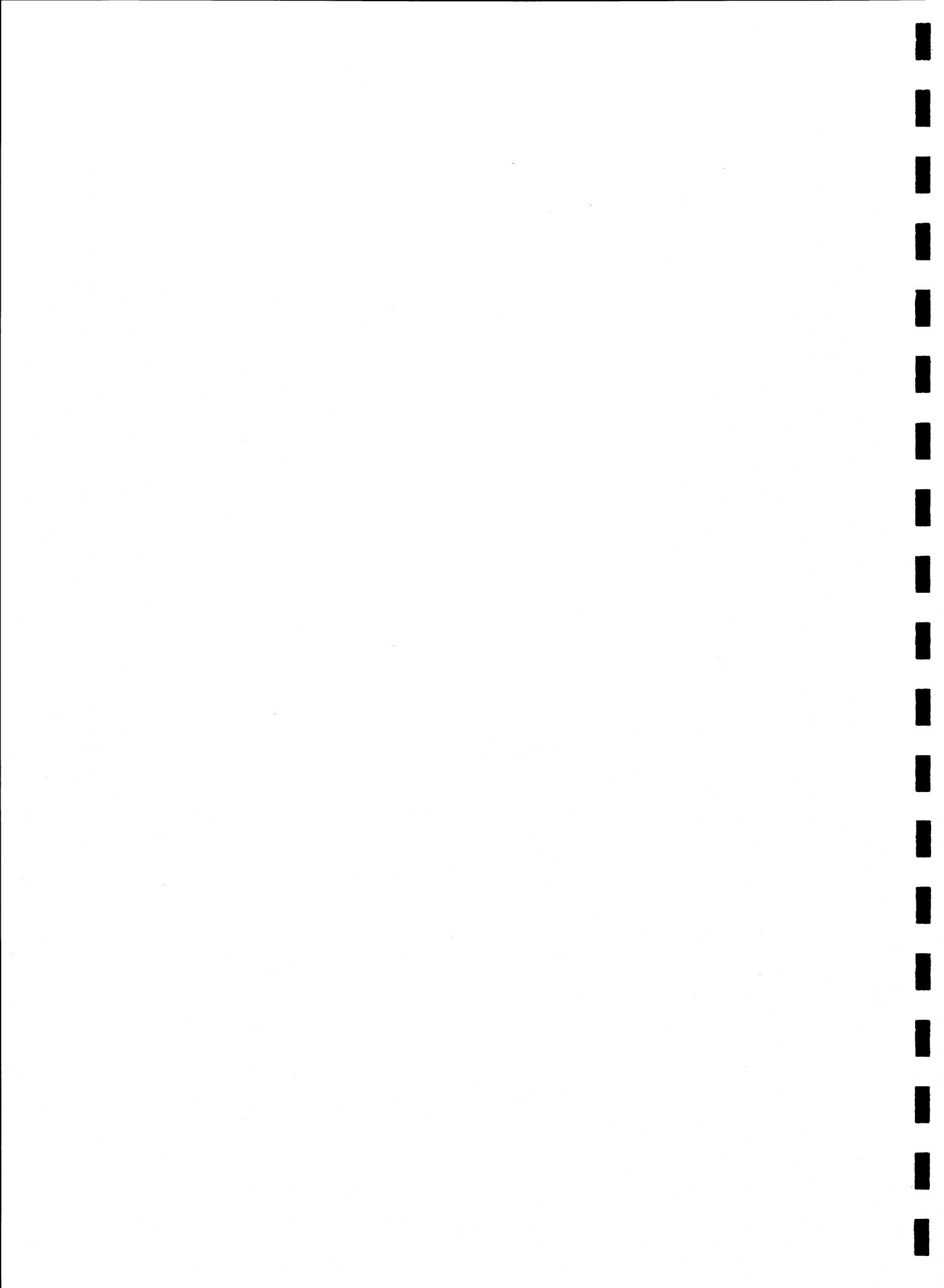


## **Appendix B**

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The following supplemental report is available upon request from BIO/WEST or Glen Canyon Environmental Studies.

Valdez, R.A., W.J. Masslich, and A. Wasowicz. 1995. Evaluation of Sampling Design. Supplement No. II: Life history and ecology of the humpback chub (Gila cypha) in the Colorado River, Grand Canyon Arizona. BIO/WEST, Inc. Logan, UT.

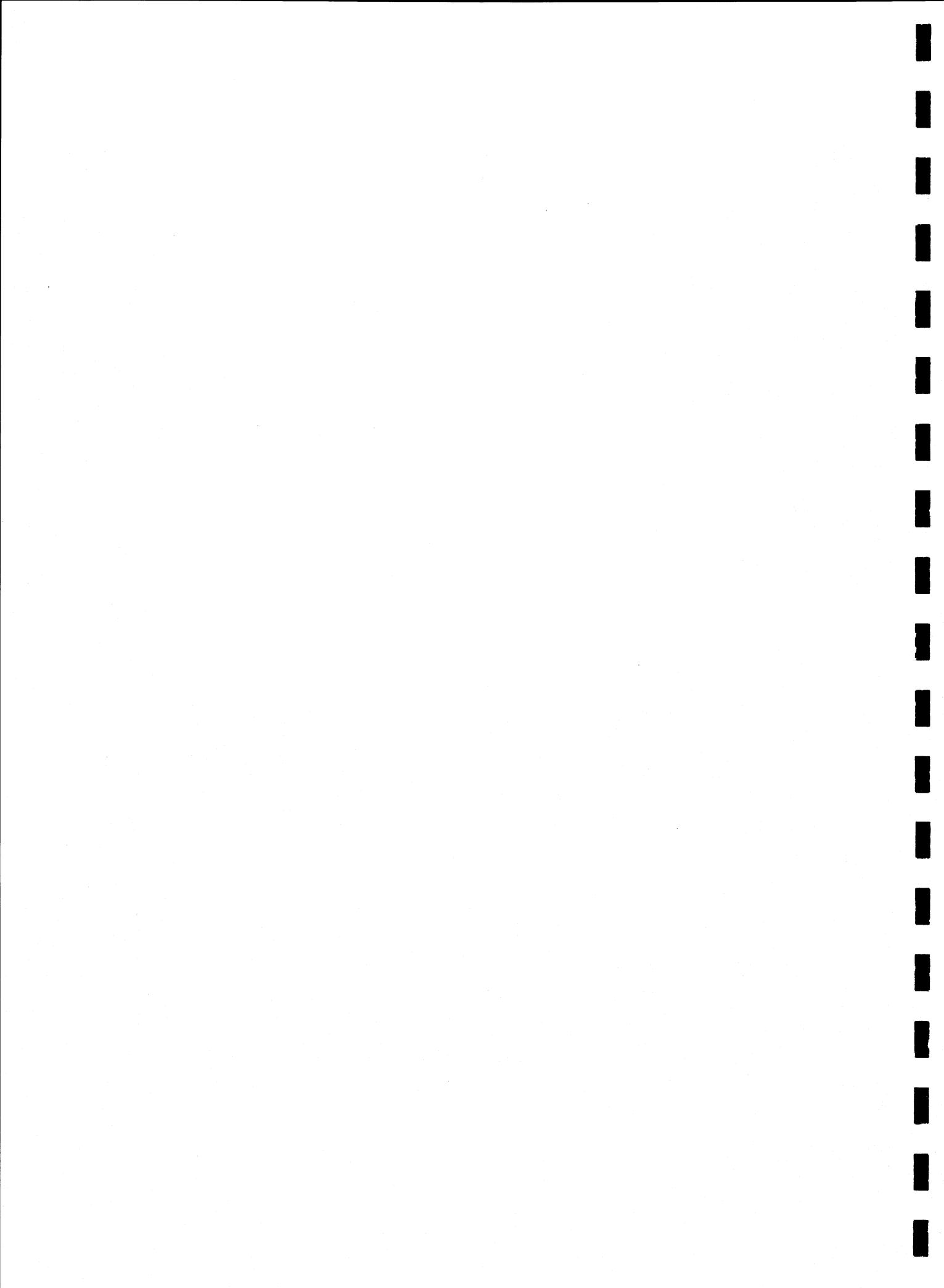


## **Appendix C**

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The following supplemental report is available upon request from BIO/WEST or Glen Canyon Environmental Studies.

Goodwin, C.N. 1995. Flow routing model: a simple method for estimating stream discharge on the Colorado River below Glen Canyon Dam. Supplement No. IV: Life history and ecology of the humpback chub (Gila cypha) in the Colorado River, Grand Canyon Arizona. BIO/WEST, Inc. Logan, UT.



## **Appendix D**

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**Table D-1. Water quality instruments used by BIO/WEST in the mainstem Colorado River by river mile and tributary and by month for 1991, 1992, and 1993. DS2 = DataSonde 2; SV2m = Surveyor 2, manually recorded; SV2L = Surveyor 2 electronically recorded; SV3m = Surveyor 3 (manually recorded); SV3L = Surveyor 3 electronically recorded; T = turbidity in NTU's. Tributaries: NK = Nankoweep, LC = Little Colorado River; CL - Clear Creek; BA = Bright Angel; CR = Crystal Creek; SH = Shinumo Creek; ST = Stone Creek; TP = Tapeats Creek, DC = Deer Creek; KN = Kanab Creek; HV = Havasu Creek.**

River Mile	Months										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
<b>Year 1991</b>											
29.5											SV2m
55.5										DS2	SV2m
57.3					DS2						
58.3							DS2				
58.4					DS2						
58.6								DS2			
58.8										DS2	
61.2	SV2m		DS2	DS2	DS2	DS2	DS2				DS2
61.3		DS2						DS2	SV2m		
61.6			DS2								
64.5				DS2	DS2	DS2					
64.7						DS2					
65.2								DS2			
65.4										DS2	
68.0										DS2	
69.5											SV2m
75.9								DS2			
81.1	SV2m										SV2m
83.8							DS2				
85.3		DS2									
87.1									DS2		SV2m
87.4					DS2						
98.0	SV2m										
108.3	SV2m		DS2		DS2				DS2		SV2m
108.4					DS2						
112.1					DS2						

Table D-1 continued

Table D-1 continued

River Mile	Months										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
LC 61.3			SV2m	DS2	SV2m	DS2	DS2	DS2	DS2	DS2	DS2
CL 84.1							DS2				
BA 87.7											SV2m
SH 108.6	SV2m					DS2			DS2		SV2m
ST 131.7	SV2m						DS2				
TP 133.7		SV2m	SV2m			DS2					SV2m
DC 136.3			SV2m	SV2m		DS2					
KN 143.5			SV2m	SV2m		DS2			DS2		SV2m
HV 156.7			SV2m	SV2m		DS2			DS2		SV2m
179.2							DS2				Lava Springs

## Year 1992

30.0		DS2 SV2L										
30.2			DS2 SV2L									
55.9		DS2 SV2L										
56.1											SV2m	
58.3				DS2 SV2L T				DS2 T	DS2	SV2L	DS2	SV2m
58.9		DS2 SV2L				DS2 SV2L T						
60.8									DS2			
61.1	DS2 SV2L	DS2 SV2L	DS2 SV2L T		DS2 SV2L T							
61.2				DS2 T			SV2m T	DS2 T				
61.3									DS2	SV2L	DS2	
64.6								DS2 T		SV2L		
65.4	DS2 SV2L		DS2 SV2L T		DS2 SV2L T						SV2m	

**Table D-1 continued**

Table D-1 continued

River Mile	Months										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
143.4					DS2 SV2L T			DS2			DS2 SV2L
145.2							DS2				
155.7			DS2 SV2L								DS2 SV2L
156.5					DS2 SV2L T						
158.6							DS2				
166.6	DS2 SV2L										
168.1								DS2			
174.2							DS2 T				
177.8	DS2 SV2L										
179.9					DS2 SV2L T						
182.4			DS2 SV2L								
184.6							DS2				
190.3					DS2 SV2L T						
196.5			DS2 SV2L								
198.5								DS2			
203.0							DS2 T				
208.8			DS2 SV2L T								
214.1	DS2 SV2L				DS2 SV2L T		DS2				DS2 SV2L
219.8	DS2 SV2L				DS2 SV2L T						



Table D-1 continued

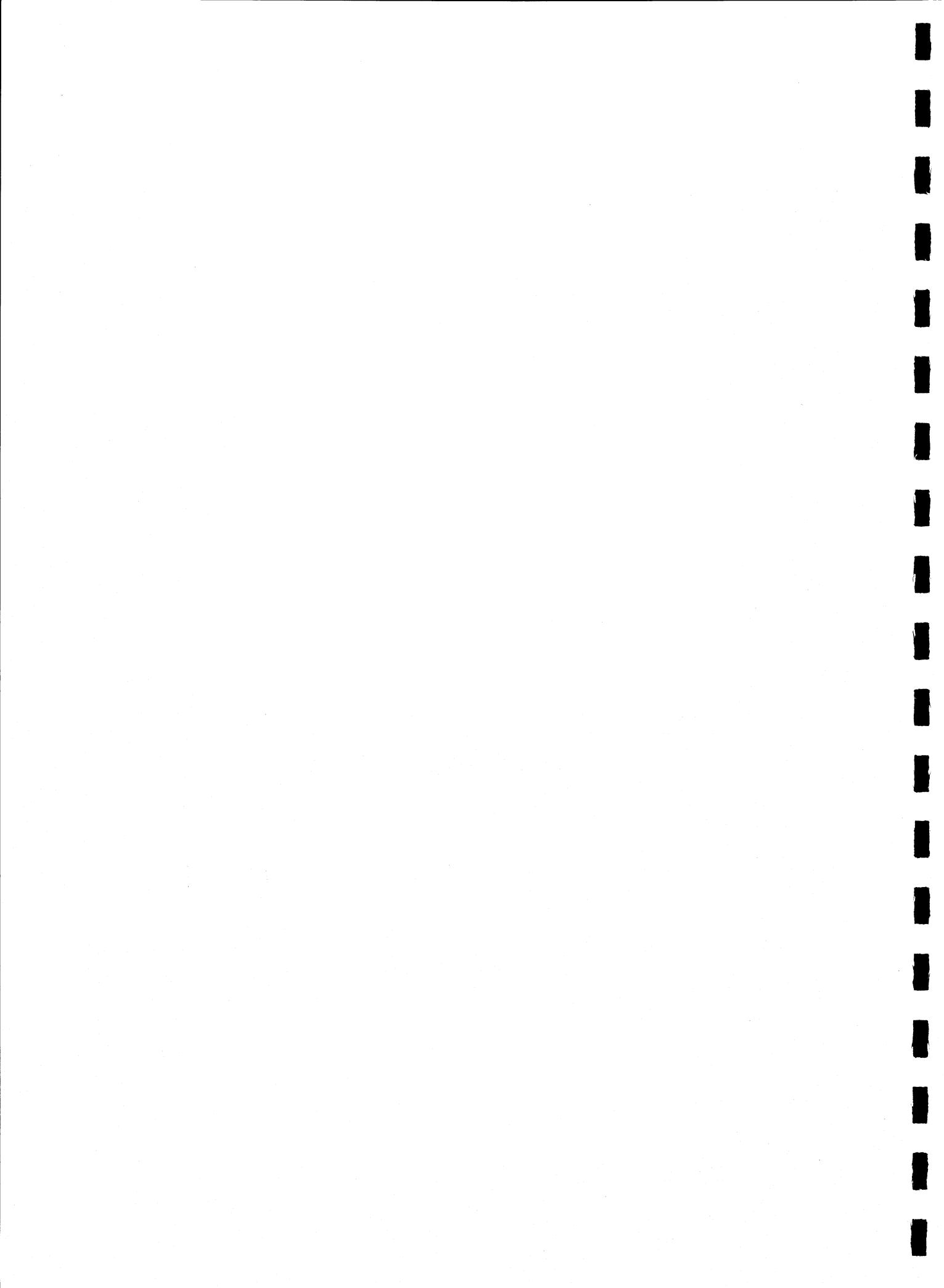
River Mile	Months										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
20.5			SV2m T								
30.0					DS2 T						
30.2			SV2L T								DS2 T
30.5			SV2m T	DS2 T			DS2 T		SV2L T		
31.5										SV2m T	
43.7						DS2 T					
51.5	SV2L T										
51.8									SV2L T		
58.3	SV2m T		SV2m T		DS2 T		DS2 T		SV2L T	SV2m T	DS2 T
61.1				DS2 T			DS2 T				
61.2	SV2m T	SV2L T	SV2m T			DS2 T			SV2L T		DS2 T
61.3					DS2 T			DS2 T			
62.8									SV2m T		
63.0								DS2 T			
65.4	SV2m T		SV2m T	DS2 T	DS2 T	DS2 T	DS2 T		SV2L T	SV2m T	DS2 T
67.8							DS2 T				
68.0								DS2 T			DS2 T
68.3									SV2L T	SV2m T	
71.0							DS2 T	DS2 T			
71.2										SV3 T	

Table D-1 continued

Table D-1 continued

River Mile	Months										
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
156.4									DS2	SV3	T
156.5					DS2 <sup>a</sup>		T				
164.9	SV2L	T									
172.8								DS2	SV3	T	
174.2										SV3	T
184.6					DS2 <sup>a</sup>		T				
219.9					DS2 <sup>a</sup>		T				
224.0										SV3	T
LC 61.3		DS2	DS2	DS2		DS2	DS2	DS2	DS2		DS2
CL 84.1					DS2						
BA 87.7			DS2		DS2				DS2		DS2
SH 108.6	SV2m		DS2		DS2				DS2		DS2
KN 143.5			DS2		DS2				DS2		DS2
HV 156.7			DS2		DS2				DS2		
RM 126.7							SV3m				
RM 183					MAN.						
					Temps						

<sup>a</sup>possible manually external data



## **Appendix E**

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Table E-1. Description of fish sample gear and numbers of humpback chub captured in the Colorado River in Grand Canyon, October 1990 - November 1993.

Sample Gear Code-Description	Total No. Samples	Total Effort	Number of Chub <sup>a</sup>				Gross CPE (no/hrs) <sup>b</sup>
			Y	J	A	T	
Gill Nets		(Hours)					(#/100 ft/100 hr)
GP - 100'x6'x1.5" gill net	1,321	2,751	0	1	143	144	5.2
GM - 100'x6'x2" gill net	932	1,945	0	0	65	65	3.3
GX - Experimental gill net, 100'	509	1,061	0	45	51	96	9.0
GZ - Experimental gill net, 60'	30	59	0	0	0	0	0
Trammel Nets							
TL - 75'x6'x1.5"x12" trammel net	3,235	6,774	0	2	586	588	11.6
TK - 75'x6'x1"x12" trammel net	3,229	6,734	0	33	553	586	11.6
TM - 50'x6'x1"x12" trammel net	747	1,550	0	12	107	119	15.4
TN - 50'x6'x1.5"x12" trammel net	767	1,599	0	0	119	119	14.9
TW - 75'x6'x0.5"x10" trammel net	22	43	0	0	0	0	0
TY - Floating TK	6	11	0	0	3	3	36.0
TZ - Floating TL	3	5	0	0	1	1	25.6
Hoop Nets							(#/100 hr)
HL - Large hoop net (4'x16'x1")	63	910	1	1	2	4	0.4
HM - Medium hoop net (3'x13'x1")	17	270	0	0	0	0	0
HS - Small hoop net (2'x10'x1½")	86	1,369	0	0	2	2	0.1
Minnow Traps							
MT - Commercial minnow trap	4,562	85,111	629	298	0	927	1.1
Electrofishing							(#/10 hr)
EL - 220-V DC	2,886	784	1,272	767	138	2,177	27.8
Seines		(m <sup>2</sup> )					(#/100m <sup>2</sup> ) <sup>c</sup>
SA - 10'x3'x1/8" seine	113	15,672	90	51	0	141	0.9
SB - 30'x4'x1/4" seine	83	10,562	135	42	2	179	1.7
SG - 30'x5'x0.25" seine	328	59,057	705	351	9	1,065	1.8
GF - Floated gill net	6	1,350	0	0	2	2	0.1
TF - Floated trammel net	2	22,500	0	0	0	0	0
Misc. qualitative seine hauls	83	-	33	35	5	73	-
Angling <sup>d</sup>							
AN - standard gear	2	-	0	0	2	2	-
AL - standard gear, lures	4	-	0	0	1	1	-
Total	19,036	-	2,865	1,638	1,791	6,294	

<sup>a</sup>Y = young-of-the-year, J = juvenile, A = adult, T = total.

<sup>b</sup>Gross catch-per-effort (CPE computed from total hour areas; all nets adjusted to 100 feet.)

<sup>c</sup>Seining CPE's exclude qualitative seine hauls.

<sup>d</sup>no effort recorded

**Table E-2. Description of fish sample gear and numbers of humpback chub captured in the Colorado River in Grand Canyon, 1990.**

Sample Gear Code-Description	Total No. Samples	Total Effort (Hours)	Number of Chub <sup>a</sup>				Gross CPE (no/hrs) <sup>b</sup>
			Y	J	A	T	
Gill Nets							(#/100 ft/100 hr)
GP - 100'x6'x1.5" gill net	82	194.9	0	0	28	28	14.4
GM - 100'x6'x2" gill net	74	176.0	0	0	3	3	1.7
GX - Experimental gill net, 100'	23	55.4	0	0	1	1	1.8
Trammel Nets							
TL - 75'x6'x1.5"x12" trammel net	104	249.8	0	0	31	31	16.5
TK - 75'x6'x1"x12" trammel net	99	232.6	0	0	26	26	14.9
Hoop Nets							(#/100 hr)
HL - Large hoop net (4'x16'x1")	10	130.4	0	0	0	0	0
HS - Small hoop net (2'x10'x1/2")	4	61.7	0	0	0	0	0
Electrofishing							(#/10 hr)
EL - 220-V DC	50	14.8	0	3	3	9	4.1
<b>TOTAL</b>	<b>446</b>		<b>0</b>	<b>3</b>	<b>92</b>	<b>95</b>	

<sup>a</sup>Y = young-of-the-year, J = juvenile, A = adult, T = total.

<sup>b</sup>Gross catch-per-effort (CPE computed from total hour areas; all nets adjusted to 100 feet.)

**Table E-3. Description of fish sample gear and numbers of humpback chub captured in the Colorado River in Grand Canyon, 1991.**

Sample Gear Code-Description	Total No. Samples	Total Effort	Number of Chub <sup>a</sup>				Gross CPE (no/hrs) <sup>b</sup>
			Y	J	A	T	
Gill Nets		(Hours)					(#/100 ft/100 hr)
GP - 100'x6'x1.5" gill net	641	1,304.4	0	1	74	75	5.7
GM - 100'x6'x2" gill net	430	876.0	0	0	21	21	2.4
GX - Experimental gill net, 100'	287	587.5	0	7	33	40	6.8
GZ - Experimental gill net, 60'	30	58.6	0	0	0	0	0
Trammel Nets							
TL - 75'x6'x1.5"x12" trammel net	1,285	2,637.9	0	0	241	241	12.2
TK - 75'x6'x1"x12" trammel net	1,191	2,435.2	0	7	101	108	5.9
Hoop Nets							(#/100 hr)
HL - Large hoop net (4'x16'x1")	26	337.0	0	0	2	2	0.6
HM - Medium hoop net (3'x13'x1")	16	245.9	0	0	0	0	0
HS - Small hoop net (2'x10'x1/2")	40	513.6	0	0	2	2	0.4
Minnow Traps							
MT - Commercial minnow trap	320	6,118.2	8	35	0	43	0.7
Electrofishing							(#/10 hr)
EL - 220-V DC	709	255.2	109	189	36	334	13.1
Seines		(m <sup>2</sup> )					(#/100m <sup>2</sup> ) <sup>c</sup>
SA - 10'x3'x1/8" seine	21	3,585.9	0	0	0	0	0
SB - 30'x4'x1/4" seine	1	120.0	0	0	0	0	0
TF - Floated trammel net	2	22,500.0	0	0	0	0	0
Misc. qualitative seine hauls	7		0	0	4	4	
<b>TOTAL</b>	<b>5,006</b>		<b>117</b>	<b>239</b>	<b>514</b>	<b>870</b>	

<sup>a</sup>Y = young-of-the-year, J = juvenile, A = adult, T = total.

<sup>b</sup>Gross catch-per-effort (CPE computed from total hour areas; all nets adjusted to 100 feet.)

<sup>c</sup>Seining CPE's exclude qualitative seine hauls.

**Table E-4. Description of fish sample gear and numbers of humpback chub captured in the Colorado River in Grand Canyon, 1992.**

Sample Gear Code-Description	Total No. Samples	Total Effort (Hours)	Number of Chub <sup>a</sup>				Gross CPE (no/hrs) <sup>b</sup>
			Y	J	A	T	
Gill Nets							(#/100 ft/100 hr)
GP - 100'x6'x1.5" gill net	431	897.1	0	0	29	29	3.2
GM - 100'x6'x2" gill net	252	540.8	0	0	25	25	4.6
GX - Experimental gill net, 100'	158	334.0	0	14	10	24	7.2
Trammel Nets							
TL - 75'x6'x1.5"x12" trammel net	823	1,739.6	0	1	128	129	9.9
TK - 75'x6'x1"x12" trammel net	763	1,599.6	0	9	126	135	11.3
TM - 50'x6'x1"x12" trammel net	328	669.0	0	2	35	37	11.1
TN - 50'x6'x1.5"x12" trammel net	339	697.0	0	0	20	20	5.7
TW - 75'x6'x0.5"x10" trammel net	10	19.0	0	0	0	0	0
Hoop Nets							(#/100 hr)
HL - Large hoop net (4'x16'x1")	15	314.4	0	0	0	0	0
HM - Medium hoop net (3'x13'x1")	1	23.6	0	0	0	0	0
HS - Small hoop net (2'x10'x1/2")	19	347.8	0	0	0	0	0
Minnow Traps							
MT - Commercial minnow trap	813	20,481.6	29	48	0	77	0.4
Electrofishing							(#/10 hr)
EL - 220-V DC	931	269.7	75	342	41	458	17.0
Seines							(#/100m <sup>2</sup> ) <sup>c</sup>
SA - 10'x3'x1/8" seine	36	8,165.5	0	19	0	19	0.2
SB - 30'x4'x1/4" seine	22	3,159.0	0	34	2	36	1.1
SG - 30'x5'x0.25" seine	53	11,975.5	16	58	0	74	0.6
GF - Floated gill net	6	1,350.0	0	0	2	2	0.2
Misc. qualitative seine hauls	25		0	0	0	0	
Angling							(#/10 hr)
AN - standard gear	2	1.7	0	0	2	2	11.8
AL - standard gear, lures	4		0	0	1	1	
<b>TOTAL</b>	<b>5,031</b>		<b>120</b>	<b>527</b>	<b>421</b>	<b>1,068</b>	

<sup>a</sup>Y = young-of-the-year, J = juvenile, A = adult, T = total.

<sup>b</sup>Gross catch-per-effort (CPE computed from total hour areas; all nets adjusted to 100 feet.)

<sup>c</sup>Seining CPE's exclude qualitative seine hauls.

Table E-5. Description of fish sample gear and numbers of humpback chub captured in the Colorado River in Grand Canyon, 1993.

Sample Gear Code-Description	Total No. Samples	Total Effort	Number of Chub <sup>a</sup>				Gross CPE (no/hrs) <sup>b</sup>
			Y	J	A	T	
Gill Nets		(Hours)					(#/100 ft/100 hr)
GP - 100'x6'x1.5" gill net	167	354.8	0	0	12	12	3.4
GM - 100'x6'x2" gill net	176	352.3	0	0	16	16	4.5
GX - Experimental gill net, 100'	41	83.7	0	24	7	31	37.0
Trammel Nets							
TL - 75'x6'x1.5"x12" trammel net	1,022	2,146.5	0	1	186	187	11.6
TK - 75'x6'x1"x12" trammel net	1,176	2,466.4	0	18	299	317	17.1
TM - 50'x6'x1"x12" trammel net	419	881.3	0	10	72	82	18.6
TN - 50'x6'x1.5"x12" trammel net	428	902.4	0	0	99	99	21.9
TW - 75'x6'x0.5"x10" trammel net	12	24.2	0	0	0	0	0
TY - Floating TK	6	11.1	0	0	3	3	36.0
TZ - Floating TL	3	5.2	0	0	1	1	25.6
Hoop Nets							(#/100 hr)
HL - Large hoop net (4'x16'x1")	12	258.8	1	1	0	2	0.8
HS - Small hoop net (2'x10'x1½")	23	445.8	0	0	0	0	0
Minnow Traps							
MT - Commercial minnow trap	3,428	53,950.5	610	198	0	808	1.5
Electrofishing							(#/10 hr)
EL - 220-V DC	1,193	244.0	1,101	218	57	1,376	56.4
Seines		(m <sup>2</sup> )					(#/100m <sup>2</sup> ) <sup>c</sup>
SA - 10'x3'x1/8" seine	56	3,921.0	90	32	0	122	3.1
SB - 30'x4'x1/4" seine	59	7,282.5	135	8	0	143	2.0
SG - 30'x5'x0.25" seine	275	47,081.5	689	293	9	991	2.1
Misc. qualitative seine hauls	51		58	11	0	69	
<b>TOTAL</b>	<b>8,547</b>		<b>2,684</b>	<b>814</b>	<b>761</b>	<b>4,259</b>	

<sup>a</sup>Y = young-of-the-year, J = juvenile, A = adult, T = total.

<sup>b</sup>Gross catch-per-effort (CPE computed from total hour areas; all nets adjusted to 100 feet.)

<sup>c</sup>Seining CPE's exclude qualitative seine hauls.

**Table E-6. Arithmetic mean catch rate (Amcpe) of adult, juvenile and YOY humpback chub by gear in the Colorado River in Grand Canyon, October 1990 - November 1993.**

Table E-6 continued

Table E-6 continued

GEAR*	Total samples (Total time - hr)			AMcpe (number of fish)											
	REGION			Adult HB REGION			Juvenile HB REGION			REGION					
	0	1	2	3	0	1	2	3	0	1	2	3			
<b>ELECTROFISHING*</b>															
EL	217 (40.8)	1319 (308.5)	909 (293.4)	441 (141.0)	0.43 (2)	5.8 (125)	0.5 (9)	0.1 (1)	0 (1)	24.9 (742)	0.4 (11)	0 (742)	55.1 (1283)	0.1 (3)	0 (3)
<b>ANGLING†</b>															
AL	-	-	-	-	-	-	-	-	-	-	-	-			
AN	-	-	-	-	-	-	-	-	-	-	-	-			

\*See Table 5-8 of the Final Report for gear codes.

†CPE = fish/100 ft/100 hr

‡CPE = fish/100 hr

§CPE = fish/100 m<sup>2</sup>

\*CPE = fish/10 hr

†no effort recorded

Table E-7. Number (percentage) of adults captured in gill and trammel nets by trip in all study regions of the Colorado River in Grand Canyon, October 1990 - November 1993.

Trip	F/S*	BH <sup>b</sup>	BK	BR	CC	CP	FM	FR	FV	HB	RB	SB	SD	WE
90-01	83/80		6 (7.2)		1 (1.2)	8 (9.6)				43 (51.8)		25 (30.1)		
90-02	228/302	4 (1.8)	1 (0.4)	8 (3.5)	7 (3.1)	7 (3.1)	36 (15.8)	1 (0.4)		46 (20.2)		118 (51.8)		
91-01	309/554	5 (1.6)		3 (1.0)	6 (1.9)	7 (2.3)	42 (13.6)			78 (25.2)		168 (54.4)		
91-02	21/4					14 (66.7)				3 (14.3)		4 (19.1)		
91-03	491/692	46 (9.4)		12 (2.4)	3 (0.6)	24 (4.9)	81 (16.5)			125 (25.5)		200 (40.7)		
91-04	37/13	1 (2.7)			4 (10.8)	1 (2.7)	16 (43.2)			6 (16.2)		9 (24.3)		
91-05	496/682	25 (5.0)		12 (2.4)	4 (0.8)	25 (5.0)	202 (40.7)	2 (0.4)	1 (0.2)	30 (6.1)		191 (38.5)	4 (0.8)	
91-06	96/69	2 (0.1)			2 (2.1)	34 (35.4)				31 (32.3)		27 (28.1)		
91-07	404/597	6 (1.5)		5 (1.2)	19 (4.7)	25 (6.2)	99 (24.5)			74 (18.3)		6 (41.8)		
91-09	338/695	9 (2.7)		34 (10.1)	11 (3.3)	40 (11.8)	60 (17.8)		1 (0.3)	87 (25.7)		96 (28.4)		
91-11	236/560	4 (1.7)		10 (4.2)	4 (1.7)	13 (5.5)	41 (17.4)			2 (0.9)		36 (15.3)		
92-01	150/475	4 (2.7)		2 (1.3)	4 (2.7)	12 (8.0)	24 (16.0)			23 (15.3)		81 (54.0)		
92-02	16/4	1 (6.3)				7 (43.8)				6 (37.5)		2 (12.5)		
92-03	371/530	32 (8.6)		15 (4.0)	4 (1.1)	25 (6.7)	100 (27.0)		5 (1.4)	40 (10.8)		150 (40.4)		

Table E-7. continued

Trip	F/S*	BH <sup>b</sup>	BK	BR	CC	CP	FM	FR	FV	HB	RB	SB	SD	WE
92-04	75/35	10 (13.3)					24 (32.0)		1 (1.3)	38 (50.7)		2 (2.7)		
92-05	353/600	16 (4.5)	24 (6.8)	7 (2.0)	38 (10.8)	136 (38.5)	1 (0.3)		49 (13.9)	81 (23.0)	1 (0.3)			
92-06	67/37	2 (3.0)		1 (1.5)		19 (28.4)			37 (55.2)	8 (11.9)				
92-07	239/495	3 (1.3)	17 (7.1)	1 (0.4)	45 (18.8)	45 (18.8)			79 (33.1)	48 (20.1)	1 (0.4)			
92-09	214/508	6 (2.8)	14 (6.5)	2 (0.9)	17 (7.9)	67 (31.3)			47 (22.0)	61 (28.5)				
92-11	231/420	4 (1.7)	2 (0.9)	1 (0.4)	27 (11.7)	43 (18.6)	1 (0.4)	1 (0.4)	1 (0.4)	54 (23.4)	98 (42.4)			
93-01	267/343	3 (1.1)	1 (0.4)	2 (0.8)	1 (0.4)	35 (13.1)			94 (35.2)	130 (48.7)	1 (0.4)			
93-02	248/205	5 (2.0)			1 (0.4)	21 (8.5)			73 (29.4)	148 (59.7)				
93-03	389/466	26 (6.7)	38 (9.8)	2 (0.5)	16 (4.1)	38 (9.8)			55 (14.1)	214 (55.0)				
93-04	167/282	4 (2.4)	1 (0.6)	1 (0.6)	3 (1.8)	31 (18.6)			42 (25.2)	85 (50.9)				
93-05	402/595	16 (4.0)	17 (4.2)	3 (0.8)	34 (8.5)	159 (39.6)		1 (0.3)	91 (22.6)	81 (20.2)				
93-06	143/169	4 (2.8)			2 (1.4)	36 (25.2)			67 (46.9)	33 (23.1)	1 (0.7)			
93-07	248/475	13 (5.2)	15 (6.1)	7 (2.8)	11 (4.4)	67 (27.0)			79 (31.9)	48 (19.4)	8 (3.2)			
93-08	134/129	3 (2.2)	3 (2.2)	1 (0.8)	2 (1.5)	21 (15.7)		1 (0.8)	37 (27.6)	66 (49.3)				

Table E-7. continued

Trip	F/S <sup>a</sup>	BH <sup>b</sup>	BK	BR	CC	CP	FM	FR	FV	HB	RB	SB	SD	WE
93-09	341/529	28 (8.2)	22 (6.5)	2 (0.6)	25 (7.3)	92 (27.0)				79 (23.2)	93 (27.3)			
93-10	230/109	4 (1.7)	2 (0.9)		3 (1.3)	35 (15.2)				44 (19.1)	142 (61.7)			
93-11	143/149	5 (3.5)	5 (3.5)	1 (0.7)	6 (4.2)	56 (39.2)				34 (23.8)	36 (25.2)			
<b>Total</b>	<b>7167</b>	<b>291</b>	<b>1</b>	<b>268</b>	<b>97</b>	<b>413</b>	<b>1689</b>	<b>5</b>	<b>13</b>	<b>1627</b>	<b>2740</b>	<b>21</b>	<b>1</b>	<b>1</b>

<sup>a</sup>F = total number of fish, S = total number of samples or net sets.<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

**Table E-8. Number (percentage) of adults captured by gill and trammel net by trip in Region 0, of the Colorado River in Grand Canyon, October 1990 - November 1993.**

Trip	F/S*	BH <sup>b</sup>	BK	BR	CC	CP	FM	FV	HB	RB	SB	SD	FH	PK
92-03	58/20							3 (5.2)					55 (94.8)	
93-01	66/58												66 (100.0)	
93-02	123/85						1 (0.8)						122 (99.2)	
93-03	124/63							1 (0.8)					122 (98.4)	
93-04	70/78						2 (2.9)	8 (11.4)					4 (5.7)	56 (80.0)
93-05	35/39							3 (8.6)			1 (2.9)		31 (88.6)	
93-06	22/27												22 (100.0)	
93-07	25/35							2 (8.0)					23 (92.0)	
93-08	40/21												40 (100.0)	
93-09	58/57								3 (5.2)				7 (12.1)	48 (82.8)
93-10	108/39		1 (1.0)					2 (1.9)	2 (1.9)				7 (6.5)	96 (88.9)
93-11	22/8		1 (4.5)										4 (18.2)	17 (77.3)
<b>Total</b>		<b>2</b>						<b>7</b>	<b>20</b>		<b>24</b>		<b>698</b>	

\*F = total number of fish, S = total number of samples or net sets.

<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

Table E-9. Number (percentage) of adults captured in gill and trammel nets by trip in Region I, of the Colorado River in Grand Canyon, October 1990 - November 1993.

Trip	F/S*	BH <sup>b</sup>	BK	BR	CC	CP	FM	FR	FV	HB	RB	SD
90-01	83/80		6 (7.2)		1 (1.2)	8 (9.6)				43 (51.8)	25 (30.1)	
90-02	142/85	1 (0.7)	1 (0.7)	5 (3.5)	1 (0.7)	12 (8.5)	1 (0.7)			41 (28.9)	80 (56.3)	
91-01	216/157	2 (0.9)			2 (0.9)	1 (0.5)	37 (17.1)			73 (33.8)	101 (46.8)	
91-02	21/4						14 (66.7)			3 (14.3)	4 (19.1)	
91-03	318/163	25 (7.9)	1 (0.3)	1 (0.3)	1 (0.3)	26 (8.2)				121 (38.1)	144 (45.3)	
91-04	37/13	1 (2.7)			4 (10.8)	1 (2.7)	16 (43.2)			6 (16.2)	9 (24.3)	
91-05	304/219	8 (2.6)			1 (0.3)	2 (0.7)	100 (32.9)	2 (0.7)	1 (0.3)	25 (8.2)	165 (54.3)	
91-06	96/67	2 (2.1)				2 (2.1)	34 (35.4)		31 (32.3)	27 (28.1)		
91-07	292/120		1 (0.3)		3 (1.0)	89 (30.5)				66 (22.6)	133 (45.5)	
91-09	208/214	4 (1.9)		7 (3.4)		2 (1.1)	31 (14.9)			80 (38.5)	84 (40.4)	
91-11	187/159	2 (1.1)			1 (0.5)	2 (1.1)	33 (17.7)		1 (0.5)	36 (19.3)	112 (59.9)	
92-01	116/162	2 (1.7)			1 (0.9)	1 (0.9)	17 (14.7)			23 (19.8)	72 (62.1)	
92-02	16/4	1 (6.3)					7 (43.8)			6 (37.5)	2 (12.5)	
92-03	151/127	5 (3.3)		1 (0.7)		40 (26.5)				40 (26.5)	65 (43.1)	

Table E-9. continued

Trip	F/S*	BH <sup>b</sup>	BK	BR	CC	CP	FM	FR	FV	HB	RB	SD
92-04	75/35	10 (13.3)					24 (32.0)		1 (1.3)	38 (50.7)	2 (2.7)	
92-05	142/148	3 (2.1)	1 (0.7)	1 (0.7)	2 (1.4)	44 (31.0)			39 (27.5)	52 (36.6)		
92-06	67/37	2 (3.0)		1 (1.5)		19 (28.4)			37 (55.2)	8 (11.9)		
92-07	100/123	1 (1.0)	1 (1.0)			25 (25.0)			49 (49.0)	24 (24.0)		
92-09	134/131	2 (1.5)	2 (1.5)	1 (0.8)		43 (32.1)			38 (28.4)	48 (35.8)		
92-11	176/155	1 (0.6)	1 (0.6)	1 (0.6)		26 (14.8)	1 (0.6)		50 (28.4)	96 (54.6)		
93-01	194/192	2 (1.0)	1 (0.5)	1 (0.5)		31 (16.0)			94 (48.5)	1 (33.0)	1 (0.5)	
93-02	119/78	5 (4.2)				20 (16.8)			68 (57.1)	26 (21.9)		
93-03	158/156	16 (10.1)	1 (0.6)		1 (0.6)	13 (8.2)			44 (27.9)	83 (52.5)		
93-04	79/133	4 (5.1)		1 (1.3)		22 (27.9)			25 (31.7)	27 (34.2)		
93-05	135/117	2 (1.5)		1 (0.7)	2 (1.5)	28 (20.7)		1 (0.7)	70 (51.9)	31 (23.0)		
93-06	92/77	3 (3.3)				18 (19.6)			62 (67.4)	9 (9.8)		
93-07	121/147	9 (7.4)	1 (0.8)			26 (21.5)			65 (53.7)	20 (16.5)		
93-08	94/108	3 (3.2)	3 (3.2)	1 (1.1)	2 (2.1)	21 (22.3)		1 (1.1)	37 (39.4)	26 (27.7)		

Table E-9, continued

Trip	F/S <sup>a</sup>	BH <sup>b</sup>	BK	BR	CC	CP	FM	FR	FV	HB	RB	SD
93-09	116/134	8 (6.9)	1 (0.9)	1 (0.9)	1 (0.9)	1 (0.9)	17 (14.7)			49 (42.2)	39 (33.6)	
93-10	122/70	3 (2.5)	2 (1.6)		1 (0.8)		33 (27.1)			37 (30.3)	46 (37.7)	
93-11	71/29	3 (4.2)	1 (1.4)	1 (1.4)			25 (35.2)			25 (35.2)	16 (22.5)	
<b>Total</b>	<b>4182</b>	<b>130</b>	<b>1</b>	<b>36</b>	<b>21</b>	<b>25</b>	<b>899</b>	<b>4</b>	<b>36</b>	<b>1417</b>	<b>1613</b>	<b>1</b>

<sup>a</sup>F = total number of fish, S = total number of samples or net sets.<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

Table E-10. Number (percentage) of adults captured in gill and trammel nets by trip in Region II, of the Colorado River in Grand Canyon, October 1990 - November 1993.

Trip	F/S*	BH <sup>b</sup>	BR	CC	CP	FM	FR	FW	HB	RB	SB
90-02	51/102	2 (3.9)	3 (5.9)	2 (3.9)		13 (25.5)			1 (2.0)	30 (58.8)	
91-01	68/179	1 (1.5)	3 (4.4)		4 (5.9)	1 (1.5)			4 (5.9)	55 (80.9)	
91-03	83/340	4 (4.82)	11 (13.3)		11 (13.3)	17 (20.5)			1 (1.2)	39 (47.0)	
91-05	160/283	14 (8.8)	12 (7.5)		12 (7.5)	92 (57.5)			4 (2.5)	26 (16.3)	
91-07	68/271	6 (8.8)	5 (7.4)		6 (8.8)	7 (10.3)			8 (11.8)	35 (51.5)	
91-09	82/245	4 (4.9)	27 (32.9)		19 (23.2)	16 (19.5)			7 (8.5)	9 (11.0)	1 (1.5)
91-11	37/251	2 (5.4)	10 (27.0)		5 (13.5)	6 (16.2)			14 (37.8)		
92-01	16/156	2 (12.5)			3 (18.8)	2 (12.5)			9 (56.3)		
92-03	68/165	7 (10.3)	12 (19.1)		8 (11.8)	11 (16.2)			29 (42.7)		
92-05	148/309	13 (8.8)	23 (15.5)		13 (8.8)	61 (41.2)	1 (0.7)		8 (5.4)	29 (19.6)	
92-07	86/231	1 (1.2)	16 (18.6)		11 (12.8)	7 (8.1)			30 (34.9)	21 (24.4)	
92-09	70/223	3 (4.3)	13 (17.1)		10 (14.3)	23 (32.9)			9 (12.9)	13 (18.6)	
92-11	46/235	3 (6.5)	1 (2.2)		18 (39.1)	17 (37.0)	1 (2.2)		4 (8.7)	2 (4.4)	
93-01	5/68				1 (20.0)	4 (80.0)					

Table E-10. continued

Trip	F/S <sup>a</sup>	BH <sup>b</sup>	BR	CC	CP	FM	FR	FV	HB	RB	SB
93-02	7/42			1 (14.3)					5 (71.4)		1 (14.3)
93-03	101/226	10 (9.9)	37 (36.6)		13 (12.9)	22 (21.8)			10 (9.9)	9 (8.9)	
93-04	18/71		1 (5.6)		1 (5.6)	1 (5.6)			13 (72.2)	2 (11.1)	
93-05	212/344	14 (6.6)	17 (8.0)		18 (8.5)	124 (58.5)			20 (9.4)	19 (9.0)	
93-06	30/65	1 (3.3)			2 (6.7)	18 (60.0)			5 (16.7)	3 (10.0)	1 (3.3)
93-07	80/237	3 (3.8)	14 (17.5)		6 (7.5)	32 (40.0)			14 (17.5)	5 (6.3)	6 (7.5)
93-09	146/300	18 (12.3)	21 (14.4)	1 (0.7)	11 (7.5)	66 (45.2)			23 (15.8)	6 (4.1)	
93-11	50/112	1 (2.0)	4 (8.0)		6 (12.0)	31 (62.0)			5 (10.0)	3 (6.0)	
<b>Total</b>	<b>1632</b>	<b>107</b>	<b>232</b>	<b>3</b>	<b>179</b>	<b>571</b>	<b>1</b>	<b>1</b>	<b>171</b>	<b>359</b>	<b>8</b>

<sup>a</sup>F = total number of fish, S = total number of samples or net sets.<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

**Table E-11. Number (percentage) of adults captured in gill and trammel nets by trip in Region III, of the Colorado River in Grand Canyon, October 1990 - November 1993.**

Trip	F/S <sup>a</sup>	BH <sup>b</sup>	BR	CC	CP	FM	FV	HB	RB	SB	WE
90-02	35/115	1 (2.9)	5 (14.3)	6 (17.1)	11 (31.4)	4 (11.4)	8 (22.9)				
91-01	25/218	2 (8.0)	4 (16.0)	2 (8.0)	4 (16.0)	1 (4.0)	12 (48.0)				
91-03	90/189	17 (18.9)	2 (2.2)	13 (14.4)	38 (42.2)	3 (3.3)	17 (18.9)				
91-05	32/180	3 (9.4)	3 (9.4)	11 (34.4)	10 (31.3)	1 (3.1)	4 (12.5)				
91-07	44/206		18 (40.9)	16 (36.4)	3 (6.8)	1 (2.3)	5 (11.4)				
91-09	48/236	1 (2.1)	11 (22.9)	19 (39.6)	13 (27.1)	1 (2.1)	3 (6.3)				
91-11	12/150		3 (25.0)	6 (50.0)	2 (16.7)	1 (8.3)					
92-01	18/157	2 (11.1)	3 (16.7)	8 (44.4)	5 (27.8)						
92-03	94/218	20 (21.3)	1 (1.1)	4 (4.3)	14 (14.9)	49 (52.1)	5 (5.3)	1 (1.1)	1 (1.6)		
92-05	63/143		6 (9.5)	23 (36.5)	31 (49.2)		2 (3.2)				
92-07	53/141	1 (1.9)	1 (1.9)	34 (64.2)	13 (24.5)				3 (5.7)	1 (1.9)	
92-09	10/154	1 (10.0)	1 (10.0)	7 (70.0)	1 (10.0)						
92-11	9/30			9 (100.0)							
93-01	2/25	1 (50.0)		1 (50.0)							

Table E-11. continued

Trip	F/S <sup>a</sup>	BH <sup>b</sup>	BR	CC	CP	FM	FV	HB	RB	SB	WE
93-03	6/21			2 (33.3)		2 (33.3)		2 (33.4)			
93-05	20/95			2 (10.0)	14 (70.0)	14 (70.0)		4 (20.0)			
93-07	22/56	1 (4.6)		7 (31.8)	5 (22.7)	5 (22.7)		7 (31.8)			
93-09	21/38	2 (9.5)			13 (61.9)	13 (61.9)		6 (28.6)			
<b>Total</b>	<b>604</b>	<b>52</b>	<b>1</b>	<b>73</b>	<b>202</b>	<b>199</b>	<b>7</b>	<b>11</b>	<b>45</b>	<b>13</b>	<b>1</b>

<sup>a</sup>F = total number of fish, S = total number of samples or net sets.<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

**Table E-12.** Number (percentage) of subadults captured by seining by trip in all study regions, of the Colorado River In Grand Canyon, October 1990 - November 1993.

Table E-12. continued

Trip	F/S <sup>a</sup>	BH <sup>b</sup>	BR	CC	CP	FH	FM	HB	PK	RB	SD	SU
93-04	33/41	6 (18.2)					2 (6.1)	25 (75.8)				3 (1.3)
93-05	228/39	59 (25.9)				5 (2.2)	47 (20.6)	27 (11.8)			87 (38.2)	
93-07	140/43	18 (12.9)					80 (57.1)	40 (28.6)			1 (0.7)	1 (0.7)
93-08	322/26	59 (18.3)			2 (0.6)		15 (4.7)	241 (74.8)			5 (1.6)	
93-09	613/84	43 (7.0)	1 (0.2)	1 (0.2)		4 (0.7)	15 (2.4)	540 (88.1)			8 (1.3)	1 (0.2)
93-10	355/31	12 (3.4)				1 (0.3)	64 (18.0)	276 (77.7)			2 (0.6)	
93-11	45/55	16 (35.6)				1 (2.2)	6 (13.3)	22 (48.9)				
<b>Total</b>	<b>2,219</b>	<b>241</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>30</b>	<b>339</b>	<b>1,443</b>	<b>1</b>	<b>68</b>	<b>91</b>	<b>28</b>

<sup>a</sup>F = total number of fish, S = total number of samples or net sets.<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

**Table E-13. Number (percentage) of subadults captured by seining by trip In Region 0, of the Colorado River In Grand Canyon, October 1990 -November 1993.**

Trip	F/S <sup>a</sup>	RB
93-01	6/13	6 (100.0)
93-02	0/3	
93-04	0/3	
<b>Total</b>	<b>6</b>	<b>6</b>

<sup>a</sup>F = total number of fish, S = total number of samples or net sets.

<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

Table E-14. Number (percentage) of subadults captured by seining by trip in Region I, of the Colorado River in Grand Canyon, October 1990 - November 1993.

Trip	F/S <sup>a</sup>	BH <sup>b</sup>	CC	CP	FH	FM	HB	RB	SD	SU
91-04	1/5									1 (100.0)
91-09	0/1									
92-05	25/19	5 (20.0)				6 (24.0)	14 (56.0)			
92-07	9/7					1 (11.1)	8 (88.9)			
92-08	30/13				4 (13.3)	4 (13.3)	26 (86.7)			
92-09	9/24				1 (11.1)	1 (11.1)	8 (88.9)			
92-10	0/2									
92-11	82/39	8 (4.8)				8 (9.8)	66 (80.4)			
93-01	131/45		1 (0.8)		8 (6.1)	1 (0.8)	119 (90.8)	2 (1.5)		
93-02	13/14						12 (72.3)	1 (7.7)		
93-03	16/25				1 (6.3)		14 (87.5)	1 (6.3)		
93-04	33/38	6 (18.2)				2 (6.1)	25 (75.8)			
93-05	25/25						25 (100.0)			
93-07	136/34	15 (11.0)					79 (58.1)	40 (29.4)	1 (0.7)	1 (0.7)
93-08	322/26	59 (18.3)			2 (0.6)		15 (4.7)	241 (74.8)	5 (1.6)	

Table E-14. continued

Trip	F <sup>a</sup> S <sup>a</sup>	BH <sup>b</sup>	CC	CP	FH	FM	HB	RB	SD	SU
93-09	559/33	35 (6.3)	1 (0.2)			10 (1.8)	510 (91.2)	3 (0.5)		
93-10	355/31	12 (3.4)		1 (0.3)	64 (18.0)	64 (18.0)	276 (77.7)	2 (0.6)		
93-11	45/55	16 (35.6)		1 (2.2)	6 (13.3)	6 (13.3)	22 (48.9)			
<b>Total</b>	<b>1,791</b>	<b>156</b>	<b>3</b>	<b>2</b>	<b>10</b>	<b>197</b>	<b>1,406</b>	<b>14</b>	<b>2</b>	<b>1</b>

<sup>a</sup>F = total number of fish, S = total number of samples or net sets.<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

Table E-15. Number (percentage) of subadults captured by seining by trip in Region II, of the Colorado River in Grand Canyon, October 1990 -November 1993.

Trip	F/S*	BH <sup>b</sup>	BR	FH	FM	HB	RB	SD	SU
91-03	0/6								
91-05	32/1								
91-07	0/1								
92-03	1/5	1 (100.0)							
92-05	45/5								
92-07	17/6	1 (5.9)							
92-09	4/5		2 (50.0)						
92-11	0/3								
93-01	7/20								
93-07	4/9		3 (15.0)						
93-09	50/48	7 (14.0)	1 (2.0)	3 (6.0)	3 (6.0)	30 (60.0)	30 (60.0)	5 (10.0)	1 (2.0)
<b>Total</b>	<b>160</b>	<b>12</b>	<b>3</b>	<b>3</b>	<b>42</b>	<b>35</b>	<b>47</b>	<b>2</b>	<b>16</b>

\*F = total number of fish, S = total number of samples or net sets.

<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

**Table E-16. Number (percentage) of subadults captured by seining by trip In Region III, of the Colorado River In Grand Canyon, October 1990 -November 1993.**

Trip	F/S <sup>a</sup>	BH <sup>b</sup>	FH	FM	HB	PK	RB	SD	SU
91-03	6/14	3 (50.0)			3 (50.0)				
92-03	28/6	5 (17.9)			17 (60.7)		1 (3.6)		5 (17.9)
92-05	18/6	2 (11.1)	11 (61.1)	2 (11.1)	29 (90.6)				3 (16.7)
92-07	32/1	3 (9.4)							
92-09	1/1					1 (100.0)			
93-01	0/3								
93-05	203/14	59 (29.1)	5 (2.5)	47 (23.2)	2 (1.0)			87 (42.9)	3 (1.5)
93-09	4/3	1 (25.0)	1 (25.0)	1 (50.0)	2 (50.0)				
<b>Total</b>	<b>292</b>	<b>73</b>	<b>17</b>	<b>100</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>87</b>	<b>11</b>

<sup>a</sup>F = total number of fish, S = total number of samples or net sets.

<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

**Table E-17. Number (percentage) of subadults captured by seining by trip in all regions combined, of the Colorado River in Grand Canyon, October 1990 - November 1993.**

Trip	F/S <sup>a</sup>	BH <sup>b</sup>	BR	CC	CP	FH	FM	HB	PK	RB	SD	SU
91-01	0/3											
91-03	6/20	3 (50.0)										
91-04	1/5										1 (100.0)	
91-05	32/1										32 (100.0)	
91-07	0/1											
91-09	0/1											
92-03	29/11	6 (20.7)										
92-05	88/30	7 (8.0)										
92-07	58/14	4 (6.9)										
92-08	30/13											
92-09	14/30		2 (14.3)									
92-10	0/2											
92-11	82/42	8 (9.8)										
93-01	144/81			1 (0.7)								
93-02	13/17											
93-03	16/25				1 (6.3)							

Table E-17. continued

Trip	F/S*	BB	BH <sup>b</sup>	BK	BR	CC	CP	FH	FM	FV	GS	HB	PK	RB	SB	SU	SD
92-11	641/162	3 (0.5)		77 (12.0)	1 (0.2)	57 (8.9)	51 (8.0)	22 (3.4)		72 (11.2)		353 (55.1)		5 (0.8)			
93-01	463/101	2 (0.4)		27 (5.8)	2 (0.4)	59 (12.7)	5 (1.1)	8 (1.7)		1 (0.2)	33 (7.1)	318 (68.7)		8 (1.7)			
93-02	263/77					17 (6.5)	2 (0.8)	2 (0.8)		26 (9.9)		208 (79.1)		8 (3.0)			
93-03	444/137		1 (0.2)	26 (5.9)	1 (0.4)	43 (9.1)	1 (2.5)	2 (14.8)		32 (7.2)	1 (0.2)	324 (73.0)		14 (3.2)			
93-04	243/54	1 (0.4)		3 (1.2)	1 (0.4)	22 (9.1)	6 (2.5)	36 (14.8)		44 (18.1)		121 (49.8)		9 (3.7)			
93-05	595/210	2 (0.3)	10 (1.7)	71 (11.9)		60 (10.1)	3 (0.5)	25 (4.2)		42 (7.1)		340 (57.1)	1 (0.2)	41 (6.9)			
93-06	140/62		1 (0.7)		5 (3.6)	2 (1.4)	8 (5.7)			19 (13.6)	1 (0.7)	88 (62.9)	3 (2.1)	13 (9.3)			
93-07	697/219		8 (1.2)	20 (2.9)		72 (10.3)	6 (0.9)	45 (6.5)	2 (0.3)		187 (26.8)		319 (45.8)	7 (1.0)	31 (4.5)		
93-08	825/75		11 (1.3)		8 (1.0)	7 (0.9)	11 (1.3)				359 (43.5)		350 (42.4)		79 (9.6)		
93-09	685/129	25 (3.7)		29 (4.2)	1 (0.2)	22 (3.2)	89 (13.0)	25 (3.7)		1 (0.2)	327 (47.7)		120 (17.5)		46 (6.7)		
93-10	717/70	2 (0.3)			7 (1.0)	44 (6.1)	9 (1.3)			255 (35.6)	1 (0.1)	361 (50.4)		38 (5.3)			
93-11	207/62	2 (1.0)		15 (7.3)		10 (4.8)	28 (13.5)	12 (5.8)		54 (26.1)		70 (33.8)		16 (7.7)			
<b>Total</b>		<b>4</b>	<b>120</b>	<b>4</b>	<b>1390</b>	<b>10</b>	<b>1986</b>	<b>352</b>	<b>406</b>	<b>5</b>	<b>3</b>	<b>2176</b>	<b>6</b>	<b>7977</b>	<b>11</b>	<b>4</b>	<b>508</b>

\*F = total number of fish, S = total number of samples or net sets.

<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

Table E-18. Number (percentage) of adults captured by electrofishing by trip in Region 0, of the Colorado River in Grand Canyon, October 1990 - November 1993.

Trip	F/S*	BH <sup>b</sup>	BK	BR	CC	CP	FM	FV	HB	RB	SB	SD	FH	PK
92-03	71/5		1 (1.4)										70 (98.6)	
93-01	152/12		1 (0.7)										151 (99.3)	
93-02	172/27					3 (1.7)							169 (98.3)	
93-03	185/23		1 (0.5)	1 (0.5)			3 (1.6)						180 (97.3)	
93-04	133/23			1 (0.8)			7 (5.3)	26 (19.5)					99 (74.4)	
93-05	223/37				1 (0.4)		4 (1.8)						218 (97.8)	
93-06	68/9												68 (100.0)	
93-07	113/32					8 (7.1)	17 (15.0)						86 (76.1)	2 (1.8)
93-08	276/8												276 (100.0)	
93-09	44/18												2 (4.5)	42 (95.5)
93-10	257/19						3 (1.2)	1 (0.4)					251 (97.7)	2 (0.8)
93-11	24/4					1 (4.2)	2 (8.3)						21 (87.5)	
<b>Total</b>		1	2	4		30	44		2	1,631		4		

\*F = total number of fish, S = total number of samples or net sets.  
bSee Table 5-3 of the Final Report for fish codes.

**Table E-19. Number (percentage) of adults captured by electrofishing by trip In Region I, of the Colorado River in Grand Canyon, October 1990 - November 1993.**

Trip	F/S <sup>a</sup>	BH <sup>b</sup>	BR	CC	CP	FM	FV	HB	RB	SD	FH	PK	BB	GS
90-01	102/19	2 (2.0)	1 (1.0)	12 (11.8)	3 (2.9)			1 (1.0)	83 (81.4)					
90-02	98/8	2 (2.0)	11 (11.2)					2 (2.0)	82 (83.7)					
91-01	54/6			2 (3.7)	1 (1.9)			1 (1.9)	50 (92.6)					
91-03	9/2		1 (11.1)						8 (88.9)					
91-05	220/31	1 (0.5)	1 (0.5)	4 (1.8)	4 (1.8)			1 (0.5)	205 (93.2)	3 (1.4)				
91-06	161/32	1 (0.6)	3 (1.9)	2 (1.2)				4 (2.5)	139 (86.3)	11 (6.8)				
91-07	406/50	1 (0.3)	4 (1.0)	6 (1.5)	5 (1.2)			5 (1.2)	377 (92.9)	8 (2.0)				
91-09	466/67	3 (0.6)	7 (1.5)	5 (1.1)				13 (2.8)	429 (92.1)	8 (1.7)				
91-11	284/49			7 (2.5)				10 (3.5)	257 (90.5)	6 (2.1)				
92-01	242/59	3 (1.2)	9 (3.7)					4 (1.7)	210 (86.8)	9 (3.7)				
92-03	147/68			4 (2.7)	2 (1.4)			3 (2.0)	128 (87.1)	7 (4.8)				
92-05	138/32	1 (0.7)	5 (3.6)	2 (1.5)				2 (1.5)	107 (77.5)	5 (3.6)				
92-07	205/68	2 (1.0)	4 (2.0)	5 (2.4)				15 (7.3)	162 (79.0)	1 (0.5)				
92-08	149/40	2 (1.3)	3 (2.0)	4 (2.7)				5 (3.4)	123 (82.6)	6 (4.0)				
92-09	87/74	1 (1.2)	1 (1.2)	9 (10.3)				1 (1.2)	66 (75.9)	4 (4.6)				

Table E-19. continued

Trip	F/S <sup>a</sup>	BH <sup>b</sup>	BR	CC	CP	FM	FV	HB	RB	SD	FH	PK	BB	GS
92-11	317/85	1 (0.3)	13 (4.1)	1 (0.3)	5 (1.6)	265 (83.6)	1 (0.3)	1 (9.8)	31					
93-01	178/67	1 (0.6)	1 (0.6)	2 (1.1)	16 (9.0)	6 (3.4)	11 (6.2)	131 (73.6)	8 (4.5)	1 (0.6)				1 (0.6)
93-02	42/34				2 (4.8)	1 (2.4)		6 (14.3)	23 (54.8)	8 (19.1)			2 (4.8)	
93-03	139/79	3 (2.2)		3 (2.2)			1 (0.7)	117 (84.2)	13 (9.4)	1 (0.7)			1 (0.7)	
93-04	41/27	1 (2.4)	1 (2.4)	5 (12.2)	1 (2.4)	1 (2.4)		3 (7.3)	19 (46.3)	9 (22.0)			2 (4.9)	
93-05	135/69	1 (0.7)		12 (8.9)	1 (0.7)		2 (1.5)	85 (63.0)	32 (23.7)				2 (1.5)	
93-06	39/30			3 (7.7)	1 (2.6)		3 (7.7)	18 (46.2)	12 (30.8)	2 (5.1)				
93-07	213/107	2 (0.9)	2 (0.9)	14 (6.6)	13 (6.1)	1 (0.5)	14 (6.6)	138 (64.8)	24 (11.3)	5 (2.4)				
93-08	155/67	2 (1.3)		8 (5.2)	7 (4.5)		3 (1.9)	50 (32.3)	79 (51.0)	6 (3.9)				
93-09	174/54	3 (1.7)		1 (0.6)	4 (2.3)	7 (4.0)	5 (2.9)	51 (29.3)	40 (23.0)	40 (36.2)			63 (36.2)	
93-10	152/51	1 (0.7)		3 (2.0)	5 (3.3)		65 (42.8)	36 (23.7)	41 (27.0)	1 (0.7)				
93-11	81/44			3 (3.7)	4 (4.9)		5 (6.2)	35 (43.2)	13 (16.1)	21 (25.9)				
<b>Total</b>	<b>4434</b>	<b>12</b>	<b>32</b>	<b>5</b>	<b>172</b>	<b>80</b>	<b>1</b>	<b>125</b>	<b>3423</b>	<b>343</b>	<b>234</b>	<b>3</b>	<b>3</b>	<b>1</b>

<sup>a</sup>F = total number of fish, S = total number of samples or net sets.

<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

**Table E-20. Number (percentage) of adults captured by electrofishing by trip In Region II, of the Colorado River In Grand Canyon, October 1990 - November 1993.**

Trip	F/S <sup>a</sup>	BH <sup>b</sup>	BR	CP	FM	FV	HB	RB	SD	FH
90-02	218/16	27 (12.4)	50 (22.9)	1 (0.5)				139 (63.8)	1 (0.5)	
91-01	382/38	20 (5.2)	63 (16.5)					298 (78.0)		1 (0.3)
91-03	482/45	1 (0.2)	118 (24.5)	111 (23.0)				250 (51.9)	2 (0.4)	
91-05	518/60	1 (0.2)	161 (31.1)	111 (21.4)	4 (0.8)		1 (0.2)	239 (46.1)	1 (0.2)	
91-07	289/56		56 (19.4)	86 (29.8)	1 (0.4)		1 (0.4)	142 (49.1)	3 (1.0)	
91-09	351/51	1 (0.3)	77 (21.9)	72 (20.5)	6 (1.7)	1 (0.3)		186 (53.0)	8 (2.3)	
91-11	341/63	2 (0.6)	130 (38.1)	112 (32.8)	2 (0.6)			84 (24.6)	11 (3.2)	
92-01	336/36		67 (19.9)	67 (19.9)	4 (1.2)			198 (58.9)		
92-03	248/59	1 (0.4)	55 (22.2)	101 (40.7)	5 (2.0)			78 (31.5)	8 (3.2)	
92-05	258/37	1 (0.4)	148 (57.4)	33 (12.8)	3 (1.2)		1 (0.4)	72 (27.9)		
92-07	253/43	6 (2.4)	55 (21.7)	76 (30.0)	4 (1.6)		4 (1.6)	95 (37.6)	7 (2.8)	6 (2.4)
92-09	230/46	2 (0.9)	95 (41.3)	31 (13.5)	8 (3.5)			66 (28.7)	7 (3.0)	21 (9.1)
92-11	175/72	1 (0.6)	69 (39.4)	40 (22.9)	8 (4.6)			39 (22.3)	2 (1.1)	16 (9.1)
93-01	57/15		20 (35.1)	25 (43.9)				12 (21.1)		

Table E-20. continued

Trip	F/S <sup>a</sup>	BH <sup>b</sup>	BR	CP	FM	FV	HB	RB	SD	FH
93-02	10/16			10 (100.0)				9 (13.6)	1 (1.5)	
93-03	66/34		20 (30.3)	34 (51.5)	2 (3.0)					
93-04	14/4			8 (57.1)				2 (14.3)		4 (28.6)
93-05	128/74	4 (3.1)	66 (51.6)	32 (25.0)	4 (3.1)			18 (14.1)	4 (3.1)	
93-06	7/22		1 (14.3)	2 (28.6)	2 (28.6)					1
93-07	102/60	3 (2.9)	14 (13.7)	22 (21.6)	9 (8.8)	1 (1.0)	1 (1.0)	49 (48.0)	2 (2.0)	1 (1.0)
93-09	63/48	1 (1.6)	25 (39.7)	13 (20.6)	9 (14.3)			4 (6.4)	4 (6.4)	7 (11.1)
93-11	27/14		14 (51.9)	5 (18.5)				1 (3.7)	3 (11.1)	4 (14.8)
<b>Total</b>	<b>4555</b>	<b>24</b>	<b>1238</b>	<b>1104</b>	<b>72</b>	<b>2</b>	<b>9</b>	<b>1981</b>	<b>65</b>	<b>60</b>

<sup>a</sup>F = total number of fish, S = total number of samples or net sets.<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

**Table E-21. Number (percentage) of adults captured by electrofishing by trip in Region III, of the Colorado River in Grand Canyon, October 1990 - November 1993.**

Trip	F/S*	BH <sup>b</sup>	BK	BR	CC	CP	FM	FV	HB	RB	SB	SD	FH	PK
90-02	46/7	1 (2.2)	1 (2.2)	1 (2.2)		26 (56.5)	1 (2.2)			17 (37.0)				
91-01	54/14	1 (1.9)	1 (1.9)	1 (1.9)		46 (85.2)				6 (11.1)				
91-03	42/17	3 (7.1)		1 (2.4)		29 (69.1)	2 (4.8)			6 (14.3)		1 (2.4)		
91-05	15/9					5 (33.3)	5 (33.3)			1 (6.7)	1 (6.7)	3 (20.0)		
91-07	213/44			2 (0.9)		186 (87.3)	4 (1.9)			10 (4.7)	6 (2.8)	2 (0.9)	2 (0.9)	1 (0.5)
91-09	98/43	2 (2.0)		2 (2.0)		51 (52.0)	8 (8.2)	1 (1.0)		6 (6.1)	6 (27.6)	1 (1.0)		
91-11	26/32					17 (65.4)	2 (7.7)			3 (11.5)		4 (15.4)		
92-01	66/26		2 (3.0)			55 (83.3)	2 (3.0)	1 (1.5)		2 (3.0)		3 (4.5)	1 (1.5)	
92-03	86/59	6 (7.0)			1 (1.2)	50 (58.1)	2 (2.3)	1 (1.2)		2 (2.3)		22 (25.6)	2 (2.3)	
92-05	18/28					13 (72.2)	1 (5.6)			1 (5.6)	1 (5.6)	1 (11.1)	1 (11.1)	2 (2.2)
92-07	109/47	1 (0.9)		2 (1.8)		90 (82.6)	2 (1.8)			4 (3.7)		9 (8.3)	1 (0.9)	
92-09	46/42	2 (4.4)				12 (26.1)	5 (10.9)			2 (4.4)		12 (26.1)	12 (26.1)	1 (2.2)
92-11	7/5					1 (14.3)						2 (28.6)	4 (57.1)	
93-01	22/7					16 (72.7)	1 (4.6)			1 (4.5)		4 (18.2)		

Table E-21. continued

Trip	F/S*	BH <sup>b</sup>	BK	BR	CC	CP	FM	FV	HB	RB	SB	SD	FH	PK
93-05	33/30	3 (9.1)			11 (33.3)	11 (33.3)					1 (3.0)	5 (15.2)	2 (6.1)	
93-06	6/1					2 (33.3)					3 (50.0)			1 (16.7)
93-07	40/20		1 (2.5)			27 (67.5)	1 (2.5)			1 (2.5)	7 (17.5)	3 (7.5)		
93-09	6/9				2 (33.3)	1 (16.7)					2 (33.3)	1 (16.7)		
<b>Total</b>	<b>933</b>	<b>17</b>	<b>2</b>	<b>12</b>	<b>1</b>	<b>637</b>	<b>50</b>	<b>2</b>	<b>1</b>	<b>60</b>	<b>20</b>	<b>96</b>	<b>32</b>	<b>3</b>

<sup>a</sup>F = total number of fish, S = total number of samples or net sets.<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

**Table E-22. Number (percentage) of subadults captured by electrofishing by trip In all study regions combined, of the Colorado River In Grand Canyon, October 1990-November 1993.**

Trip	F/S*	BB	BH <sup>b</sup>	BR	CC	CP	FH	FM	GS	HB	RB	SU
90-01	15/19									1	14	
90-02	18/31									(6.7)	(93.3)	
91-01	38/58									2	14	
91-03	46/64									(11.1)	(77.8)	
91-05	115/100									36	(94.7)	
91-06	19/32									2	36	
91-07	87/150									(4.3)	(78.3)	
91-09	265/161									3	31	
91-11	167/144									(2.6)	(26.9)	
92-01	103/121									3	73	
92-03	67/191									(63.5)	(63.9)	
92-05	156/97									9	9	
92-07	234/158									(47.3)	(47.3)	
92-08	36/40									9	9	
92-09	121/162									(47.3)	(47.3)	

Table E-22. continued

Trip	F/S <sup>a</sup>	BB	BH <sup>b</sup>	BR	CC	CP	FH	FM	GS	HB	RB	SU
92-11	142/162	2 (1.4)	7 (4.9)	1 (0.7)	3 (2.1)	13 (9.2)	67 (47.1)	49 (34.5)				
93-01	85/101	1 (1.2)	5 (5.9)		2 (2.4)	1 (1.2)	22 (25.9)	54 (63.5)				
92-02	74/77				2 (2.7)	1 (1.4)	20 (27.0)	51 (68.9)				
93-03	89/137	3 (3.4)			3 (3.4)		31 (34.8)	52 (58.4)				
93-04	77/54	1 (1.3)	1 (1.3)		2 (2.6)	9 (11.7)	41 (53.2)	23 (29.9)				
93-05	130/210	3 (2.3)	3 (2.3)		1 (0.8)	1 (0.8)	9 (6.9)	40 (30.8)	73 (56.2)			
93-06	22/62					3 (13.6)	15 (68.2)	4 (18.2)				
93-07	247/219	3 (1.2)	3 (1.2)		1 (0.4)	5 (2.0)	172 (69.6)	63 (25.5)				
93-08	400/75	9 (2.3)			1 (0.3)	4 (0.1)	356 (89.0)	30 (7.5)				
93-09	404/129	21 (5.2)	4 (1.0)		3 (0.7)	8 (4.5)	1 (2.0)	1 (0.2)	320 (79.2)	29 (7.2)		
93-10	419/70	10 (2.4)			1 (0.2)	3 (0.7)	3 (0.7)	1 (0.2)	255 (60.9)	147 (35.1)		
93-11	82/62	2 (2.4)			3 (3.7)	9 (11.0)	49 (59.8)	19 (23.2)				
<b>Total</b>	<b>1</b>	<b>107</b>	<b>104</b>	<b>4</b>	<b>43</b>	<b>26</b>	<b>161</b>	<b>2</b>	<b>2008</b>	<b>1198</b>	<b>4</b>	

<sup>a</sup>F = total number of fish, S = total number of samples or net sets.<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

**Table E-23. Number (percentage) of sub-adults captured by electrofishing by trip in Region 0, of the Colorado River in Grand Canyon, October 1990 - November 1993.**

Trip	F/S <sup>a</sup>	BH <sup>b</sup>	BK	BR	CC	CP	FM	FV	HB	RB	SB	SD	FH	PK
92-03	1/5												1	(100.0)
93-01	31/12												31	(100.0)
93-02	35/27												35	(100.0)
93-03	35/23												34	(97.1)
93-04	22/23												22	(100.0)
93-05	54/37												54	(100.0)
93-06	2/9												2	(100.0)
93-07	18/32												18	(100.0)
93-08	6/8												6	(100.0)
93-09	6/18												6	(100.0)
93-10	102/19												102	(100.0)
93-11	6/4												6	(100.0)
<b>Total</b>													<b>317</b>	

<sup>a</sup>F = total number of fish, S = total number of samples or net sets.

<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

**Table E-24.** Number (percentage) of subadults captured by electrofishing by trip in Region I, of the Colorado River In Grand Canyon, October 1990 - November 1993.

Trip	F/S*	BH <sup>b</sup>	BR	CC	CP	FM	HB	RB	BB	GS	FH
90-01	15/19						1 (6.7)	14 (93.3)			
90-02	6/8						2 (33.3)	4 (66.7)			
91-01	4/6										
91-03	1/2							4 (100.0)			
91-05	60/31							1 (100.0)			
91-06	19/32						31 (51.7)	29 (48.3)			
91-07	47/50						9 (47.4)	9 (47.9)			
91-09	211/67	1 (0.5)					11 (5.2)	25 (53.2)	21 (44.7)		
91-11	116/49	1 (0.9)					3 (1.4)	167 (79.1)	28 (13.2)		
92-01	62/59	2 (3.2)					4 (3.4)	66 (56.9)	45 (38.8)		
92-03	34/68						2 (3.2)	32 (51.6)	26 (41.9)		
92-05	118/32						2 (5.9)	20 (58.8)	10 (29.4)		
92-07	110/68	2 (1.8)					1 (0.8)	1 (0.8)	3 (94.9)	7 (2.5)	
92-08	36/40								101 (91.8)	7 (6.4)	
92-09	59/74	1 (1.7)							31 (86.1)	5 (13.9)	
							4 (6.8)	49 (83.1)	3 (5.1)	1 (1.7)	

Table E-24. continued

Trip	F/S <sup>a</sup>	BH <sup>b</sup>	BR	CC	CP	FM	HB	RB	BB	GS	FH
92-11	113/85				1 (0.9)	7 (6.2)	66 (58.4)	39 (34.5)			
93-01	44/67		1 (2.3)		2 (4.5)	1 (2.3)	22 (50.0)	18 (40.9)			
93-02	34/34				2 (5.9)		20 (58.8)	12 (35.3)			
93-03	49/79				3 (6.1)		31 (63.3)	15 (30.6)			
93-04	52/27	1 (1.9)			1 (1.9)	9 (17.3)	40 (76.9)	1 (1.9)			
93-05	51/69				1 (2.0)		39 (76.5)	10 (19.6)			
93-06	16/30						14 (87.5)	2 (12.5)			
93-07	204/107	1 (0.5)			1 (0.5)	1 (0.5)	170 (83.3)	31 (15.2)			
93-08	394/67	9 (2.3)				4 (1.0)	356 (90.4)	24 (6.1)			
93-09	367/54	10 (2.7)				3 (0.8)	2 (0.5)	317 (86.4)	19 (5.2)	1 (0.3)	
93-10	308/51	1 (0.3)				1 (0.3)	3 (1.0)	255 (82.8)	45 (14.6)	16 (4.3)	
93-11	75/44	1 (1.3)					9 (12.0)	49 (65.3)	13 (17.3)	3 (1.0)	
<b>Total</b>	<b>29</b>	<b>1</b>	<b>3</b>	<b>22</b>	<b>61</b>	<b>2025</b>	<b>438</b>	<b>1</b>	<b>1</b>	<b>24</b>	

<sup>a</sup>F = total number of fish, S = total number of samples or net sets.

<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

Table E-25. Number (percentage) of sub-adults captured by electrofishing by trip in Region II, of the Colorado River in Grand Canyon, October 1990 - November 1993.

Trip	F/S*	BH <sup>b</sup>	BR	CC	CP	FM	HB	RB	FH
90-02	5/16						5		
91-01	30/38		1 (3.3)		1 (3.3)			28 (93.3)	
91-03	37/45		1 (2.7)		1 (2.7)			35 (94.6)	
91-05	53/60		8 (15.1)				3 (5.6)	42 (79.2)	
91-07	18/56		4 (22.2)					14 (77.8)	
91-09	37/51		3 (8.1)		2 (5.4)	6 (16.2)		26 (70.3)	
91-11	45/63	4 (8.9)	5 (11.1)			4 (8.9)		32 (71.1)	
92-01	33/36		4 (12.1)					29 (87.9)	
92-03	26/59		4 (15.4)		1 (3.8)			21 (80.8)	
92-05	35/37		19 (54.3)		1 (2.8)			15 (42.9)	
92-07	92/43	5 (5.4)	12 (13.0)		1 (1.1)	12 (13.0)	4 (4.3)	58 (63.0)	
92-09	51/46		14 (27.4)			8 (15.7)	1 (2.0)	28 (54.9)	
92-11	25/72		7 (28.0)	1 (4.0)		6 (24.0)	1 (4.0)	10 (40.0)	
93-01	9/15		4 (44.4)					5 (55.6)	

Table E-25, continued

Trip	F/S*	BH <sup>b</sup>	BR	CC	CP	FM	HB	RB	FH
93-02	5/16					1 (20.0)			4 (80.0)
93-03	5/34		2 (40.0)						3 (60.0)
93-04	3/4		1 (33.3)		1 (33.3)				1 (33.3)
93-05	16/74	1 (6.2)	2 (12.5)		1 (6.2)	3 (18.8)	1 (6.2)	1 (6.2)	8 (50.0)
93-06	3/22					2 (66.7)	1 (33.3)	1 (33.3)	
93-07	21/60	2 (9.5)	3 (14.3)			3 (14.3)	2 (9.5)	1 (52.4)	
93-09	25/48	9 (36.0)	4 (16.0)			3 (12.0)	3 (12.0)	4 (16.0)	2 (8.0)
93-11	1/14	1 (100.0)							
<b>Total</b>	<b>22</b>	<b>98</b>	<b>1</b>	<b>7</b>	<b>53</b>	<b>14</b>	<b>378</b>	<b>2</b>	

<sup>a</sup>F = total number of fish, S = total number of samples or net sets.<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

Table E-26. Number (percentage) of sub-adults captured by electrofishing by trip In Region III, of the Colorado River In Grand Canyon, October 1990 - November 1993.

Trip	F/S*	BH <sup>b</sup>	BR	CP	FM	RB	SU	GS
90-02	7/7				2 (28.6)	5 (71.4)		
91-01	4/14					4 (100.0)		
91-03	8/17	2 (25.0)		4 (50.0)	2 (25.0)			
91-05	2/9						2 (100.0)	
91-07	22/44		1 (4.5)		2 (9.1)		19 (86.4)	
91-09	17/43	2 (11.8)	1 (5.9)	2 (11.8)	5 (29.4)		7 (41.1)	
91-11	6/32			2 (33.3)	1 (16.7)		3 (50.0)	
92-01	8/26				4 (50.0)		4 (50.0)	
92-03	6/59	1 (16.7)		2 (33.3)	1 (16.7)		2 (33.3)	
92-05	3/28	1 (33.3)			1 (33.3)		1 (33.3)	
92-07	32/47	1 (3.1)		1 (3.1)	16 (50.0)		10 (31.3)	4 (12.5)
92-09	11/42							
92-11	4/5	2 (18.2)	1 (9.1)	1 (9.1)	3 (27.3)		4 (36.4)	
93-01	1/7	1 (100.0)		2 (50.0)				

Table E-26. continued

Trip	F/S <sup>a</sup>	BH <sup>b</sup>	BR	CP	FM	RB	SU	GS
93-05	9/30	2 (22.2)	1 (11.1)		5 (55.6)		1 (11.1)	
93-06	1/1				1 (100.0)			
93-07	4/20				1 (25.0)		3 (75.0)	
93-09	6/9	2 (33.3)			3 (50.0)		1 (16.7)	
<b>Total</b>		<b>16</b>	<b>4</b>	<b>14</b>	<b>47</b>	<b>65</b>	<b>4</b>	<b>1</b>

<sup>a</sup>F = total number of fish, S = total number of samples or net sets.<sup>b</sup>See Table 5-3 of the Final Report for fish codes.

**Table E-27.** Arithmetic mean catch rate (AM<sub>cpe</sub>) of adult, juvenile and YOY flannelmouth sucker by gear in the Colorado River in Grand Canyon, October 1990-November 1993.

Table E-27. continued

Table E-27. continued

GEAR <sup>a</sup>	Total samples (Total time - hr)			AMcpe (number of fish)								
				Adult FM			Juvenile FM			YOY FM		
	REGION			REGION			REGION			REGION		
<b>ELECTROFISHING<sup>d</sup></b>												
EL	217 (40.8)	1319 (308.5)	909 (293.4)	441 (141.0)	42.1 (44)	3.6 (80)	3.4 (72)	5.0 (50)	0 (42)	1.4 (42)	2.2 (52)	3.7 (46)

<sup>a</sup>See Table 5-8 of the Final Report for gear codes.<sup>b</sup>CPE = fish/100 ft/100 hr<sup>c</sup>CPE = fish/100 hr<sup>d</sup>CPE = fish/10 hr<sup>e</sup>CPE = fish/100 m<sup>2</sup><sup>f</sup>CPE = fish/10 hr

**Table E-28. Arithmetic mean catch rate (AMcpe) of adult, juvenile and YOY bluehead sucker by gear in the Colorado River in Grand Canyon, October 1990-November 1993.**

GEAR*	Total samples (Total time - hr)			AMcpe (number of fish)							
	REGION			Adult BH			Juvenile BH				
	0	1	2	3	0	1	2	3	0	1	2
NETS <sup>b</sup>											
GM	63 (134.4)	378 (791.8)	298 (604.8)	193 (414.1)	0	0	0.2	0	0	0	0
GP	56 (119.4)	477 (1006.0)	507 (1030.1)	281 (595.7)	0	0.6 (6)	0.3 (3)	0.5 (3)	0	0	0
GX	0	180 (374.1)	174 (368.0)	155 (318.5)	-	2.7 (7)	0.2 (1)	0.7 (2)	-	0	0
GZ	0	0	16 (31.4)	14 (27.2)	-	0	0	-	-	0	0
TK	174 (371.7)	989 (2060.0)	1263 (2634.9)	803 (1667.0)	0.3 (1)	5.2 (76)	3.1 (60)	2.0 (24)	0	0	0
TL	137 (295.6)	1044 (2165.1)	1386 (2876.3)	668 (1436.7)	0.6 (1)	1.1 (18)	1.1 (24)	0.9 (9)	0	0	0
TM	49 (110.7)	189 (393.0)	390 (803.3)	119 (243.3)	0	8.8 (17)	3.5 (14)	0.8 (1)	0	0	0
TN	43 (92.8)	175 (362.9)	410 (858.6)	139 (285.1)	0	3.5 (6)	0.8 (4)	8.6 (13)	0	0	0
TW	8 (15.7)	3 (6.1)	11 (21.5)	0	0	0	-	0	0	0	0
TY	0	6 (11.1)	0	0	-	0	-	0	-	0	-
TZ	0	3 (5.2)	0	0	-	0	-	0	-	0	-
<b>Totals</b>	<b>530 (1140.3)</b>	<b>3444 (7175.3)</b>	<b>4455 (9228.9)</b>	<b>2372 (4987.6)</b>							

Table E-28. continued

GEAR <sup>a</sup>	Total samples (Total time - hr)						AMcpe (number of fish)									
	REGION			REGION			Adult BH			Juvenile BH			YOY BH			
	0	1	2	3	0	1	2	3	0	1	2	3				
TRAPS <sup>c</sup>																
HL	0	4	40	19	-	7.0	4.8	18.9	-	0	0.4	0.9	-	0	0	0
		(37.1)	(687.5)	(316.1)		(2)	(35)	(71)		(3)	(3)					
HM	0	2	13	2	-	0	0	0	-	0	0	0	-	0	0	0
		(38.8)	(191.3)	(39.3)												
HS	0	4	73	9	-	2.0	5.6	83.4	-	0	0.9	7.5	-	0	0	0
		(30.8)	(1187.6)	(150.4)		(1)	(73)	(148)		(13)	(14)					
MT	12	3847	622	81	0	0	0	0	0	0.001	0.1	0	0.001	0	0	0
	(210.3)	(65866.7)	(12752.2)	(1721.2)					(1)	(8)			(1)			
<b>Totals</b>	<b>12</b>	<b>3857</b>	<b>748</b>	<b>111</b>												
	(210.3)	(65973.4)	(14818.6)	(22227.0)												
SEINES <sup>e</sup>																
(area m <sup>2</sup> )																
SA	0	42	54	17	-	0	0.1	0	-	0.4	0.1	0.2	-	0.7	0.1	0.3
		(7000.0)	(5983.4)	(2689.0)			(2)			(4)	(3)	(3)		(12)	(3)	(2)
SB	13	48	19	3	-	0	0.02	0	0	0.3	0	0	0	0.8	0	0
	(779.0)	(6605.5)	(2901.0)	(276.0)		(1)			(17)					(33)		
GF	0	6	0	0	-	0	-	-	-	0.1	-		-	0	-	-
		(1350.0)								(2)						
SG	1	297	15	15	0	0.03	0	0	0	0.4	0.2	1.5	0	0.2	0.1	0.6
	(60.0)	(53748.0)	(1789.0)	(3460.0)		(11)			(57)	(4)	(52)		(30)	(1)	(8)	
TF	0	0	0	2	-	-	-	-	-	0	-	-	-	-	-	0
Qual.	5	46	21	11	-											
<b>Total</b>	<b>19</b>	<b>439</b>	<b>68703.5</b>	<b>(10673.4)</b>						<b>50</b>						
	(839.0)									(28925.0)						

Table E-28. continued

GEAR <sup>a</sup>	Total samples (Total time - hr)			AMcpe (number of fish)								
	REGION			Adult BH			Juvenile BH			YOY BH		
	0	1	2	3	0	1	2	3	0	1	2	3
ELECTROFISHING <sup>d</sup>												
EL	217 (40.8)	1319 (308.5)	909 (293.4)	441 (141.0)	0 (12)	0.76 (24)	1.0 (17)	1.5 (17)	0 (26)	1.0 (17)	0.6 (15)	1.2 (15)

<sup>a</sup>See Table 5-8 of the Final Report for gear codes.<sup>b</sup>CPE = fish/100 ft/100 hr<sup>c</sup>CPE = fish/100 hr<sup>d</sup>CPE = fish/10 hr<sup>e</sup>CPE = fish/100 m<sup>2</sup><sup>f</sup>CPE = fish/10 hr

**Table E-29. Arithmetic mean catch rate (AMcpe) of adult, juvenile and YOY rainbow trout by gear in the Colorado River in Grand Canyon, October 1990-November 1993.**

GEAR <sup>a</sup>	Total samples (Total time - hr)			AMcpe (number of fish)			REGION	REGION	REGION			
	Adult RB			Juvenile RB								
	0	1	2	0	1	2						
NETS <sup>b</sup>												
GM	63 (134.4)	378 (791.8)	298 (604.8)	193 (414.1)	1.3 (2)	6.0 (39)	0.3 (2)	0 0	0 0			
GP	56 (119.4)	477 (1006.0)	507 (1030.1)	281 (595.7)	54.0 (66)	38.0 (383)	5.0 (47)	0.8 (5)	0 0			
GX	0	180 (374.1)	174 (368.0)	155 (318.5)	-	16.6 (51)	4.2 (13)	1.9 (6)	- 0.3 (1)			
GZ	0	0	16 (31.4)	14 (27.2)	-	0 (21.4)	0 (317)	0 (19)	- 0.7 (2)			
TK	174 (371.7)	989 (2060.0)	1263 (2634.9)	803 (1667.0)	79.7 (214)	22.6 (160)	8.3 (19)	1.5 (2)	0 0			
TL	137 (295.6)	1044 (2165.1)	1386 (2876.3)	668 (1436.7)	101.7 (222)	47.0 (741)	3.4 (68)	1.3 (13)	0 0.1 (1)			
TM	49 (110.7)	189 (393.0)	390 (803.3)	119 (243.3)	175.5 (107)	15.0 (27)	13.4 (49)	1.7 (2)	0 0.1 (1)			
TN	43 (92.8)	175 (362.9)	410 (858.6)	139 (285.1)	173.1 (85)	42.3 (75)	4.4 (20)	0 0	0 0			
TW	8 (15.7)	3 (6.1)	11 (21.5)	0 (1.1)	0 0	0 0	0 0	0 0	- 0			
TY	0	6 (11.1)	0 (5.2)	0 0	-	82.0 (7)	- 0	- 0	- 0			
TZ	0	3 (5.2)	0 0	0 0	-	0 0	- 0	- 0	- 0			
<b>Totals</b>	<b>530 (1140.3)</b>	<b>3444 (7175.3)</b>	<b>4455 (9228.9)</b>	<b>2372 (4987.6)</b>								

Table E-29. continued

Table E-29, continued

GEAR <sup>a</sup>	Total samples (Total time - hr)						AMcpe (number of fish)					
	REGION			Adult RB			REGION			Juvenile RB		
	0	1	2	3	0	1	2	3	0	1	2	3
<b>ELECTROFISHING<sup>d</sup></b>												
EL	217 (40.6)	1319 (308.5)	909 (293.4)	441 (141.0)	343.8 (1314)	123.1 (3423)	86.1 (981)	4.4 (61)	88.3 (283)	14.3 (391)	12.9 (348)	3.7 (58)
<b>ANGLING</b>												
AN	0	2 (1.7)	0	0	-	0	-	-	0	-	-	0
AL	0	4 (4.5)	0	0	-	216.7 (6)	-	-	0	-	-	0
<b>Totals</b>	<b>0</b>	<b>6 (6.2)</b>	<b>0</b>	<b>0</b>								

<sup>a</sup>See Table 5-8 of the Final Report for gear codes.<sup>b</sup>CPE = fish/100 ft/100 hr<sup>c</sup>CPE = fish/100 hr<sup>d</sup>CPE = fish/10 hr<sup>e</sup>CPE = fish/100 m<sup>2</sup><sup>f</sup>CPE = fish/10 hr

Table E-30a. Catch rates (AMCPE) for all fish species with netting.

Month 'Year	Sample Effort	Time in Effort	Catch Rates									CP	
			A	S	A	S	A	S	A	S	A		
Netting													
Oct '90			29.00	0.00	0.00	1.65	0.00	12.37	0.00	3.03	0.00	1.11	0.00
Nov '90			17.23	0.00	1.15	12.34	0.00	49.35	0.00	2.04	0.00	1.01	0.00
Jan '91			25.64	1.61	1.67	6.38	0.00	33.73	0.69	0.00	0.96	0.87	0.00
Feb '91			41.72	0.00	0.00	225.4	0.00	44.01	0.00	0.00	0.00	0.00	0.00
Mar '91			61.48	2.18	22.64	12.92	0.00	21.68	0.00	0.00	0.00	0.00	0.00
Apr '91			61.67	0.00	9.26	124.7	0.00	39.00	0.00	0.00	48.27	6.83	0.00
May '91			10.81	0.81	5.02	44.37	0.46	28.48	0.00	0.00	0.45	0.55	0.00
Jun '91			22.60	2.74	2.04	33.78	0.00	26.01	0.00	0.00	0.00	3.38	0.00
Jul '91			27.65	2.28	0.00	61.80	0.00	11.57	0.00	0.00	1.19	3.09	0.00
Sep '91			40.74	1.13	2.47	13.61	0.00	20.93	0.00	2.86	0.00	0.00	0.00
Nov '91			17.34	0.00	3.44	33.28	0.00	10.34	0.00	0.00	2.57	0.00	0.00
Jan '92			9.73	0.00	2.37	9.41	0.00	17.22	0.00	0.00	0.00	0.00	0.00
Feb '92			62.90	0.00	0.00	122.3	0.00	31.45	0.00	0.00	0.00	0.00	0.00
Mar '92			27.41	0.00	4.83	17.67	0.00	2.54	0.00	1.26	0.00	0.00	0.00
Apr '92			83.43	9.27	28.54	58.57	0.00	1.90	0.00	0.00	0.00	0.00	0.00
May '92			19.96	1.48	1.49	23.77	0.00	7.97	0.00	0.43	0.57	1.33	0.00
Jun '92			48.21	0.00	2.70	23.87	0.00	12.54	0.00	0.00	1.58	0.00	0.00
Jul '92			47.42	1.67	1.69	30.08	0.00	9.37	0.00	1.15	0.00	0.00	0.00
Sep '92			8.80	0.00	0.00	27.04	0.00	0.00	0.00	2.20	2.74	0.00	0.00
Nov '92			42.60	0.00	3.86	7.93	0.00	11.56	0.00	2.27	0.00	0.00	0.00
Jan '93			69.79	2.53	2.29	24.27	0.00	1.20	0.00	1.26	1.00	0.00	0.00
Feb '93			107.79	1.87	5.92	15.45	0.00	2.79	0.00	0.00	0.00	0.00	0.00
Mar '93			32.64	6.17	19.59	8.01	0.00	3.89	0.00	0.00	0.00	0.00	0.00
Apr '93			17.34	1.95	2.74	14.94	0.00	3.10	0.00	0.00	0.00	0.00	0.00
May '93			111.73	0.00	4.39	36.75	0.00	8.75	0.00	0.00	0.00	0.92	0.00
Jun '93			56.14	1.46	4.57	22.05	0.00	6.18	0.00	0.00	0.00	0.00	0.00
Jul '93			66.88	3.24	5.00	10.47	0.00	15.96	0.00	0.00	0.00	0.00	0.00
Aug '93			98.98	0.00	0.00	25.30	0.00	12.10	0.00	0.00	0.00	1.20	0.00

Table E30a. continued



Table E-30c. Catch rates (AMCPE) for all fish species with minnow traps.

Month Year	Sample Effort	Time In Effort	HB	BH				SD	FH	RB	BR	CC	PK
				S	T	S	T						
Minnow Traps													
May '91	18	442.06	0.23	0.00	0.00	9.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Jun '91	32	320.07	2.92	0.00	0.00	1.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Jul '91	38	856.85	2.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sep '91	10	253.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nov '91	36	798.79	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Jan '92	40	1023.9	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mar '92	59	1366.3	0.96	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00
Apr '92	20	565.04	0.19	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00
May '92	49	1259.9	0.77	0.00	0.00	0.04	0.04	0.84	0.00	0.00	0.00	0.00	0.09
Jun '92	8	187.73	0.95	0.00	0.00	0.95	0.46	0.46	0.00	0.00	0.00	0.00	0.00
Jul '92	62	1427.0	1.17	0.00	0.00	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00
Aug '92	41	2222.8	0.50	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00
Sep '92	77	1880.5	0.41	0.00	0.00	0.05	0.05	0.07	0.00	0.00	0.00	0.00	0.00
Oct '92	48	723.60	0.09	0.00	0.00	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00
Nov '92	50	1159.1	0.82	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00
Jan '93	39	585.16	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feb '93	45	766.16	0.28	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00
Mar '93	172	2927.9	0.17	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Apr '93	56	1205.3	0.62	0.00	0.00	0.06	0.09	0.00	0.00	0.00	0.00	0.00	0.00
May '93	176	2843.4	2.59	0.00	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Jun '93	310	3618.2	0.65	0.00	0.00	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Jul '93	293	3627.8	2.27	0.00	0.06	0.23	0.00	0.04	0.00	0.00	0.00	0.00	0.00
Aug '93	124	1386.8	3.24	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sep '93	109	2397.7	2.77	0.00	0.00	0.11	0.03	0.09	0.00	0.00	0.00	0.00	0.00
Oct '93	148	1977.5	6.44	0.00	0.00	0.08	0.17	0.05	0.00	0.00	0.00	0.00	0.00
Nov '93	103	2322.6	3.20	0.00	0.04	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Jan '94			0.79	0.00	0.00	0.20	0.13	0.00	0.00	0.00	0.00	0.00	0.00

**Table E-30d. Catch rates (AMCPPE) for all fish species with seining**

Table E-31. Mean weights for three age classifications of 21 species of fishes found in Grand Canyon

SPECIE	YOY			JUV			ADU		
	TL-mm	WT-g		TL-mm	WT-g		TL-mm	WT-g	
BB	52	1.95		172	67.04		276	268.75	
BC	61	6.43		118	102.61		206	432.14	
BH	56	4.82		156	82.41		306	304.56	
BG	56	3.9		102	86.14		156	190.1	
BK	78	5.76		226	124.56		248	241.04	
BR	76	3.77		248	163.74		303	310.15	
CC	51	1.29		225	110.42		486	258.45	
CP	61	10.21		186	303.05		488	1307.7	
FH	26	1		36	3.5		48	4	
FM	62	5.16		161	94.12		418	526.14	
GA	23	0.82		32	1.1		48	2.87	
GS	58	3.86		98	83.2		128	187.61	
HB	75	3.25		175	48.91		340	393	
LM	123	12.12		248	112.62		302	438.62	
PK	46	2.41		58	3.24		62	4.38	
RB	76	4		275	245		350	600	
RS	24	1		35	3.5		40	4	
SB	128	86.4		348	448.56		562	986.14	
SD	26	1.08		38	3.61		52	4.62	
TS	70	3.44		103	9.33		120	15.55	
WE	118	10.47		236	102.61		346	423	

Table E-32. Calculations of fish biomass.

REACH: Dam-Lees Fer MILES:		15.8 KILOM:		25.42694 WIDT:		123.7 HECT:		314.53						
SPECIE	NO.	YOY	WT-g	BIO MASS	NO.	WT-g	BIO MASS	NO.	WT-g	BIO MASS	STOTAL BI	(KG/HA)	BIOMASS	PERCENT BIOMASS
BB	0	1.95	0	0	67.04	0	0	268.75	0	0.00	0.00	0.00	0.00	0
BC	0	6.43	0	0	102.61	0	0	432.14	0	0.00	0.00	0.00	0.00	0
BH	0	4.82	0	0	82.41	0	0	304.56	0	0.00	0.00	0.00	0.00	0
BG	0	3.9	0	0	86.14	0	0	190.1	0	0.00	0.00	0.00	0.00	0
BK	0	5.76	1000	0	124.56	5000	0	241.04	0	6000.00	19.08	0.101012	0	0
BR	0	3.77	0	0	163.74	0	0	310.15	0	0.00	0.00	0.00	0.00	0
CC	0	1.29	0	0	110.42	0	0	258.45	0	0.00	0.00	0.00	0.00	0
CP	0	10.21	0	0	303.05	0	0	1307.7	0	0.00	0.00	0.00	0.00	0
FH	0	1	0	0	3.5	0	0	4	0	0.00	0.00	0.00	0.00	0
FM	0	5.16	0	0	94.12	0	0	526.14	0	0.00	0.00	0.00	0.00	0
GA	0	0.82	0	0	1.1	0	0	2.87	0	0.00	0.00	0.00	0.00	0
GS	0	3.86	0	0	83.2	0	0	187.61	0	0.00	0.00	0.00	0.00	0
HB	0	3.25	0	0	48.91	0	0	393	0	0.00	0.00	0.00	0.00	0
LM	0	12.12	0	0	112.62	0	0	438.62	0	0.00	0.00	0.00	0.00	0
PK	0	2.41	0	0	3.24	0	0	4.38	0	0.00	0.00	0.00	0.00	0
RB	50000	4	200	35000	245	8575	75000	600	45000	53775.00	170.97	0.9055318	0	0
RS	0	1	0	0	3.5	0	0	4	0	0.00	0.00	0.00	0.00	0
SB	0	86.4	0	0	448.56	0	0	986.14	0	0.00	0.00	0.00	0.00	0
SD	0	1.08	0	0	3.61	0	0	4.62	0	0.00	0.00	0.00	0.00	0
TS	0	3.44	0	0	9.33	0	0	15.55	0	0.00	0.00	0.00	0.00	0
WE	0	10.47	0	0	102.61	0	0	0	0	0.00	0.00	0.00	0.00	0
										59775.00	190.05	1.00633		

Table E-32. continued

REACH 1: 0-11.3	MILES:	11.3 KILOM:	18.18509 WDIT	ADU	TOTAL BI	BIO MASS	PERCENT BIOMASS
SPECIE	NO.	WT-g	BIOMASS	NO.	WT-g	BIOMASS	(KG/HA)
SPECIE	NO.	WT-g	BIOMASS	NO.	WT-g	BIOMASS	(KG/HECT)
BB	0	1.95	0	0	67.04	0	268.75
BC	0	6.43	0	0	102.61	0	432.14
BH	0	4.82	0	0	82.41	0	304.56
BG	0	3.9	0	0	86.14	0	190.1
BK	0	5.76	0	0	124.56	0	241.04
BR	0	3.77	0	0	163.74	0	310.15
CC	0	1.29	0	0	110.42	0	258.45
CP	0	10.21	0	0	303.05	0	1307.7
FH	0	1	0	0	3.5	0	4
FM	0	5.16	0	0	94.12	0	7630
GA	0	0.82	0	0	1.1	0	2.87
GS	0	3.86	0	0	83.2	0	187.61
HB	0	3.25	0	0	48.91	0	393
LM	0	12.12	0	0	112.62	0	438.62
PK	0	2.41	0	0	3.24	0	4.38
RB	545	4	2.18	2452	245	600.74	4905
RS	0	1	0	0	3.5	0	4
SB	0	86.4	0	0	448.56	0	986.14
SD	0	1.08	0	0	3.61	0	218
TS	0	3.44	0	0	9.33	0	15.55
WE	0	10.47	0	0	102.61	0	423

Table E-32. continued

REACH 2: 11.3-22.6		MILES:	11.3 KILOM:		18.18509 WD'T	ADU	BIOMASS		PERCENT
SPECIE	NO.	WT-g	BIOMASS	NO.	WT-g	BIOMASS	NO.	(KG/HA)	BIOMASS
BB	0	1.95	0	0	67.04	0	0	268.75	0
BC	0	6.43	0	0	102.61	0	0	432.14	0
BH	0	4.82	0	0	82.41	0	0	304.56	0
BG	0	3.9	0	0	86.14	0	0	190.1	0
BK	0	5.76	0	0	124.56	0	0	241.04	0
BR	0	3.77	0	0	163.74	0	0	310.15	0
CC	0	1.29	0	0	110.42	0	0	258.45	0
CP	0	10.21	0	0	303.05	0	0	1307.7	0
FH	0	1	0	0	3.5	0	0	4	0
FM	0	5.16	0	0	94.12	0	0	230	0
GA	0	0.82	0	0	1.1	0	0	2.87	0
GS	0	3.86	0	0	83.2	0	0	187.61	0
HB	0	3.25	0	0	48.91	0	0	393	0
LM	0	12.12	0	0	112.62	0	0	438.62	0
PK	0	2.41	0	0	3.24	0	0	4.38	0
RB	460	4	1.84	4025	245	986.125	11500	600	6900
RS	0	1	0	0	3.5	0	0	4	0
SB	0	86.4	0	0	448.56	0	0	986.14	0
SD	0	1.08	0	0	3.61	0	0	4.62	0
TS	0	3.44	0	0	9.33	0	0	15.55	0
WE	0	10.47	0	0	102.61	0	0	423	0

Table E-32. continued

REACH 3: 22.6-35.9 SPECIE	MILES: YOY	WT-g	BIO MASS NO.	JUV	WT-g	BIO MASS NO.	WT-g	BIO MASS NO.	WT-g	BIO MASS NO.	WT-g	BIO MASS (KG/HECT)	BIOMASS (KG/HA)	PERCENT BIOMASS
BB	0	1.95	0	0	67.04	0	0	268.75	0	0	0	0.00	0.00	0
BC	0	6.43	0	0	102.61	0	0	432.14	0	0	0	0.00	0.00	0
BH	0	4.82	0	0	82.41	0	266	304.56	81.01296	81.01	0	0.56	0.007178	
BG	0	3.9	0	0	86.14	0	0	190.1	0	0	0	0.00	0.00	0
BK	0	5.76	0	0	124.56	0	10	241.04	2.4104	2.41	0	0.02	0.000214	
BR	0	3.77	0	266	163.74	43.55484	532	310.15	164.9998	208.55	0	1.45	0.01848	
CC	0	1.29	0	0	110.42	0	0	258.45	0	0	0	0.00	0.00	0
CP	0	10.21	0	0	303.05	0	530	1307.7	693.0969	693.10	0	4.83	0.061414	
FH	0	1	0	0	3.5	0	0	4	0	0	0	0.00	0.00	0
FM	0	5.16	0	0	94.12	0	266	526.14	139.9532	139.95	0	0.98	0.012401	
GA	0	0.82	0	0	1.1	0	0	2.87	0	0	0	0.00	0.00	0
GS	0	3.86	0	0	83.2	0	0	187.61	0	0	0	0.00	0.00	0
HB	0	3.25	0	0	48.91	0	40	393	15.72	15.72	0	0.11	0.001393	
LM	0	12.12	0	0	112.62	0	0	438.62	0	0	0	0.00	0.00	0
PK	0	2.41	0	0	3.24	0	0	4.38	0	0	0	0.00	0.00	0
RB	133	4	0.532	1663	245	407.435	16226	600	9735.6	10143.57	70.74	0.898808		
RS	0	1	0	0	3.5	0	0	4	0	0	0	0.00	0.00	0
SB	0	86.4	0	0	448.56	0	0	986.14	0	0	0	0.00	0.00	0
SD	0	1.08	0	0	3.61	0	333	4.62	1.53846	1.54	0	0.01	0.000136	
TS	0	3.44	0	0	9.33	0	0	15.55	0	0	0	0.00	0.00	0
WF	0	10.47	0	0	102.61	0	0	423	0	0	0	0.00	0.00	0
												11285.85	78.70	1.000024

Table E-32. continued

REACH 4: 35.9-61.5 MILES:		25.6 KILOM:		41.19808 WTDT		ADU		BIOMASS		PERCENT BIOMASS	
SPECIE	NO.	WT-g	BIOMASS	NO.	WT-g	BIOMASS	NO.	WT-g	BIOMASS	(KG/HA)	BIOMASS
BB	0	1.95	0	0	67.04	0	10	268.75	2.6875	2.69	0.01
BC	0	6.43	0	0	102.61	0	0	432.14	0	0.00	0
BH	3	4.82	0.01446	5	82.41	0.41205	125	304.56	38.07	38.50	0.09
BG	0	3.9	0	0	86.14	0	0	190.1	0	0.00	0
BK	0	5.76	0	0	124.56	0	5	241.04	1.2052	1.21	0.00
BR	0	3.77	0	50	163.74	8.187	300	310.15	93.045	101.23	0.23
CC	0	1.29	0	0	110.42	0	100	258.45	25.845	25.85	0.06
CP	0	10.21	0	100	303.05	30.305	5000	1307.7	6538.65	6568.96	14.90
FH	25	1	0.025	0	3.5	0	5000	4	20	20.03	0.05
FM	100	5.16	0.516	400	94.12	37.648	1200	526.14	631.368	669.53	1.52
GA	0	0.82	0	0	1.1	0	0	2.87	0	0.00	0
GS	0	3.86	0	0	83.2	0	5	187.61	0.93805	0.94	0.00
HB	500	3.25	1.625	3000	48.91	146.73	1447	393	568.671	717.03	1.63
LM	0	12.12	0	0	112.62	0	0	438.62	0	0.00	0
PPK	0	2.41	0	0	3.24	0	25	4.38	0.1095	0.11	0.00
RB	430	4	1.72	1613	245	395.185	46230	600	27738	28134.91	63.82
RS	0	1	0	0	3.5	0	0	4	0	0.00	0
SB	0	86.4	0	0	448.56	0	0	986.14	0	0.00	0
SD	0	1.08	0	0	3.61	0	3000	4.62	13.86	13.86	0.03
TS	0	3.44	0	0	9.33	0	0	15.55	0	0.00	0
WE	0	10.47	0	0	102.61	0	0	423	0	0.00	0
										36294.82	82.33

Table E-32. continued

REACH 5: 61.5-77.4 SPECIE NO.	MILES: YOY WT-g	KILOM: BIOMASS NO.	JUV WT-g	WT-g	BIOMASS NO.	ADU WT-g	BIOMASS NO.	WT-g	BIOMASS NO.	BIOMASS (KG/REAC (KG/HA))	PERCENT BIOMASS
BB	0	1.95	0	10	67.04	0.6704	10	268.75	2.6875	3.36	0.01
BC	0	6.43	0	0	102.61	0	0	432.14	0	0.00	0.000169
BH	2811	4.82	13.54902	3820	82.41	314.8062	3244	304.56	987.9926	1316.35	4.32
BG	0	3.9	0	0	86.14	0	0	190.1	0	0.00	0
BK	0	5.76	0	0	124.56	0	0	241.04	0	0.00	0
BR	0	3.77	0	3000	163.74	491.22	3000	310.15	930.45	1421.67	4.67
CC	25	1.29	0.03225	25	110.42	2.7605	100	258.45	25.845	28.64	0.09
CP	25	10.21	0.25525	400	303.05	121.22	3000	1307.7	3923.19	4044.67	13.28
FH	300	1	0.3	50	3.5	0.175	7000	4	28	28.48	0.09
FM	100	5.16	0.516	400	94.12	37.648	1200	526.14	631.368	669.53	2.20
GA	0	0.82	0	0	1.1	0	0	2.87	0	0.00	0
GS	0	3.86	0	5	83.2	0.416	0	187.61	0	0.42	0.000021
HB	2e+05	3.25	719.55	22640	48.91	1107.322	2000	393	786	2612.87	8.58
LM	0	12.12	0	0	112.62	0	0	438.62	0	0.00	0
PK	0	2.41	0	0	3.24	0	50	4.38	0.219	0.22	0.000011
RB	2230	4	8.92	15000	245	3675	10000	600	6000	9683.92	31.80
RS	0	1	0	0	3.5	0	0	4	0	0.00	0
SB	0	86.4	0	0	448.56	0	0	986.14	0	0.00	0
SD	25	1.08	0.027	0	3.61	0	5000	4.62	23.1	23.13	0.08
TS	0	3.44	0	0	9.33	0	0	15.55	0	0.00	0
WE	0	10.47	0	0	102.61	0	0	423	0	0.00	0
									19833.24	65.13	1.00

Table E-32. continued

REACH 6: 77.4-117.8 SPECIE	MILES: YOY	WT-g	BIOMASS NO.	JUV	WT-g	BIOMASS NO.	WT-g	BIOMASS NO.	WT-g	BIOMASS NO.	WT-g	BIOMASS (KG/HECT.)	PERCENT BIOMASS
BB	0	1.95	0	0	67.04	0	0	268.75	0	0.00	0.00	0.00	0
BC	0	6.43	0	0	102.61	0	0	432.14	0	0.00	0.00	0.00	0
BH	20	4.82	0.0964	139	82.41	11.45499	1137	304.56	346.2847	357.84	0.95	0.026611	
BG	0	3.9	0	0	86.14	0	0	190.1	0	0.00	0.00	0.00	0
BK	0	5.76	0	0	124.56	0	0	241.04	0	0.00	0.00	0.00	0
BR	0	3.77	0	10000	163.74	1637.4	5000	310.15	1550.75	3188.15	8.45	0.23709	
CC	0	1.29	0	10	110.42	1.1042	0	258.45	0	1.10	0.00	0.000082	
CP	0	10.21	0	20	303.05	6.061	1000	1307.7	1307.73	1313.79	3.48	0.097701	
FH	0	1	0	0	3.5	0	5000	4	20	20.00	0.05	0.001487	
FM	0	5.16	0	396	94.12	37.27152	3236	526.14	1702.589	1739.86	4.61	0.129386	
GA	0	0.82	0	0	1.1	0	0	2.87	0	0.00	0.00	0.00	0
GS	0	3.86	0	0	83.2	0	0	187.61	0	0.00	0.00	0.00	0
HB	300	3.25	0.975	25	48.91	1.22275	23	393	9.039	11.24	0.03	0.000836	
LM	0	12.12	0	0	112.62	0	0	438.62	0	0.00	0.00	0.00	0
PK	0	2.41	0	0	3.24	0	0	4.38	0	0.00	0.00	0.00	0
RB	884	4	3.536	5701	245	1396.745	8999	600	5399.4	6799.68	18.03	0.505664	
RS	0	1	0	0	3.5	0	0	4	0	0.00	0.00	0.00	0
SB	0	86.4	0	0	448.56	0	0	986.14	0	0.00	0.00	0.00	0
SD	0	1.08	0	0	3.61	0	3000	4.62	13.86	13.86	0.04	0.001031	
TS	0	3.44	0	0	9.33	0	0	15.55	0	0.00	0.00	0.00	0
WE	0	10.47	0	0	102.61	0	0	423	0	0.00	0.00	0.00	0
										13445.52	35.66		
											1.00		

Table E-32. continued

REACH 7: 117.8-125.5 MILES:		7.7 KILOM: JUV		12.39161 WIDT		70 HECT: ADU		BIOMASS TOTAL BI		BIOMASS (KG/HA)		PERCENT BIOMASS	
SPECIE NO.	YOY	WT-g	BIOMASS NO.	WT-g	BIOMASS NO.	WT-g	BIOMASS NO.	WT-g	BIOMASS TOTAL BI	(KG/HECT)	BIOMASS (KG/HA)	(KG/REAC)	PERCENT BIOMASS
BB	0	1.95	0	0	67.04	0	0	268.75	0	0.00	0.00	0.00	0
BC	0	6.43	0	0	102.61	0	0	432.14	0	0.00	0.00	0.00	0
BH	25	4.82	0.1205	100	82.41	8.241	50	304.56	15.228	23.59	0.27	0.008609	
BG	0	3.9	0	0	86.14	0	0	190.1	0	0.00	0.00	0.00	0
BK	0	5.76	0	0	124.56	0	0	241.04	0	0.00	0.00	0.00	0
BR	0	3.77	0	375	163.74	61.4025	1245	310.15	386.1368	447.54	5.16	0.163329	
CC	0	1.29	0	0	110.42	0	0	258.45	0	0.00	0.00	0.00	0
CP	0	10.21	0	10	303.05	3.0305	500	1307.7	653.865	656.90	7.57	0.239733	
FH	25	1	0.025	0	3.5	0	2500	4	10	10.03	0.12	0.003659	
FM	0	5.16	0	248	94.12	23.34176	346	526.14	182.0444	205.39	2.37	0.074955	
GA	0	0.82	0	0	1.1	0	0	2.87	0	0.00	0.00	0.00	0
GS	0	3.86	0	0	83.2	0	0	187.61	0	0.00	0.00	0.00	0
HB	2	3.25	0.0065	15	48.91	0.73365	31	393	12.183	12.92	0.15	0.004716	
LM	0	12.12	0	0	112.62	0	0	438.62	0	0.00	0.00	0.00	0
PK	0	2.41	0	0	3.24	0	0	4.38	0	0.00	0.00	0.00	0
RB	0	4	0	743	245	182.035	2002	600	1201.2	1383.24	15.95	0.504809	
RS	0	1	0	0	3.5	0	0	4	0	0.00	0.00	0.00	0
SB	0	86.4	0	0	448.56	0	0	986.14	0	0.00	0.00	0.00	0
SD	10	1.08	0.0108	0	3.61	0	50	4.62	0.231	0.24	0.00	0.000088	
TS	0	3.44	0	0	9.33	0	0	15.55	0	0.00	0.00	0.00	0
WE	0	10.47	0	0	102.61	0	0	423	0	0.00	0.00	0.00	0
									2739.84	31.59	1.00		

Table E-32. continued

REACH 8: 125.5-139.9 MILES:		14.4 KILOM:		23.17392 WIDT		64 HECT:		148.31			
SPECIE	NO.	YOY	WT-g	BIO MASS	NO.	WT-g	BIO MASS	NO.	WT-g	BIO MASS	(KG/HECT)
BB	0	1.95	0	0	67.04	0	0	268.75	0	0.00	0
BC	0	6.43	0	0	102.61	0	0	432.14	0	0.00	0
BH	5	4.82	0.0241	35	82.41	2.88435	378	304.56	115.1237	118.03	0.029674
BG	0	3.9	0	0	86.14	0	0	190.1	0	0.00	0
BK	0	5.76	0	0	124.56	0	0	241.04	0	0.00	0
BR	5	3.77	0.01885	50	163.74	8.187	650	310.15	201.5975	209.80	0.052745
CC	0	1.29	0	0	110.42	0	0	258.45	0	0.00	0
CP	0	10.21	0	25	303.05	7.57625	2000	1307.7	2615.46	2623.04	17.69
FH	0	1	0	0	3.5	0	1250	4	5	5.00	0.03
FM	0	5.16	0	100	94.12	9.412	500	526.14	263.07	272.48	1.84
GA	0	0.82	0	0	1.1	0	0	2.87	0	0.00	0
GS	0	3.86	0	0	83.2	0	0	187.61	0	0.00	0
HB	5	3.25	0.01625	20	48.91	0.9782	100	393	39.3	40.29	0.27
ILM	0	12.12	0	0	112.62	0	0	438.62	0	0.00	0
PK	0	2.41	0	0	3.24	0	20	4.38	0.0876	0.09	0.00
RB	400	4	1.6	1328	245	325.36	635	600	381	707.96	4.77
RS	0	1	0	0	3.5	0	0	4	0	0.00	0
SB	0	86.4	0	0	448.56	0	0	986.14	0	0.00	0
SD	0	1.08	0	0	3.61	0	100	4.62	0.462	0.46	0.00
TS	0	3.44	0	0	9.33	0	0	15.55	0	0.00	0.000116
WE	0	10.47	0	0	102.61	0	0	423	0	0.00	0
										3977.16	26.82

Table E-32. continued

REACH 9: 139.9-159.9 MILES:	20 KILOM:	32.186 WDWT	55 HECT:	177.02				
SPECIE	YOY	JUV	ADU					
NO.	WT-g	BIO MASS NO.	WT-g	BIO MASS NO.	WT-g	BIO MASS TOTAL BI	BIOMASS (KG/HECTA)	PERCENT BIOMASS
BB	0	1.95	0	5	67.04	0.3352	0	0.34
BC	0	6.43	0	0	102.61	0	432.14	0.00
BH	25	4.82	0.1205	445	82.41	36.67245	867	304.56
BG	0	3.9	0	0	86.14	0	190.1	0.00
BK	0	5.76	0	0	124.56	0	241.04	0.48
BR	0	3.77	0	5	163.74	0.8187	20	310.15
CC	5	1.29	0.00645	0	110.42	0	10	258.45
CP	0	10.21	0	515	303.05	156.0708	3045	1307.7
FH	10	1	0.01	0	3.5	0	1500	4
FM	50	5.16	0.258	165	94.12	15.5298	1580	526.14
GA	0	0.82	0	0	1.1	0	0	2.87
GS	0	3.86	0	0	83.2	0	0	187.61
HB	0	3.25	0	0	48.91	0	15	393
LM	0	12.12	0	0	112.62	0	0	438.62
PK	0	2.41	0	0	3.24	0	200	4.38
RB	5	4	0.02	125	245	30.625	565	600
RS	0	1	0	0	3.5	0	0	4
SB	0	86.4	0	0	448.56	0	20	986.14
SD	10	1.08	0.0108	188	3.61	0.67868	5600	4.62
TS	0	3.44	0	0	9.33	0	0	15.55
WE	0	10.47	0	0	102.61	0	0	423
							0	0.00
							0	0
							5725.18	32.34
							1.000062	

Table E-32. continued

REACH 10: 159.9-213.9 MILES:		54 KILOM:			86.9022 WIDT			ADU			95 HECT:			825.57		
SPECIE	YOY	JUV	WT-g	BIOMASS	NO.	WT-g	BIOMASS	NO.	WT-g	BIOMASS	NO.	WT-g	BIOMASS	NO.	WT-g	BIOMASS
														(KG/REAC	(KG/HA)	PERCENT BIOMASS
BB	0	1.95	0	0	67.04	0	0	268.75	0	0.00	0	0.00	0	0.00	0	0
BC	0	6.43	0	0	102.61	0	0	432.14	0	0.00	0	0.00	0	0.00	0	0
BH	50	4.82	0.241	200	82.41	16.482	150	304.56	45.684	62.41	0.08	0.08	0.009414			
BG	0	3.9	0	0	86.14	0	0	190.1	0	0.00	0	0.00	0	0.00	0	0
BK	0	5.76	0	0	124.56	0	1	241.04	0.24104	0.24	0.00	0.00	0.000036			
BR	0	3.77	0	15	163.74	2.4561	20	310.15	6.203	8.66	0.01	0.01	0.001306			
CC	0	1.29	0	0	110.42	0	350	258.45	90.4575	90.46	0.11	0.11	0.013645			
CP	0	10.21	0	50	303.05	15.1525	3523	1307.7	4607.133	4622.29	5.60	5.60	0.697248			
FH	100	1	0.1	50	3.5	0.175	7000	4	28	28.28	0.03	0.03	0.004265			
FM	1990	5.16	10.2684	5003	94.12	470.8824	2152	526.14	1132.253	1613.40	1.95	1.95	0.243374			
GA	0	0.82	0	0	1.1	0	0	2.87	0	0.00	0	0.00	0	0.00	0	0
GS	5	3.86	0.0193	0	83.2	0	0	187.61	0	0.02	0.02	0.00	0.000003			
HB	0	3.25	0	5	48.91	0.24455	10	393	3.93	4.17	0.01	0.01	0.00063			
LM	0	12.12	0	0	112.62	0	0	438.62	0	0.00	0.00	0.00	0	0.00	0	0
PK	0	2.41	0	5	3.24	0.0162	20	4.38	0.0876	0.10	0.00	0.00	0.000016			
RB	20	4	0.08	164	245	40.18	150	600	90	130.26	0.16	0.16	0.019649			
RS	0	1	0	0	3.5	0	0	4	0	0.00	0.00	0.00	0	0.00	0	0
SB	0	86.4	0	0	448.56	0	20	986.14	19.7228	19.72	0.02	0.02	0.002975			
SD	0	1.08	0	3000	3.61	10.83	8000	4.62	36.96	47.79	0.06	0.06	0.007209			
TS	0	3.44	0	0	9.33	0	0	15.55	0	0.00	0.00	0.00	0	0.000128		
WE	0	10.47	0	0	102.61	0	2	423	0.846	0.85	0.00	0.00	0.999897		8.03	8.03

Table E-32. continued

REACH 11: 213.9-225.0 MILES:	11.1 KILOM:	17.86323 WIDT	ADU	73 HECT:	130.40
SPECIE	YOY	JUV	WT-g BIOMASS NO.	WT-g BIOMASS NO.	WT-g BIOMASS TOTAL BI
NO.	WT-g BIOMASS	WT-g BIOMASS	WT-g BIOMASS	WT-g BIOMASS	(KG/HECT)
BB	0 1.95	0 0	67.04 0	0 268.75	0 0.00
BC	0 6.43	0 0	102.61 0	0 432.14	0 0.00
BH	0 4.82	0 50	82.41 4.1205	75 304.56	22.842 26.96
BG	0 3.9	0 0	86.14 0	0 190.1	0 0.00
BK	0 5.76	0 0	124.56 0	0 241.04	0 0.00
BR	0 3.77	0 15	163.74 2.4561	5 310.15	1.55075 4.01
CC	0 1.29	0 10	110.42 1.1042	325 258.45	83.99625 85.10
CP	25 10.21	0.25525 50	303.05 15.1525	1236 1307.7	1616.354 1631.76
FH	0 1	0 0	3.5 0	100 4	0.4 0.40
FM	25 5.16	0.129 213	94.12 20.04756	542 526.14	285.1679 305.34
GA	0 0.82	0 0	1.1 0	0 2.87	0 0.00
GS	0 3.86	0 0	83.2 0	0 187.61	0 0.00
HB	0 3.25	0 5	48.91 0.24455	5 393	1.965 2.21
LM	0 12.12	0 0	112.62 0	0 438.62	0 0.00
PK	0 2.41	0 0	3.24 0	0 4.38	0 0.00
RB	5 4	0.02 10	245 2.45	20 600	12 14.47
RS	0 1	0 0	3.5 0	0 4	0 0.00
SB	0 86.4	0 0	448.56 0	30 986.14	29.5842 29.58
SD	0 1.08	0 0	3.61 0	756 4.62	3.49272 3.49
TS	0 3.44	0 0	9.33 0	0 15.55	0 0.00
WE	0 10.47	0 0	102.61 0	0 423	0 0.00
					2103.33 16.13
					0.999991

Table E-32. continued

REACH 11a: 213.9-235. MILES: SPECIE NO.	YOY WT-g	BIO MASS NO.	JUV WT-g	BIO MASS NO.	WT-g	BIOMASS NO.	WT-g	BIOMASS NO.	WT-g	BIOMASS NO.	WT-g	BIOMASS (KG/HECT)	PERCENT BIOMASS
BB	0	1.95	0	0	67.04	0	0	268.75	0	0.00	0.00	0.00	0
BC	0	6.43	0	0	102.61	0	0	432.14	0	0.00	0.00	0.00	0
BH	0	4.82	0	50	82.41	4.1205	25	304.56	7.614	11.73	0.07	0.004529	
BG	0	3.9	0	0	86.14	0	0	190.1	0	0.00	0.00	0.00	0
BK	0	5.76	0	0	124.56	0	0	241.04	0	0.00	0.00	0.00	0
BR	0	3.77	0	0	163.74	0	0	310.15	0	0.00	0.00	0.00	0
CC	0	1.29	0	0	110.42	0	450	258.45	116.3025	116.30	0.69	0.04489	
CP	0	10.21	0	0	303.05	0	1800	1307.7	2353.914	2353.91	13.86	0.908551	
FH	0	1	0	0	3.5	0	0	4	0	0.00	0.00	0.00	0
FM	0	5.16	0	0	94.12	0	180	526.14	94.7052	94.71	0.56	0.036554	
GA	0	0.82	0	0	1.1	0	0	2.87	0	0.00	0.00	0.00	0
GS	0	3.86	0	0	83.2	0	0	187.61	0	0.00	0.00	0.00	0
HB	0	3.25	0	0	48.91	0	0	393	0	0.00	0.00	0.00	0
LM	0	12.12	0	0	112.62	0	0	438.62	0	0.00	0.00	0.00	0
PK	0	2.41	0	0	3.24	0	0	4.38	0	0.00	0.00	0.00	0
RB	0	4	0	0	245	0	5	600	3	3.00	0.02	0.001158	
RS	0	1	0	0	3.5	0	0	4	0	0.00	0.00	0.00	0
SB	0	86.4	0	0	448.56	0	10	986.14	9.8614	9.86	0.06	0.003806	
SD	25	1.08	0.027	25	3.61	0.09025	350	4.62	1.617	1.73	0.01	0.000669	
TS	0	3.44	0	0	9.33	0	0	15.55	0	0.00	0.00	0.00	0
WE	0	10.47	0	0	102.61	0	0	423	0	0.00	0.00	0.00	0
										2591.25	15.26	1.000158	

Table E-32. continued

REACH: 235.1-251.9	MILES:	16.8 KILOM:	27.03624 WIDT	80 HECT:	216.29							
SPECIE	YOY	JUV	WT-g	BIOMASS NO.	WT-g	BIOMASS NO.	WT-g	BIOMASS	(KG/HECT)	BIOMASS	(KG/HA)	PERCENT BIOMASS
NO.	WT-g	BIOMASS	NO.	WT-g	BIOMASS	NO.	WT-g	BIOMASS	(KG/REAC	BIOMASS	(KG/HA)	
BB	0	1.95	0	67.04	0	0	268.75	0	0.00	0.00	0.00	0
BC	0	6.43	0	102.61	0	0	432.14	0	0.00	0.00	0.00	0
BH	0	4.82	0	82.41	0	0	304.56	0	0.00	0.00	0.00	0
BG	0	3.9	0	86.14	0	0	190.1	0	0.00	0.00	0.00	0
BK	0	5.76	0	124.56	0	0	241.04	0	0.00	0.00	0.00	0
BR	0	3.77	0	163.74	0	0	310.15	0	0.00	0.00	0.00	0
CC	0	1.29	0	1865	110.42	205.9333	3155	258.45	815.4098	1021.34	4.72	0.062761
CP	825	10.21	8.42325	755	303.05	228.8028	7450	1307.7	9742.589	9979.81	46.14	0.61325
FH	1545	1	1.545	10250	3.5	35.875	25100	4	100.4	137.82	0.64	0.008469
FM	350	5.16	1.806	835	94.12	78.5902	150	526.14	78.921	159.32	0.74	0.00979
GA	0	0.82	0	100	1.1	0.11	800	2.87	2.296	2.41	0.01	0.000148
GS	25	3.86	0.0965	0	83.2	0	0	187.61	0	0.10	0.00	0.000006
HB	0	3.25	0	0	48.91	0	0	393	0	0.00	0.00	0
LM	0	12.12	0	25	112.62	2.8155	25	438.62	10.9655	13.78	0.06	0.000847
PK	0	2.41	0	100	3.24	0.324	500	4.38	2.19	2.51	0.01	0.000154
RB	0	4	0	1	245	0.245	0	600	0	0.25	0.00	0.000015
RS	15000	1	15	45000	3.5	157.5	5e+05	4	2000	2172.50	10.04	0.133498
SB	0	86.4	0	1500	448.56	672.84	2100	986.14	2070.894	2743.73	12.69	0.1686
SD	0	1.08	0	0	3.61	0	3450	4.62	15.939	15.94	0.07	0.000979
TS	0	3.44	0	0	9.33	0	150	15.55	2.3325	2.33	0.01	0.000143
WF	0	10.47	0	0	102.61	0	50	423	21.15	21.15	0.10	0.0013
										16272.99	75.24	0.999959

Table E-32. continued

REACH: 252.0-265.0		MILES: YOY		13 KILOM: JUV		20.9209 WIDT		ADU		BIOMASS (KG/HA)		PERCENT BIOMASS	
SPECIE	NO.	WT-g	BIOMASS NO.	WT-g	BIOMASS NO.	WT-g	BIOMASS NO.	WT-g	BIOMASS (KG/REAC	BIOMASS (KG/HA)	BIOMASS (KG/REAC	PERCENT BIOMASS	
BB	0	1.95	0	0	67.04	0	0	268.75	0	0.00	0.00	0	
BC	0	6.43	0	0	102.61	0	150	432.14	64.82	0.31	0.009279	0	
BH	0	4.82	0	0	82.41	0	0	304.56	0	0.00	0.00	0	
BG	0	3.9	0	0	86.14	0	0	190.1	0	0.00	0.00	0	
BK	0	5.76	0	0	124.56	0	0	241.04	0	0.00	0.00	0	
BR	0	3.77	0	0	163.74	0	0	310.15	0	0.00	0.00	0	
CC	0	1.29	0	0	110.42	0	845	258.45	218.393	218.39	1.04	0.031263	
CP	185	10.21	1.88885	396	303.05	120.0078	3545	1307.7	4635.903	4757.80	22.74	0.681094	
FH	3500	1	3.5	1500	3.5	5.25	3500	4	14	22.75	0.11	0.003257	
FM	0	5.16	0	50	94.12	4.706	150	526.14	78.921	83.63	0.40	0.011971	
GA	300	0.82	0.246	350	1.1	0.385	1000	2.87	2.87	3.50	0.02	0.000501	
GS	0	3.86	0	150	83.2	12.48	50	187.61	9.3805	21.86	0.10	0.003129	
HB	0	3.25	0	0	48.91	0	1	393	0.393	0.39	0.00	0.000056	
LM	25	12.12	0.303	25	112.62	2.8155	0	438.62	0	3.12	0.01	0.000446	
PK	0	2.41	0	100	3.24	0.324	50	4.38	0.219	0.54	0.00	0.000078	
RB	0	4	0	0	245	0	0	600	0	0.00	0.00	0	
RS	10000	1	10	15000	3.5	52.5 1e+05	4	400	462.50	2.21	0.066208		
SB	0	86.4	0	500	448.56	224.28	1100	986.14	1084.754	1309.03	6.26	0.187392	
SD	0	1.08	0	0	3.61	0	3000	4.62	13.86	13.86	0.07	0.001984	
TS	100	3.44	0.344	0	9.33	0	1500	15.55	23.325	23.67	0.11	0.003388	
WE	0	10.47	0	0	102.61	0	50	0	0	0.00	0.00	0	
												33.39	1.000049

REACH: 265.1-280.0 MILES: 14.9 KILOM: 23.97857 WIDT: 150 HECT: 359.68

SPECIE	NO.	WT-g	BIOMASS	NO.	WT-g	BIOMASS	NO.	WT-g	BIOMASS	ADU	BIOMASS	(KG/HECT)	PERCENT BIOMASS
BB	0	1.95	0	150	67.04	10.056	350	268.75	94.0625	104.12	0.29	0.00679	
BC	565	6.43	3.63295	500	102.61	51.305	1500	432.14	648.21	703.15	1.95	0.045858	
BH	0	4.82	0	0	82.41	0	0	304.56	0	0.00	0.00	0	
BG	2300	3.9	8.97	1800	86.14	155.052	650	190.1	123.565	287.59	0.80	0.018756	
BK	0	5.76	0	0	124.56	0	0	241.04	0	0.00	0.00	0	
BR	0	3.77	0	0	163.74	0	0	310.15	0	0.00	0.00	0	
CC	0	1.29	0	0	110.42	0	650	258.45	167.9925	167.99	0.47	0.010956	
CP	565	10.21	5.76865	800	303.05	242.44	7000	1307.7	9154.11	9402.32	26.14	0.613202	
FH	500	1	0.5	350	3.5	1.225	3000	4	12	13.73	0.04	0.000895	
FM	0	5.16	0	50	94.12	4.706	35	526.14	18.4149	23.12	0.06	0.001508	
GA	545	0.82	0.4469	565	1.1	0.6215	3545	2.87	10.17415	11.24	0.03	0.000733	
GS	0	3.86	0	150	83.2	12.48	350	187.61	65.6635	78.14	0.22	0.005096	
HB	0	3.25	0	0	48.91	0	1	393	0.393	0.39	0.00	0.000026	
LM	125	12.12	1.515	345	112.62	38.8539	110	438.62	48.2482	88.62	0.25	0.005779	
PK	0	2.41	0	100	3.24	0.324	0	4.38	0	0.32	0.00	0.000021	
RB	0	4	0	0	245	0	3	600	1.8	1.80	0.01	0.000117	
RS	5000	1	5	7000	3.5	24.5 2e+05	4	800	829.50	2.31	0.054098		
SB	0	86.4	0	0	448.56	0	3300	986.14	3254.262	3254.26	9.05	0.212237	
SD	0	1.08	0	0	3.61	0	3000	4.62	13.86	13.86	0.04	0.0000904	
TS	56000	3.44	192.64	7665	9.33	71.51445	5650	15.55	87.8575	352.01	0.98	0.022958	
WE	0	10.47	0	0	102.61	0	25	0	0	0.00	0.00	0	
									15332.16	42.63	0.999935		

	BIOMASS (KG/HA)	PERCENT BIOMASS
2. Rainbow trout biomass (kg/ha) in Reaches 8-11 ----->	292.80	0.703954
3. Rainbow trout biomass (kg/ha) in Reaches 1-11 ----->	299.93	0.600758
4. Carp biomass (kg/ha) in Reaches 1-7 ----->	44.08	0.105965
5. Carp biomass (kg/ha) in Reaches 8-11 ----->	59.18	0.710235
6. Carp biomass (kg/ha) in Reaches 1-11 ----->	103.25	0.206808
7. Carp biomass (kg/ha) in Reaches 8-15 ----->	168.06	0.672694

1. Rainbow trout biomass (kg/ha) in Reaches 1-7 ----->
2. Rainbow trout biomass (kg/ha) in Reaches 8-11 ----->
3. Rainbow trout biomass (kg/ha) in Reaches 1-11 ----->

4. Carp biomass (kg/ha) in Reaches 1-7 ----->
5. Carp biomass (kg/ha) in Reaches 8-11 ----->
6. Carp biomass (kg/ha) in Reaches 1-11 ----->
7. Carp biomass (kg/ha) in Reaches 8-15 ----->

Table E-33. Capture and recapture information for 202 PIT-tagged flannelmouth suckers (TL&gt;200 mm) from the Colorado River Grand Canyon

PIT_TAG	Capture Date	Capture RM	Capture TL	Capture WT	Recapture Date	Recapture RM	Recapture TL	Recapture WT	Miles Moved	Change TL	Change WT
1F0C74461B	5/17/93	143.40	334	255	5/19/93	143.40	330	351	2	0.00	0
1F0C746C75	5/18/93	143.40	538	1700	5/19/93	143.30	540	1696	1	0.10	161
1F0C752937	5/18/93	143.30	352	428	5/18/93	143.30	347	418	0	0.00	0
1F0C752937	5/18/93	143.30	347	418	5/19/93	143.30	359	425	1	0.00	0
1F0C767F60	5/20/93	156.70	335	257	9/25/93	167.00	288	537	128	-10.30	-16576
1F0C773727	5/18/93	143.40	329	354	9/23/93	142.45	375	520	128	0.95	1529
1F0C7A7665	5/18/93	143.40	312	303	5/18/93	143.20	310	306	0	0.20	322
1F0C7B5C7E	5/19/93	156.70	332	383	5/20/93	156.70	334	389	1	0.00	0
1F0C7C2A2F	5/18/93	143.40	206	79	7/19/93	127.20	233	103	0	0.00	0
1F0C7C2A2F	7/19/93	127.20	233	103	9/20/93	126.20	243	130	125	17.20	27681
1F0F5F5F14	5/18/93	143.20	323	710	5/18/93	143.40	425	707	0	-0.20	-322
1F0F637778	5/18/93	143.40	311	293	9/19/93	127.10	372	471	124	16.30	26232
1F0F637778	9/19/93	127.10	372	471	9/21/93	127.10	373	465	2	0.00	0
1F0F662D3F	5/17/93	143.40	280	191	5/18/93	143.40	275	185	1	0.00	0
1F0F6A5216	5/17/93	143.40	312	305	5/18/93	143.40	311	301	1	0.00	0
1F0F6B6B7C	5/18/93	143.40	362	497	11/15/93	143.35	394	590	181	0.05	80
1F0F6C085E	5/18/93	143.40	326	340	7/21/93	141.40	331	316	64	2.00	3219
1F0F6C3234	11/15/93	143.40	484	1077	11/15/93	143.40	475	1096	0	0.00	0
1F0F6D0065	5/18/93	143.40	334	0	7/20/93	126.20	356	522	63	17.20	27681
1F0F703E24	5/17/93	143.40	277	194	5/18/93	143.40	272	188	1	0.00	0
1F0F742737	5/18/93	143.40	498	1028	9/21/93	127.10	500	1133	126	16.30	26232

Table E-33. continued

PIT_TAG	Capture Date	Capture RM	Capture TL	Capture WT	Recapture Date	Recapture RM	Recapture TL	Recapture WT	Days Moved	Miles Moved	Meters Moved	Change TL	Change WT
1F0F761448	5/18/93	143.40	331	389	6/23/93	143.30	348	416	36	0.10	161	17	27
1F0F77005B	5/18/93	143.20	389	687	7/21/93	143.30	416	810	64	-0.10	-161	27	123
1F0F77D1E37	5/18/93	143.30	525	1460	7/21/93	143.40	547	1476	64	-0.10	-161	22	16
1F1E2B4454	7/12/93	58.85	185	53	9/13/93	58.85	211	79	63	0.00	0	26	26
1F1E454B33	7/15/93	119.20	442	883	7/16/93	118.80	444	858	1	0.40	644	2	-25
1F1E473646	9/22/93	143.25	402	616	9/22/93	143.30	398	610	0	-0.05	-80	-4	-6
1F1F64025C	10/13/93	60.20	260	155	10/15/93	60.32	260	141	2	-0.12	-193	0	-14
1F1F6C3E18	7/17/93	65.25	293	233	7/21/93	66.90	291	221	4	-1.65	-2655	-2	-12
1F20282B6E	9/20/93	127.10	570	1891	9/21/93	127.10	0	0	1	0.00	0	0	0
1F2045700C	10/13/93	60.50	515	1182	10/14/93	61.20	512	1158	1	-0.70	-1127	-3	-24
1F204B5D19	9/13/93	87.20	547	1558	11/7/93	87.70	544	1540	55	-0.50	-805	-3	-18
1F2B7A6C50	9/22/93	143.25	343	299	9/22/93	143.25	339	302	0	0.00	0	-4	3
1F30612729	9/10/93	30.70	520	1469	10/9/93	30.60	517	1452	29	0.10	161	-3	-17
7F7B02072E	5/17/93	143.40	280	199	5/18/93	143.40	278	198	1	0.00	0	-2	-1
7F7B020B5C	3/18/93	61.30	491	1336	4/14/93	61.50	485	1295	27	-0.20	-322	-6	-41
7F7B026635	1/15/93	62.10	353	471	9/17/93	61.75	415	595	245	0.35	563	62	124
7F7B033106	3/12/93	86.20	312	329	5/7/93	83.80	314	320	56	2.40	3862	2	-9
7F7B03420F	2/17/93	62.25	342	391	11/5/93	58.80	425	690	261	3.45	5552	83	299
7F7B034A2B	5/17/93	143.40	311	300	9/23/93	143.40	357	440	129	0.00	0	46	140
7F7B035430	4/16/93	65.25	250	153	4/16/93	65.25	250	153	0	0.00	0	0	0

Table E-33. continued

PIT_TAG	Capture Date	Capture RM	Capture TL	Capture WT	Recapture Date	Recapture RM	Recapture TL	Recapture WT	Days Moved	Miles Moved	Meters Moved	Change TL	Change WT
7F7B035430	4/16/93	65.25	250	153	4/16/93	65.25	246	153	0	0.00	0	-4	0
7F7B0D4B37	5/17/93	143.40	374	448	11/13/93	127.10	430	695	180	16.30	26232	56	247
7F7D02753E	5/10/92	62.40	584	2120	1/19/93	71.20	601	2699	254	-8.80	-14162	17	579
7F7D07240E	9/18/91	143.10	479	1077	3/20/93	143.30	468	1015	549	-0.20	-322	-11	-62
7F7D075F74	5/7/93	83.90	381	585	5/8/93	83.80	379	573	1	0.10	161	-2	-12
7F7D077E26	9/11/91	108.60	253	113	9/11/91	108.60	253	113	0	0.00	0	0	0
7F7D080222	9/11/91	108.60	280	0	11/9/93	108.20	445	903	790	0.40	644	165	0
7F7D080573	9/19/91	167.90	247	57	5/19/93	156.40	341	416	608	11.50	18507	94	359
7F7D081545	7/13/92	61.30	613	2250	9/16/92	61.70	620	2318	65	-0.40	-644	7	68
7F7D081751	9/17/91	142.80	274	198	5/18/93	143.40	365	504	609	-0.60	-966	91	306
7F7D082166	9/12/91	61.30	513	1304	9/25/92	222.20	400	725	189	0.20	322	45	171
7F7D084F1C	9/17/91	142.80	472	1134	5/15/92	143.50	467	870	241	-0.70	-1127	-5	-264
7F7D085611	7/16/92	119.10	334	360	9/17/92	119.90	336	396	63	-0.80	-1287	2	36
7F7D085814	3/14/92	156.70	355	445	8/15/93	61.51	426	698	519	95.19	153193	71	253
7F7D086355	11/7/91	87.10	293	312	8/19/93	67.92	360	465	651	19.18	30867	67	153
7F7D086355	8/19/93	67.92	360	465	8/20/93	67.92	360	465	1	0.00	0	0	0
7F7D087E12	1/14/92	108.30	258	199	11/9/93	108.10	379	540	665	0.20	322	121	341
7F7D087E12	11/9/93	108.10	379	540	11/10/93	108.30	368	546	1	-0.20	-322	-11	6
7F7D1B6C1A	3/10/92	61.90	330	372	7/16/93	61.70	435	696	493	0.20	322	105	324
7F7D1B723D	3/11/92	61.35	541	1490	3/11/92	61.35	541	1490	0	0.00	0	0	0

Table E-33. continued

PIT_TAG	Capture Date	Capture RM	Capture TL	Capture WT	Recapture Date	Recapture RM	Recapture TL	Recapture WT	Days Moved	Miles Moved	Meters Moved	Change TL	Change WT
7F7D1D2F24	5/18/93	143.40	366	550	6/23/93	143.20	380	596	36	0.20	322	14	46
7F7D1D3A37	5/18/93	143.20	346	435	6/22/93	143.30	365	492	35	-0.10	-161	19	57
7F7D224C02	11/7/92	60.75	335	356	1/14/93	61.30	340	410	68	-0.55	-885	5	54
7F7D2A7166	3/5/92	58.35	577	1903	7/15/93	61.40	590	1955	497	-3.05	-4908	13	52
7F7D2B157D	1/15/93	61.90	412	719	3/19/93	61.55	425	769	63	0.35	563	13	50
7F7D2B157D	3/19/93	61.55	425	769	5/14/93	61.35	428	757	56	0.20	322	3	-12
7F7D2B1D72	5/8/92	61.90	345	438	5/8/92	61.90	345	0	0	0.00	0	0	0
7F7D2B586A	7/11/92	58.30	535	1702	3/18/93	61.30	538	1652	250	-3.00	-4828	3	-50
7F7D2B586A	3/18/93	61.30	538	1652	7/12/93	58.85	544	1537	116	2.45	3943	6	-115
7F7D2B586A	7/12/93	58.85	544	1537	7/13/93	58.85	543	1515	1	0.00	0	-1	-22
7F7D2B5949	9/18/93	127.10	504	1252	9/19/93	127.10	501	1215	1	0.00	0	-3	-37
7F7D3E7F1A	1/15/93	60.40	522	1637	5/15/93	62.15	528	1448	120	-1.75	-2816	6	-189
7F7D3F7A2D	4/11/93	30.60	505	1306	5/14/93	61.15	523	1222	33	-30.55	-49165	18	-84
7F7D400C0A	5/10/93	59.25	446	984	5/10/93	59.25	446	984	0	0.00	0	0	0
7F7D441029	9/13/93	87.30	325	319	11/7/93	87.40	335	350	55	-0.10	-161	10	31
7F7D445850	1/14/93	61.30	582	2193	5/14/93	61.40	583	1740	120	-0.10	-161	1	-453
7F7E427F44	3/11/92	61.30	316	293	4/11/92	61.20	305	322	31	0.10	161	-11	29
7F7E43116D	11/7/91	58.80	530	1510	11/8/91	58.80	530	1505	1	0.00	0	0	-5
7F7E43116D	11/8/91	58.80	530	1505	3/6/92	87.70	520	1531	119	-28.90	-46510	-10	26
7F7E43174A	3/10/92	62.20	304	252	1/15/93	62.25	370	466	311	-0.05	-80	66	214
7F7E43263D	3/9/92	61.10	427	758	4/12/92	61.50	420	720	34	-0.40	-644	-7	-38

Table E-33, continued

PIT_TAG	Capture Date	Capture RM	Capture TL	Capture WT	Recapture Date	Recapture RM	Recapture TL	Recapture WT	Days Moved	Miles Moved	Meters Moved	Change TL	Change WT
7F7E43274E	6/15/92	61.40	398	641	4/14/93	61.70	423	875	303	-0.30	-483	25	234
7F7E432A4C	11/7/91	58.80	450	894	9/11/92	59.25	470	1086	309	-0.45	-724	20	192
7F7E432A70	11/7/91	58.80	427	788	11/7/91	58.80	427	788	0	0.00	0	0	0
7F7F0E2618	7/16/92	119.00	279	198	7/16/92	119.10	275	196	0	-0.10	-161	4	-2
7F7F103F4F	1/14/92	61.30	435	869	5/13/92	61.50	443	822	120	-0.20	-322	8	-47
7F7F18395C	9/12/92	60.20	556	1870	9/14/92	61.30	554	1502	2	-1.10	-1770	-2	-368
7F7F195E09	11/11/91	61.30	570	1809	8/16/93	61.60	575	1915	644	-0.30	-483	5	106
7F7F1F0C6B	6/13/93	62.25	562	1713	9/17/93	61.50	586	1920	96	0.75	1207	24	207
7F7F1F0D62	11/9/92	142.60	341	376	5/18/93	143.40	360	453	190	-0.80	-1287	19	77
7F7F1F0E47	5/10/93	87.50	468	1107	9/14/93	87.70	476	1220	127	-0.20	-322	8	113
7F7F1F0E5F	5/8/92	87.30	461	980	5/10/92	87.30	459	948	2	0.00	0	-2	-32
7F7F1F0F6A	5/15/92	143.50	456	960	5/15/92	143.50	459	960	0	0.00	0	3	0
7F7F1F125B	5/17/92	143.40	336	345	5/20/93	156.60	364	499	368	-13.20	-21243	28	154
7F7F1F1668	5/10/92	87.60	519	1270	10/31/92	87.70	0	0	174	-0.10	-161	0	0
7F7F1F1814	7/10/92	73.40	429	886	5/9/93	87.70	442	799	303	-14.30	-23014	13	-87
7F7F1F184F	3/12/93	87.70	500	1422	3/13/93	87.70	498	1418	1	0.00	0	-2	-4
7F7F1F1868	6/22/93	143.00	308	270	7/20/93	143.35	303	254	28	-0.35	-563	-5	-16
7F7F1F1C1D	11/9/92	143.30	304	297	11/15/93	143.30	371	523	371	0.00	0	67	226
7F7F1F1C66	9/20/92	142.20	224	89	5/18/93	143.40	239	135	240	-1.20	-1931	15	46
7F7F1F274D	3/13/93	108.30	350	472	5/12/93	108.30	354	493	60	0.00	0	4	21
7F7F1F6A00	11/11/91	61.50	433	762	2/15/93	61.30	485	1242	462	0.20	322	52	480

Table E-33. continued

PIT_TAG	Capture Date	Capture RM	Capture TL	Capture WT	Recapture Date	Recapture RM	Recapture TL	Recapture WT	Days	Miles Moved	Meters Moved	Change TL	Change WT
7F7F1F6E7A	11/11/91	61.40	532	1523	3/11/93	87.70	551	1633	486	-26.30	-42326	19	110
7F7F1F713F	1/14/92	61.30	510	1554	7/14/92	61.30	510	1445	182	0.00	0	0	-109
7F7F1F7337	11/11/91	61.30	504	1489	3/15/92	156.70	497	1365	125	-95.40	-153531	-7	-124
7F7F1F7337	3/15/92	156.70	497	1365	3/15/92	156.70	499	1359	0	0.00	0	2	-6
7F7F1F7B4E	11/11/91	126.10	558	2155	5/20/93	156.70	556	2137	556	-30.60	-49246	-2	-18
7F7F1F7B78	5/13/92	61.40	373	474	9/14/92	61.30	415	627	124	0.10	161	42	153
7F7F1F7C00	1/18/92	60.90	510	1375	9/10/92	75.70	522	1361	236	-14.80	-23818	12	-14
7F7F1F7C00	9/10/92	75.70	522	1361	9/11/92	75.70	512	1354	1	0.00	0	-10	-7
7F7F1F7D79	1/23/92	214.00	350	391	3/20/92	213.60	350	403	57	0.40	644	0	12
7F7F20042D	9/16/92	61.90	449	798	8/14/93	60.18	499	1097	332	1.72	2768	50	299
7F7F212B1B	11/11/91	61.40	434	934	1/13/92	60.50	438	1017	63	0.90	1448	4	83
7F7F213128	5/11/92	61.50	545	1517	5/11/92	61.50	545	1474	0	0.00	0	0	-43
7F7F213239	11/18/91	156.70	503	1304	3/15/92	156.70	495	1132	118	0.00	0	-8	-172
7F7F213239	3/15/92	156.70	495	1132	9/26/93	173.10	518	1417	560	-16.40	-26393	23	285
7F7F214218	5/11/92	61.50	248	147	8/15/92	61.80	282	240	96	-0.30	-483	34	93
7F7F21721E	11/18/91	156.70	535	1531	11/11/92	156.50	540	1428	359	0.20	322	5	-103
7F7F217834	5/9/92	61.40	539	1458	5/11/92	62.80	550	1477	2	-1.40	-2253	11	19
7F7F217F4E	11/10/91	61.00	385	595	3/4/92	58.25	405	680	115	2.75	4426	20	85
7F7F22073F	9/14/92	108.10	512	1242	7/15/93	60.90	516	1273	304	47.20	75961	4	31
7F7F22073F	7/15/93	60.90	516	1273	10/12/93	58.80	520	1278	89	2.10	3380	4	5

Table E-33. continued

PIT_TAG	Capture Date	Capture RM	Capture TL	Capture WT	Recapture Date	Recapture RM	Recapture TL	Recapture WT	Days Moved	Miles Moved	Meters Moved	Change TL	Change WT
7F7F220745	7/25/93	214.00	430	845	7/26/93	214.00	430	845	1	0.00	0	0	0
7F7F220745	7/26/93	214.00	430	845	7/26/93	214.00	430	845	0	0.00	0	0	0
7F7F220745	7/26/93	214.00	430	845	10/13/93	60.50	426	796	79	153.50	247034	-4	-49
7F7F26491D	5/18/92	143.20	272	172	5/18/93	143.20	332	364	365	0.00	0	60	192
7F7F264B1A	7/23/92	183.80	208	72	5/22/93	184.10	261	137	303	-0.30	-483	53	65
7F7F264E6A	5/9/93	87.70	575	2176	9/14/93	87.30	579	2247	128	0.40	644	4	71
7F7F264F55	7/15/92	119.00	268	129	7/17/92	119.00	243	126	2	0.00	0	-25	-3
7F7F265115	5/9/93	87.10	477	1322	5/10/93	87.70	475	1320	1	-0.60	-966	-2	-2
7F7F265A47	7/15/93	119.85	242	145	9/18/93	120.50	257	164	65	-0.65	-1046	15	19
7F7F265B00	5/19/92	156.30	360	402	9/18/92	127.00	390	562	122	29.30	47154	30	160
7F7F27220A	9/11/92	87.50	435	817	8/14/93	61.30	468	1022	337	26.20	42165	33	205
7F7F27304F	1/10/92	55.40	531	1474	3/6/92	58.30	530	1474	56	-2.90	-4667	-1	0
7F7F273342	3/15/92	156.70	464	990	3/16/92	156.70	468	952	1	0.00	0	4	-38
7F7F284308	5/9/92	87.60	460	936	5/10/93	87.50	465	1073	366	0.10	161	5	137
7F7F28484B	5/9/92	87.60	568	1531	5/9/93	83.80	566	1797	365	3.80	6116	-2	266
7F7F284906	11/11/92	155.00	239	130	5/20/93	156.70	262	185	190	-1.70	-2736	23	55
7F7F28492C	5/18/92	156.70	320	283	5/17/93	143.40	361	477	364	13.30	21404	41	194
7F7F284A52	9/12/92	61.75	189	73	5/17/93	63.50	220	88	247	-1.75	-2816	31	15
7F7F28770C	7/16/93	61.25	434	1027	10/14/93	61.15	435	1160	90	0.10	161	1	133
7F7F287953	5/20/93	156.10	533	1226	5/20/93	156.70	540	1186	0	-0.60	-966	7	-40
7F7F290170	4/8/92	61.30	223	115	5/14/93	61.35	322	274	401	-0.05	-80	99	159

Table E-33. continued

PIT_TAG	Capture Date	Capture RM	Capture TL	Capture WT	Recapture Date	Recapture RM	Recapture TL	Recapture WT	Days	Miles Moved	Meters Moved	Change TL	Change WT
7F7F290651	4/8/92	61.30	517	1589	11/7/93	61.15	520	1508	.15	241	3	-81	
7F7F295C0D	5/18/92	156.70	301	218	5/17/93	128.75	338	364	27.95	44981	37	179	
7F7F296362	5/19/92	156.70	385	575	9/19/92	143.40	407	633	123	13.30	21404	22	58
7F7F29650F	11/8/92	143.30	272	161	5/19/93	143.40	288	227	192	-0.10	-161	16	66
7F7F2A6F0C	3/15/92	156.70	491	970	3/16/92	156.70	496	960	1	0.00	0	5	-10
7F7F2C0B69	1/15/93	61.90	320	328	6/14/93	61.50	365	353	150	0.40	644	45	25
7F7F32304A	5/14/93	61.40	512	1430	9/16/93	60.90	515	1502	125	0.50	805	3	72
7F7F323A08	3/9/92	61.10	522	1525	2/11/93	60.40	515	1561	345	0.70	1127	-7	36
7F7F32857	11/6/92	60.75	391	438	1/14/93	61.30	391	478	69	-0.55	-885	0	40
7F7F33305A	5/16/92	143.30	425	833	5/16/92	143.20	425	0	0	0.10	161	0	0
7F7F333613	3/12/93	87.70	549	1772	3/12/93	87.70	550	1729	0	0.00	0	1	-43
7F7F33372E	3/16/93	128.30	312	335	5/18/93	143.40	315	329	63	-15.10	-24301	3	-6
7F7F333953	3/15/93	108.30	366	684	5/12/93	108.30	381	631	58	0.00	0	15	-53
7F7F333953	5/12/93	108.30	381	631	5/12/93	108.30	380	642	0	0.00	0	-1	11
7F7F333A20	9/15/92	61.30	555	1875	11/4/92	60.85	566	2068	50	0.45	724	11	193
7F7F334315	7/11/92	58.30	498	1506	10/12/93	58.85	507	1173	458	-0.55	-885	9	-333
7F7F33440D	9/15/92	61.30	395	573	7/16/93	61.70	435	850	304	-0.40	-644	40	277
7F7F334516	11/4/92	60.90	475	1281	5/9/93	87.70	485	1219	186	-26.80	-43130	10	-62
7F7F334614	5/16/92	143.20	255	164	5/18/93	143.40	302	256	367	-0.20	-322	47	92
7F7F334B43	11/6/92	60.85	380	499	2/15/93	61.25	393	567	101	-0.40	-644	13	68
7F7F334B68	3/20/93	143.40	314	302	9/22/93	143.40	365	427	186	0.00	0	51	125

Table E-33. continued

PIT_TAG	Capture Date	Capture RM	Capture TL	Capture WT	Recapture Date	Recapture RM	Recapture TL	Recapture WT	Days Moved	Miles Moved	Meters Moved	Change TL	Change WT
7F7F3E33F33	9/16/92	118.90	245	153	9/14/93	108.20	320	329	363	10.70	17220	75	176
7F7F3E33F33	9/14/93	108.20	320	329	9/15/93	108.40	322	319	1	-0.20	-322	2	-10
7F7F3E236F	3/16/92	156.70	459	952	7/15/93	118.90	473	1116	486	37.80	60833	14	164
7F7F3E2571	9/11/91	60.75	313	283	6/15/92	61.40	379	443	278	-0.65	-1046	66	160
7F7F3E4102	9/12/91	61.30	567	2212	9/12/91	61.30	567	2212	0	0.00	0	0	0
7F7F3E4564	4/13/92	61.30	526	1657	9/11/92	58.85	535	1906	151	2.45	3943	9	249
7F7F3E4564	9/11/92	58.85	535	1906	11/5/92	126.00	539	1793	55	-67.15	-108067	4	-113
7F7F3E4630	3/10/92	61.85	542	1481	7/24/93	158.00	554	1638	501	-96.15	-154738	12	157
7F7F3E4B0D	11/10/91	108.70	218	142	1/14/92	108.20	222	132	65	0.50	805	4	-10
7F7F3E4C68	5/9/93	87.30	334	459	9/13/93	87.20	382	575	127	0.10	161	48	116
7F7F3E5614	3/8/92	61.50	464	1010	3/18/93	127.50	488	1220	375	-66.00	-106217	24	210
7F7F3E5614	3/18/93	127.50	488	1220	7/14/93	60.20	484	1176	118	67.30	108309	-4	-44
7F7F3E5807	5/20/93	156.70	442	1027	11/15/93	143.35	459	971	179	13.35	21485	17	-56
7F7F3E582F	11/18/91	156.70	510	1247	3/13/93	156.70	520	1140	481	0.00	0	10	-107
7F7F3E5A6A	9/11/92	87.70	473	1092	3/12/93	87.70	478	1307	182	0.00	0	5	215
7F7F3F3245	3/15/92	156.70	481	995	3/15/92	156.70	482	996	0	0.00	0	1	1
7F7F3F3747	3/16/92	156.70	532	1312	3/16/92	156.70	532	1306	0	0.00	0	0	-6
7F7F3F4D46	9/13/91	61.40	540	1575	6/16/92	62.70	538	1560	277	-1.30	-2092	-2	-15
7F7F457338	9/11/91	60.80	497	1247	9/11/91	60.80	497	1247	0	0.00	0	0	0
7F7F475A39	1/23/92	212.90	386	533	9/13/93	117.00	433	826	604	95.90	154336	47	293
7F7F477C5D	11/7/92	126.20	337	352	3/18/93	126.10	335	393	131	0.10	161	-2	41

Table E-33. continued

PIT_TAG	Capture Date	Capture RM	Capture TL	Capture WT	Recapture Date	Recapture RM	Recapture TL	Recapture WT	Days	Miles Moved	Meters Moved	Change TL	Change WT
7F7F477C5D	3/18/93	126.10	335	393	5/14/93	126.10	330	387	57	0.00	0	-5	-6
7F7F477D28	7/23/92	184.40	305	273	7/24/92	184.40	305	273	1	0.00	0	0	0
7F7F477D28	7/24/92	184.40	305	273	7/23/92	183.80	497	1245	0	0.00	0	0	0
7F7F477F01	7/21/92	156.70	449	756	7/21/92	156.70	449	756	0	0.00	0	0	0
7F7F477F01	7/21/92	156.70	449	756	7/21/93	143.40	449	778	365	13.30	21404	0	22
7F7F477F0C	5/9/92	87.70	546	1503	7/13/92	61.30	544	1590	65	26.40	42487	-2	87
7F7F480400	11/10/92	143.30	265	171	9/22/93	143.40	350	350	316	-0.10	-161	85	179
7F7F480414	11/10/92	143.30	323	275	5/19/93	143.20	342	414	190	0.10	161	19	139
7F7F480B24	4/13/93	61.30	487	1142	4/14/93	61.50	481	1073	1	-0.20	-322	-6	-69
7F7F480B24	4/14/93	61.50	481	1073	4/14/93	61.50	490	1092	0	0.00	0	9	19
7F7F483205	6/16/92	62.70	472	1140	6/16/92	62.70	483	1157	0	0.00	0	11	17
7F7F486150	1/15/93	62.25	240	123	1/15/93	62.25	236	122	0	0.00	0	-4	-1
7F7F486150	1/15/93	62.25	236	122	1/16/93	62.20	245	120	1	0.05	80	9	-2
7F7F486150	1/16/93	62.20	245	120	11/7/93	61.30	367	406	295	0.90	1448	122	286

Table E-34. Capture and recapture information for 12 PIT-tagged bluehead suckers (TL&gt;200 mm) from the Colorado River Grand Canyon

PIT_TAG	Capture Date	Capture RM	Capture TL	Capture WT	Recapture Date	Recapture RM	Recapture TL	Recapture WT	Days	Miles Moved	Meters Moved	Change TL	Change WT
1F20187D2C	11/8/93	61.70	315	320	11/8/93	61.70	314	321	0	0.00	0	-1	1
7F7D07630B	3/15/92	156.70	218	84	3/15/92	156.70	218	0	0	0.00	0	0	0
7F7D08135E	3/15/92	156.70	285	226	3/15/92	156.70	285	0	0	0.00	0	0	0
7F7D08192E	3/15/92	156.70	267	170	3/13/93	156.70	280	165	363	0.00	0	13	-5
7F7D085365	3/15/92	156.70	196	63	5/20/93	156.70	211	43	431	0.00	0	15	-20
7F7D08550F	3/15/92	156.70	260	149	3/13/93	156.70	285	207	363	0.00	0	25	58
7F7D090844	3/15/92	156.70	255	135	3/13/93	156.70	263	144	363	0.00	0	8	9
7F7D3F7873	3/20/93	63.30	220	126	3/20/93	63.30	220	126	0	0.00	0	0	0
7F7F265612	9/17/92	127.00	228	92	3/13/93	156.70	229	87	177	-29.70	-47798	1	-5
7F7F302610	3/13/93	156.70	283	185	7/23/93	158.00	286	222	132	-1.30	-2092	3	37
7F7F334248	3/13/93	156.70	250	126	5/20/93	156.70	248	114	68	0.00	0	-2	-12
7F7F3C2B6C	3/15/92	156.70	290	250	3/13/93	156.70	295	234	363	0.00	0	5	-16

**Table E-35. Summary of non-native fish recaptures in the Colorado River in Grand Canyon, October 1990 - November 1993. # denotes missing or indistinguishable information. See Table 5-4 for description of species codes.**

Species	Tag Type/Color	Tag No.	Capture Date	Cature RM	TL	WT
CP	Floy/Yellow	300469	901129	167.5	410	936
CP	Carlin/Yellow	866	910319	208.0	417	1268
CP	Floy/Yellow	301096	920320	208.6	447	1021
CP	Floy/#	#####	920521	179.8	450	1077
RB	Floy/Yellow	02780	910614	61.8	378	457
RB	Floy/Green	27325	910713	58.4	451	794
RB	Floy/Red	P00496	910907	56.7	495	680
RB	Floy/Green	027839	910907	56.7	406	425
RB	Floy/Green	027846	910909	58.7	426	595
RB	Floy/#	17914	920510	60.2	400	567
RB	Nose Tag		930709	2.9	265	170
RB	Nose Tag		930709	3.2	112	0
RB	Nose Tag		930709	3.2	131	0

**Table E-36. Historic effort and captures of humpback chub in the Colorado River from Glen Canyon Dam (GCD) to Pearce Ferry (PF) in 25-river mile increments. O denotes sampling efforts within the reach; ● denotes capture of humpback chub.**

Researcher	Year	River Mile										
		GCD 10	11- 35	36- 60	61- 85	86- 110	111- 135	136- 160	161- 185	186- 210	211- 235	236- 260
Miller	1942											
Holden and Stalmaker	1962-67	●										
Stone	1964	●										
Stone	1965-1966	●										
Stone and Queenan	1966-1967	●										
Stone & Rathburn	1967-68	●										
Suttkus et al.	1970-76	○	●	●	○	○	○	○	○	○	○	○
Minckley & Blinn	1975	○	○	○	○	○	○	○	○	○	○	○
Carothers & Minckley	1977-79	●	●	●	●	●	●	●	●	●	●	●
Kaeding & Zimmerman	1980-81		●	●	●	●	●	●	●	●	●	●
Maddux et al.	1984-86	○	●	●	●	●	●	●	●	●	●	●
Kuby	1987-89	○	○	○	○	○	○	○	○	●	●	●
BIO/WEST, Inc. <sup>a</sup>	1990-93	○	●	●	●	●	●	●	●	●	●	○

<sup>a</sup>Includes additional fish survey by BIO/WEST below Diamond Creek.

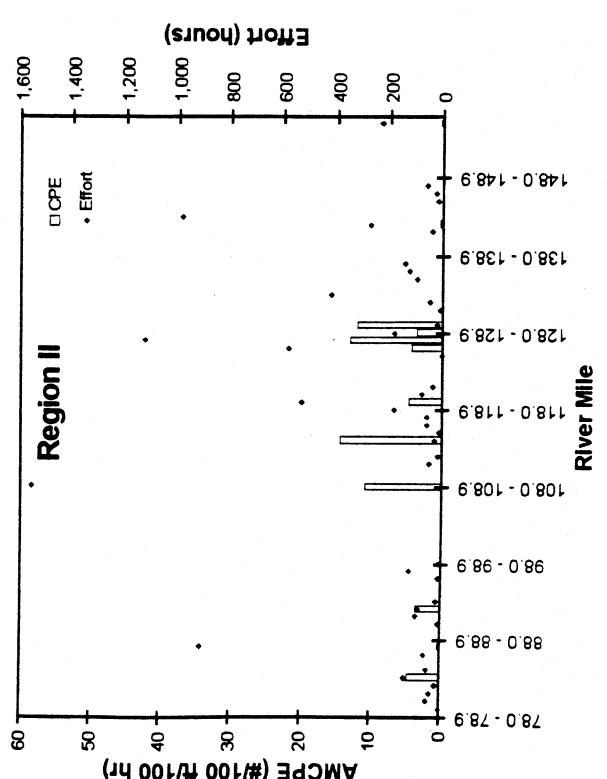
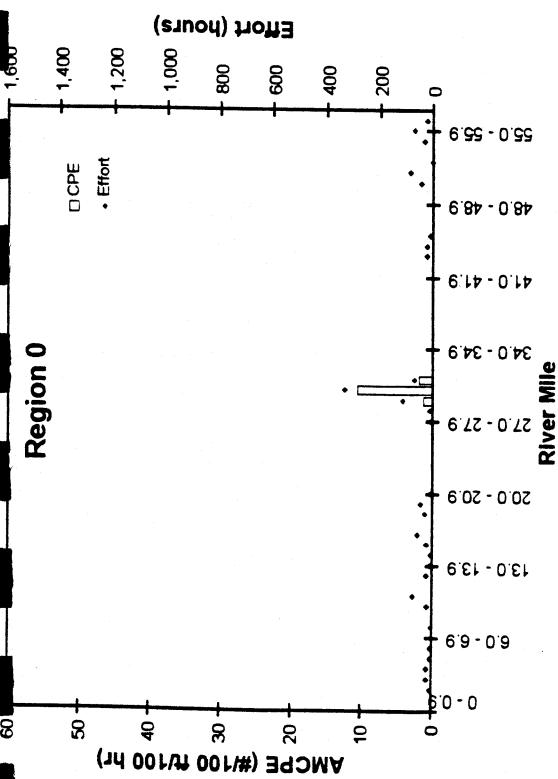
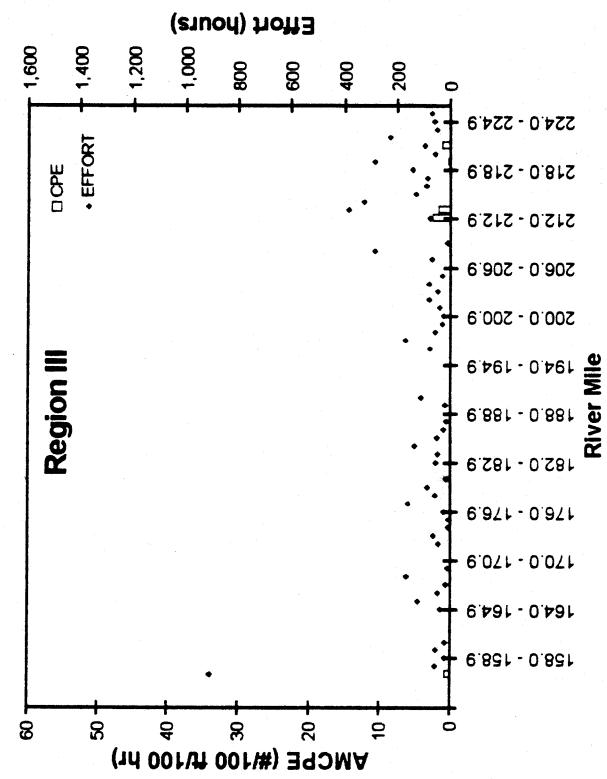
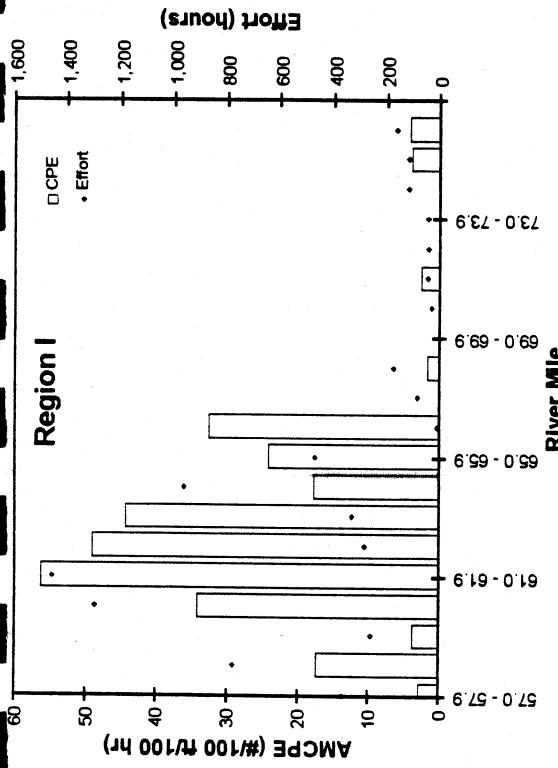
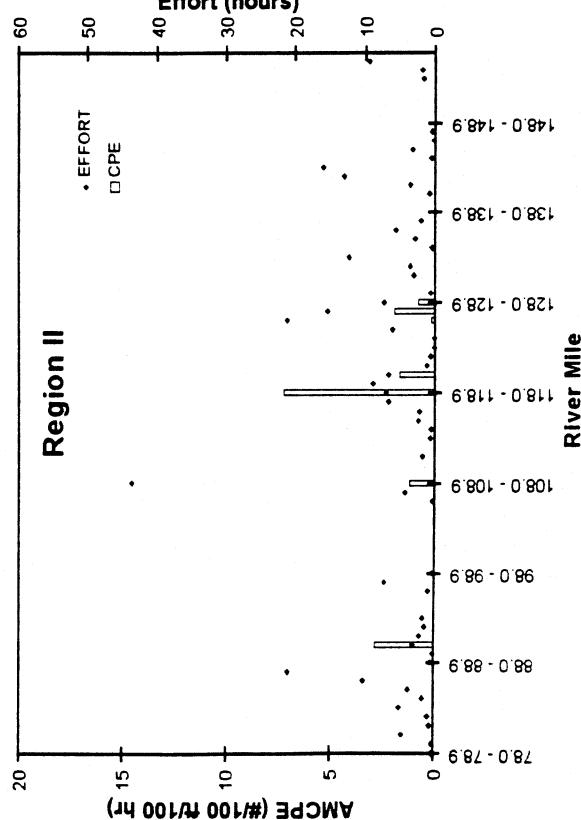
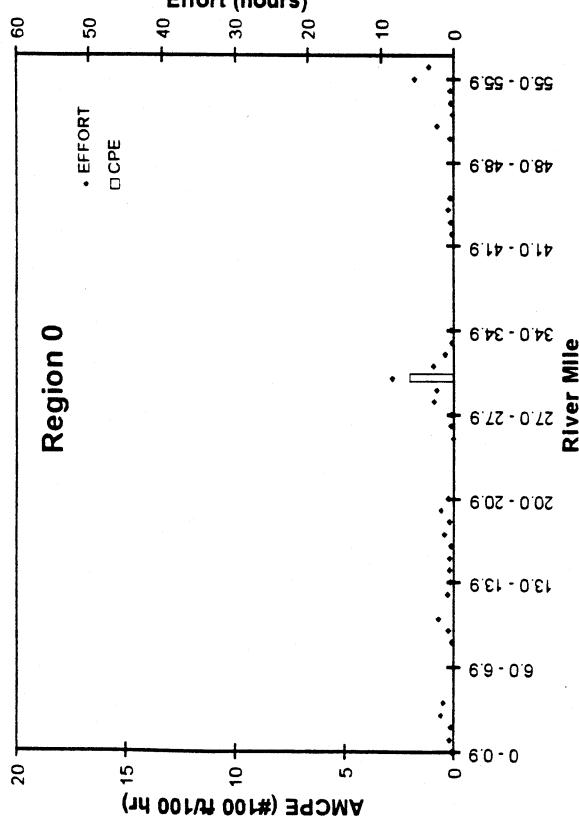
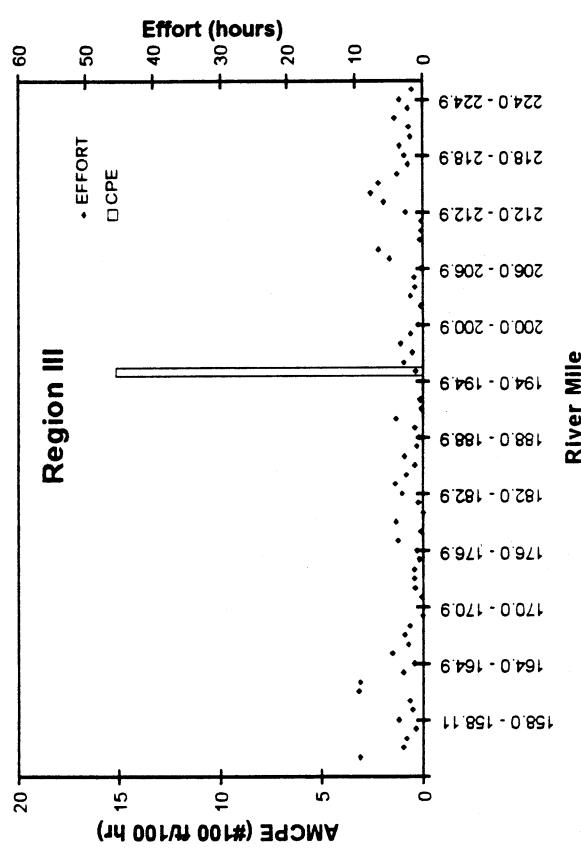
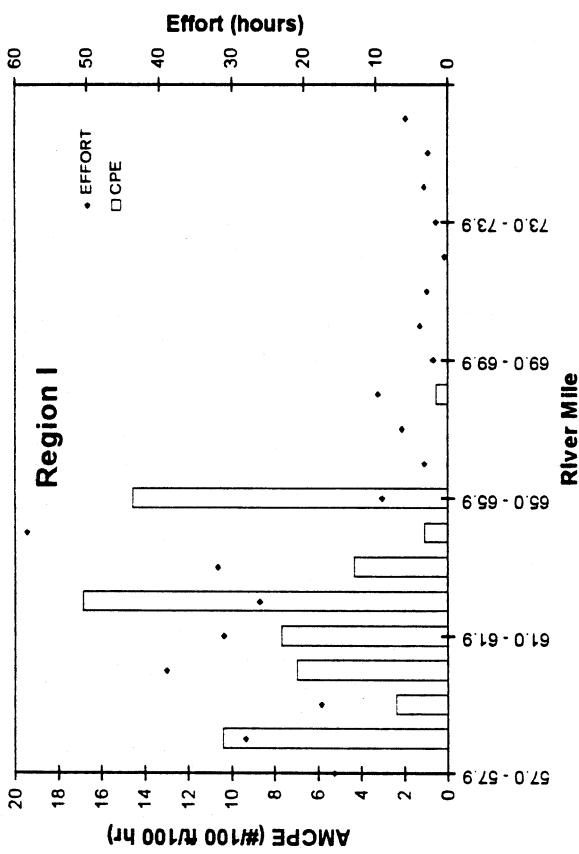


Fig. E-1. Total netting effort and arithmetic mean catch per unit effort (AMCPE) of adult humpback chub in four study regions of the Colorado River in Grand Canyon, 1990-93.



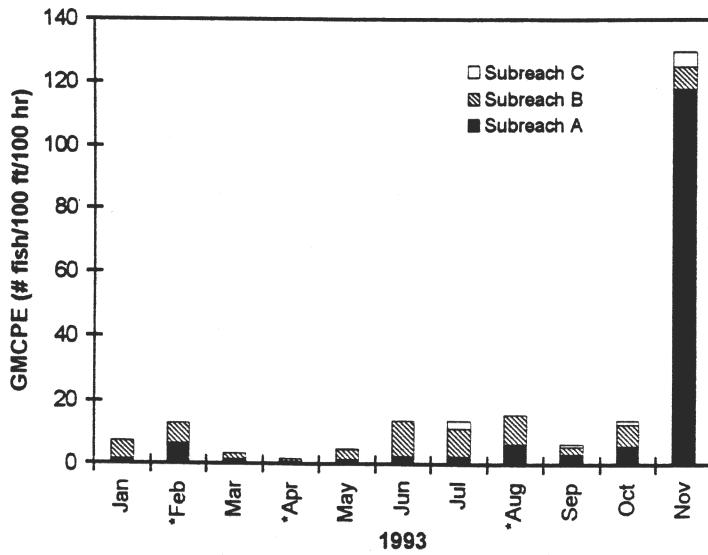
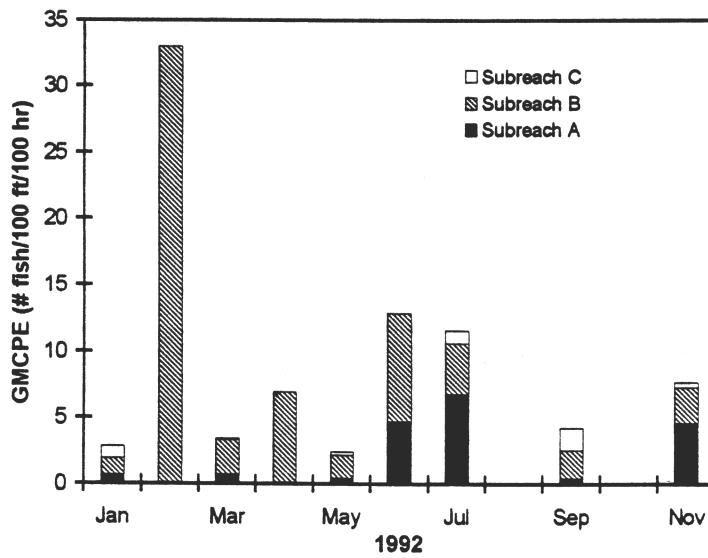
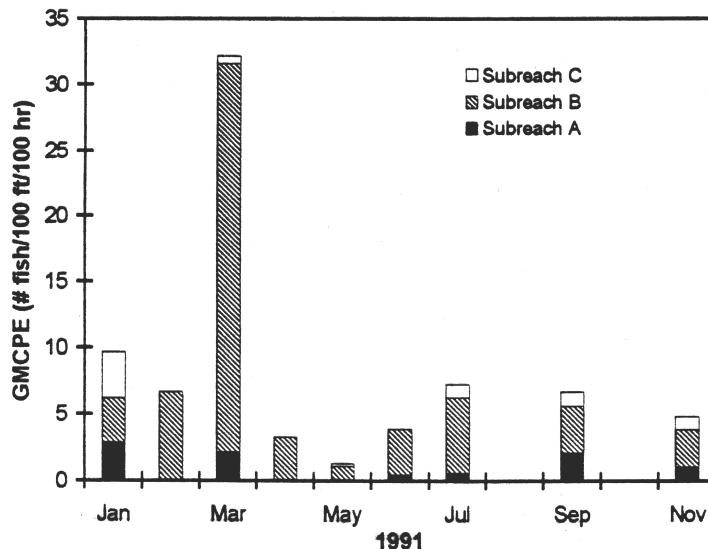


Fig. E-3. Monthly geometric mean catch per unit effort (GMCPE) of adult humpback chub captured in nets within three subreaches (SR) in Region 1 of the Colorado River in Grand Canyon, 1990-93. SR-A= RM 59.7, SR-B= RM 59.75-62.4, SR-C= RM 62.45-65.4. \* Denotes no samples taken in SR-A; \*\* denotes no samples taken in SR-a or SR-C.

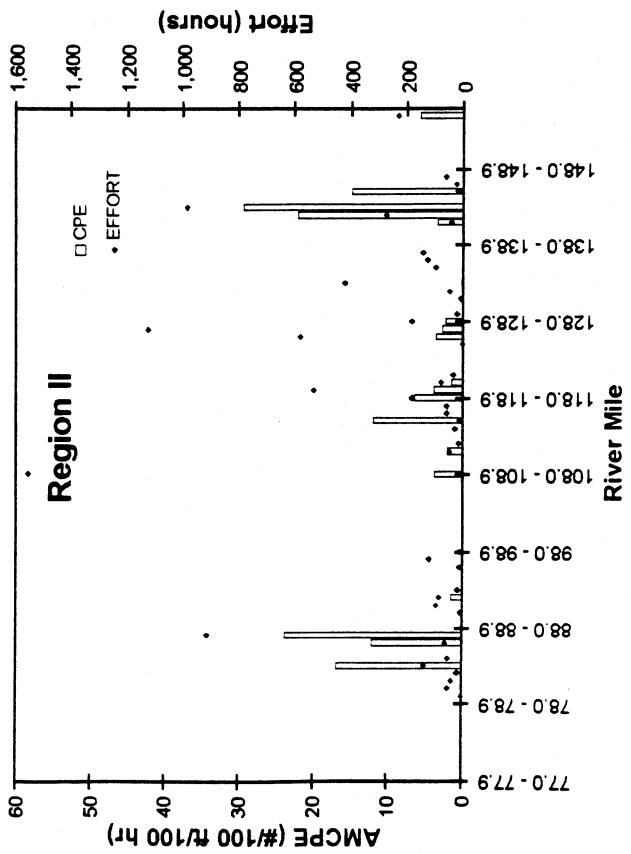
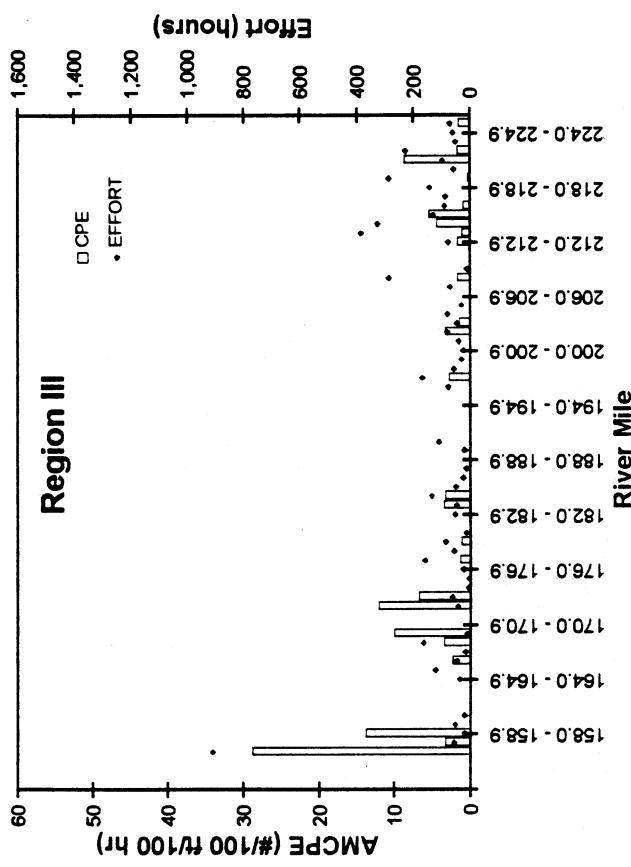
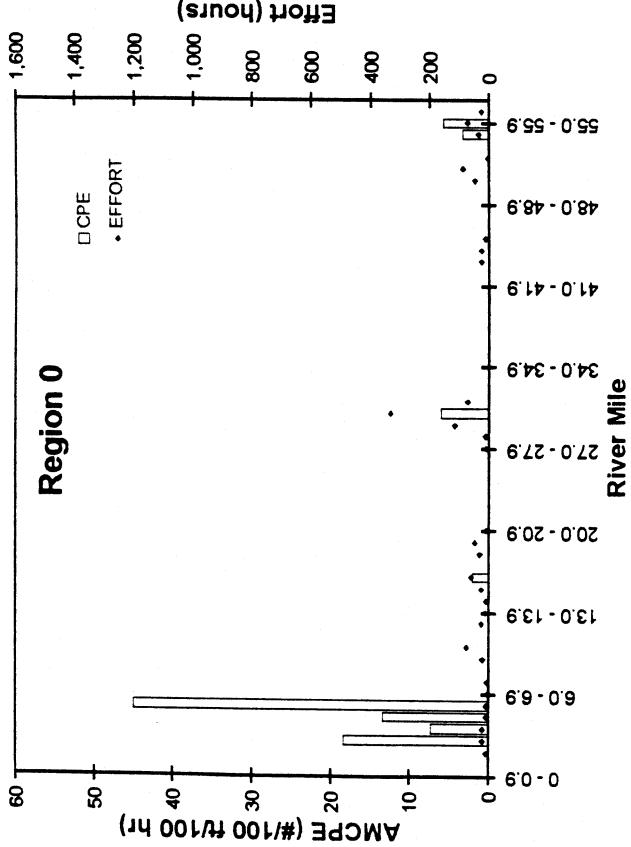
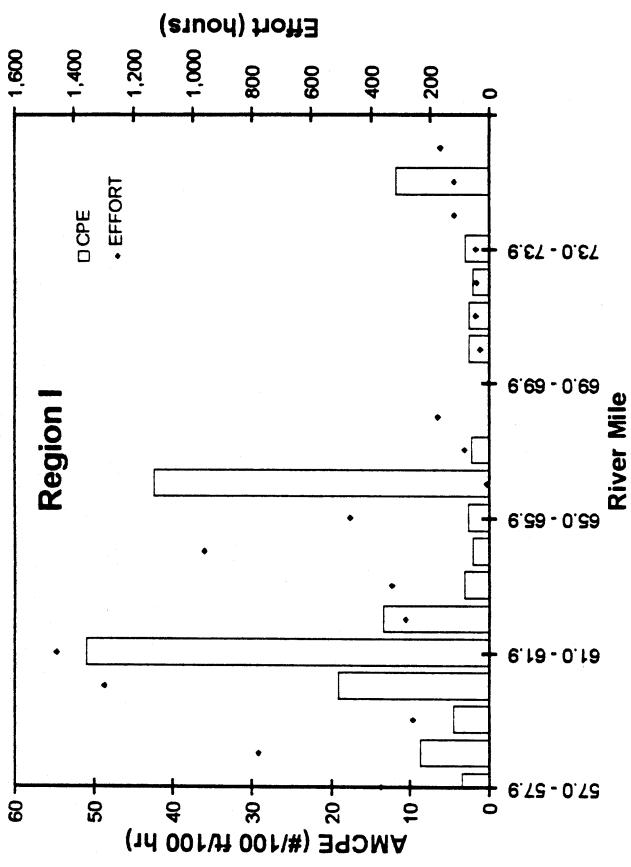


Fig. E-4. Total netting effort and arithmetic mean catch per unit effort of adult flannelmouth sucker in four study regions of the Colorado River in Grand Canyon, 1990-93

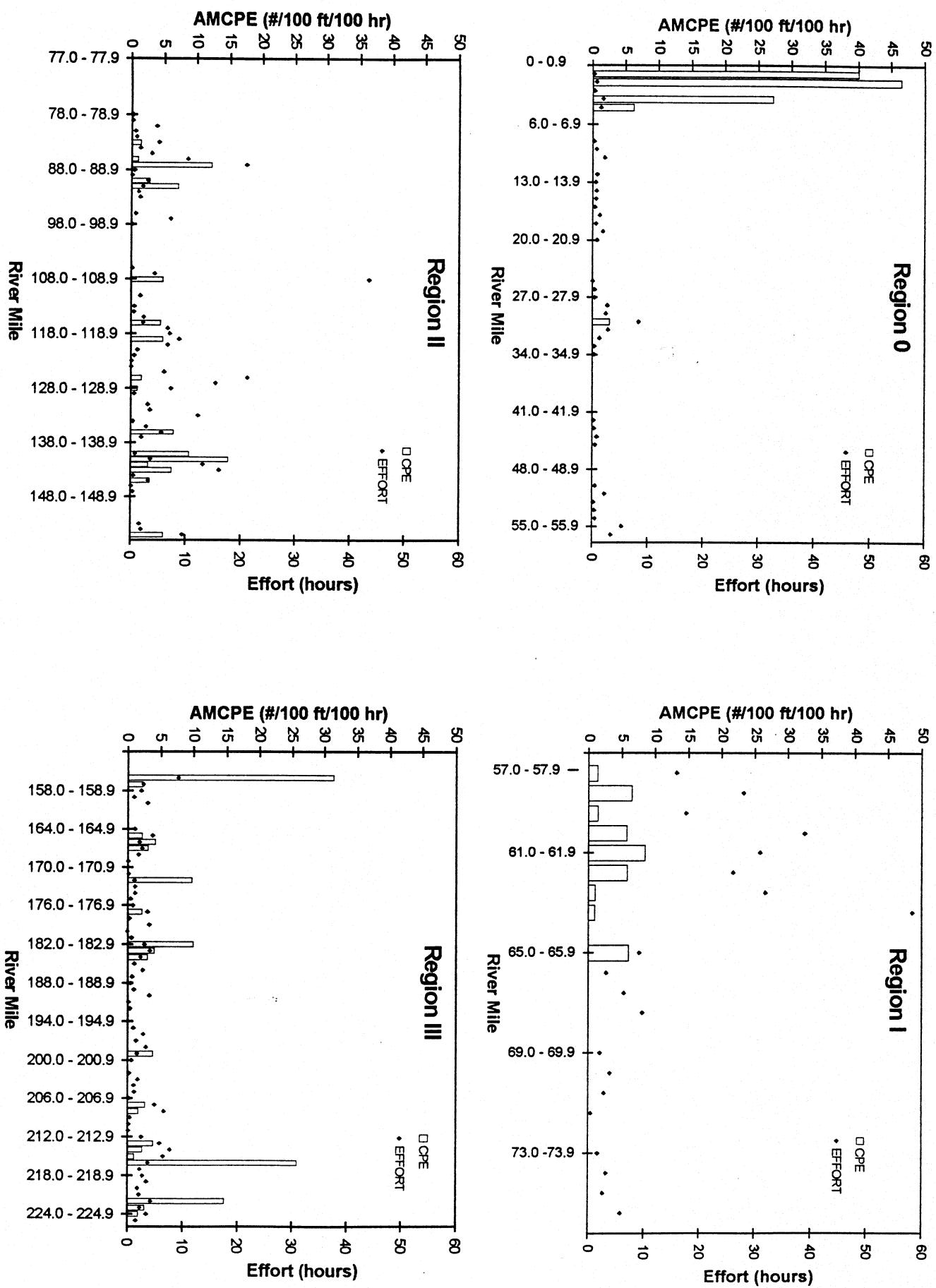


Fig. E-5. Total electrofishing effort and arithmetic mean catch per unit effort of adult flannelmouth sucker in four study regions of the Colorado River in Grand Canyon, 1990-93

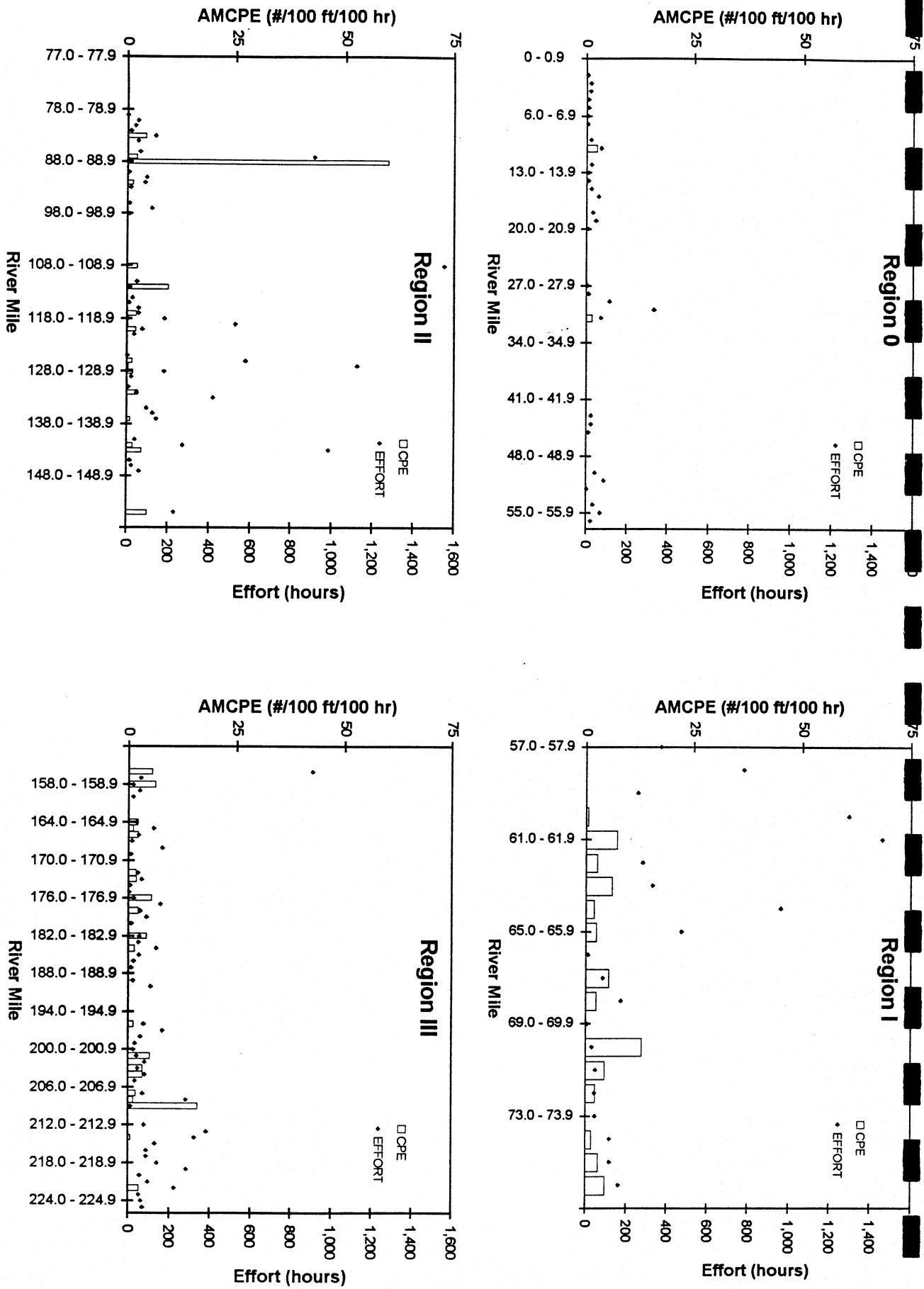


Fig. E-6. Total netting effort and arithmetic mean catch per unit effort (AMCPE) of adult bluehead sucker in four study regions of the Colorado River in Grand Canyon, 1990-93.

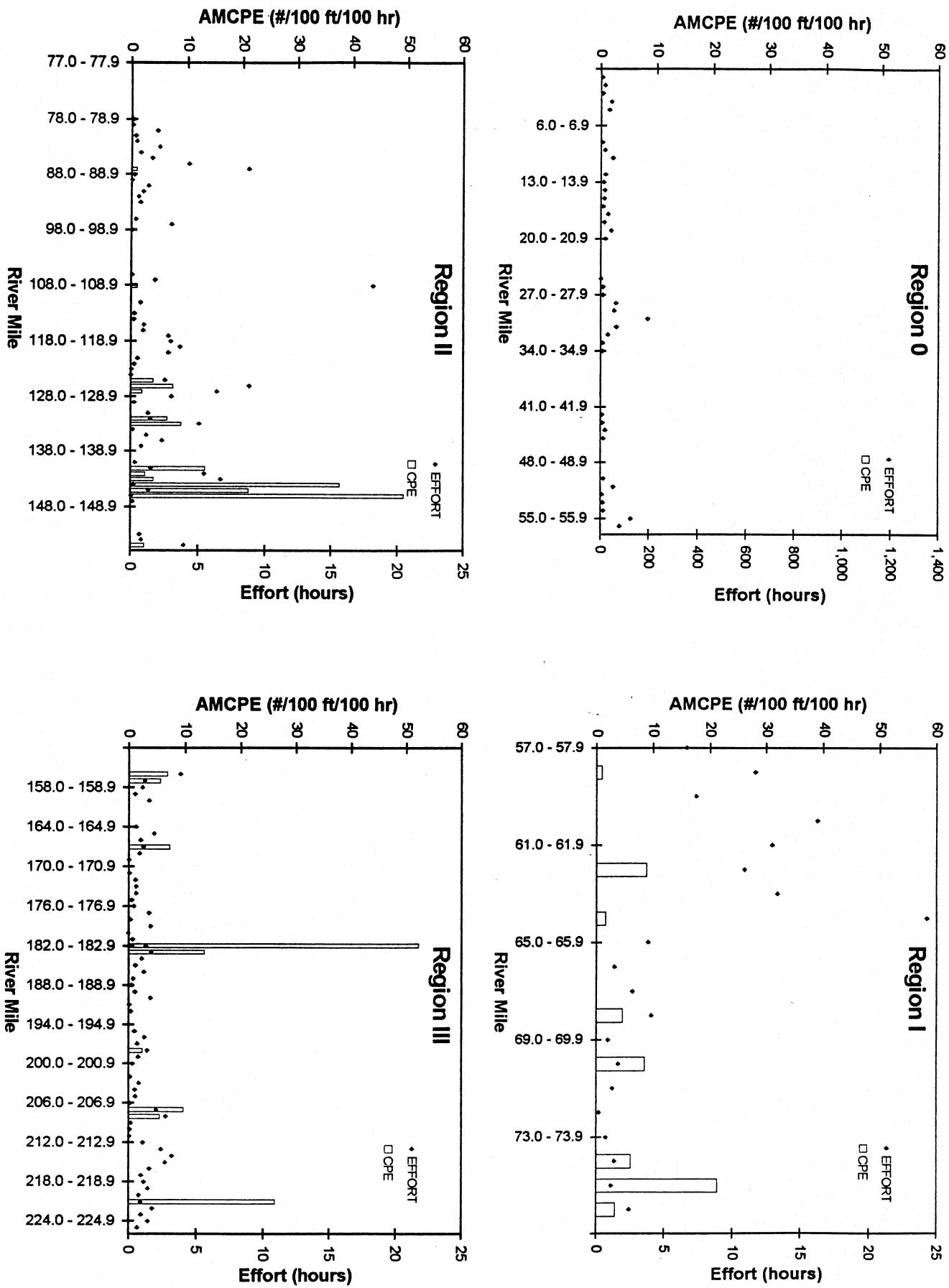


Fig. E-7. Total electrofishing effort and arithmetic mean catch per unit effort (AMCPE) of adult bluehead sucker in four study regions of the Colorado River in Grand Canyon, 1990-93.

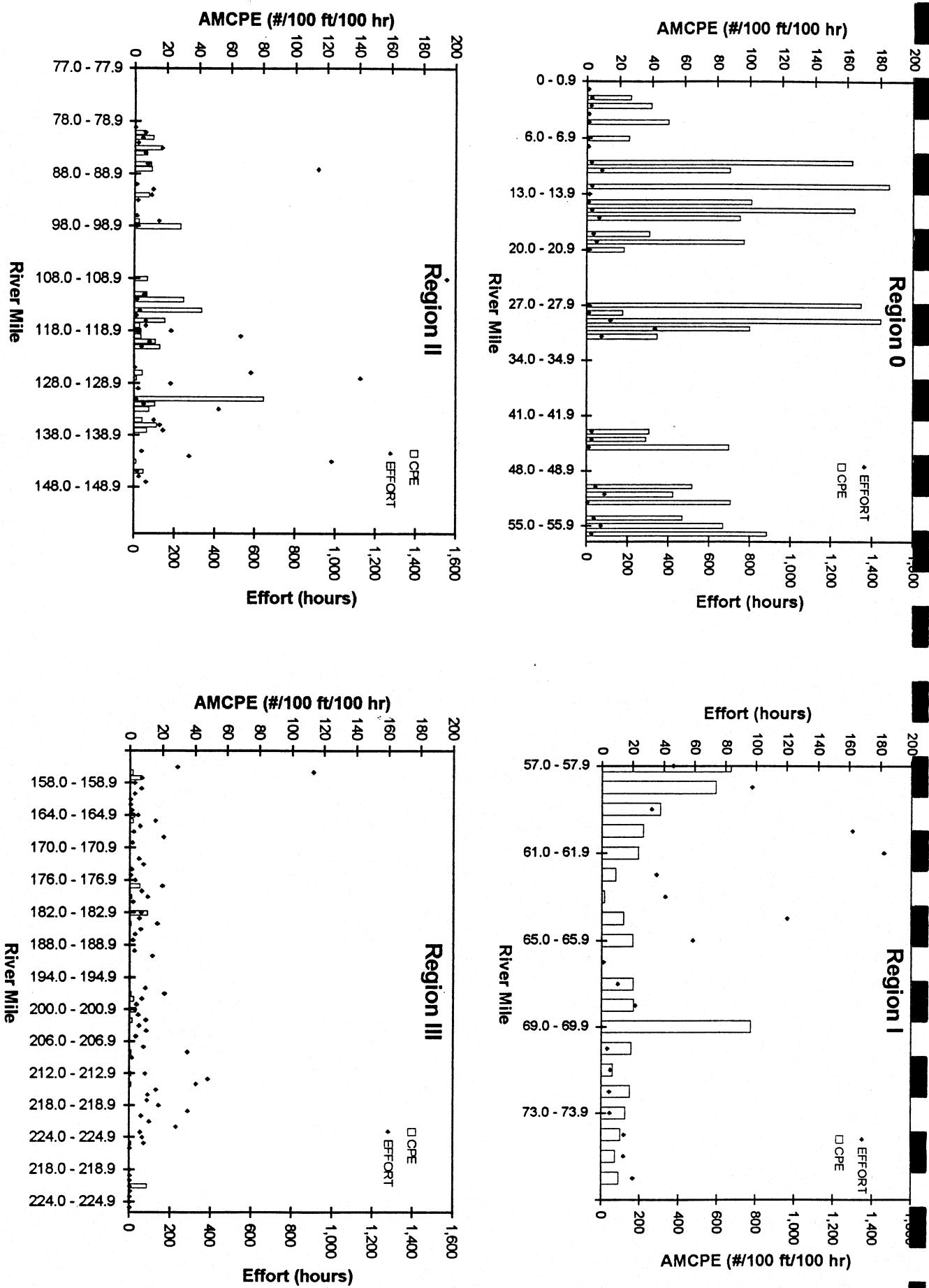


Fig. E-8. Total netting effort and arithmetic mean catch per unit effort (AMCPE) of adult rainbow trout in four study regions of the Colorado River in Grand Canyon, 1990-93.

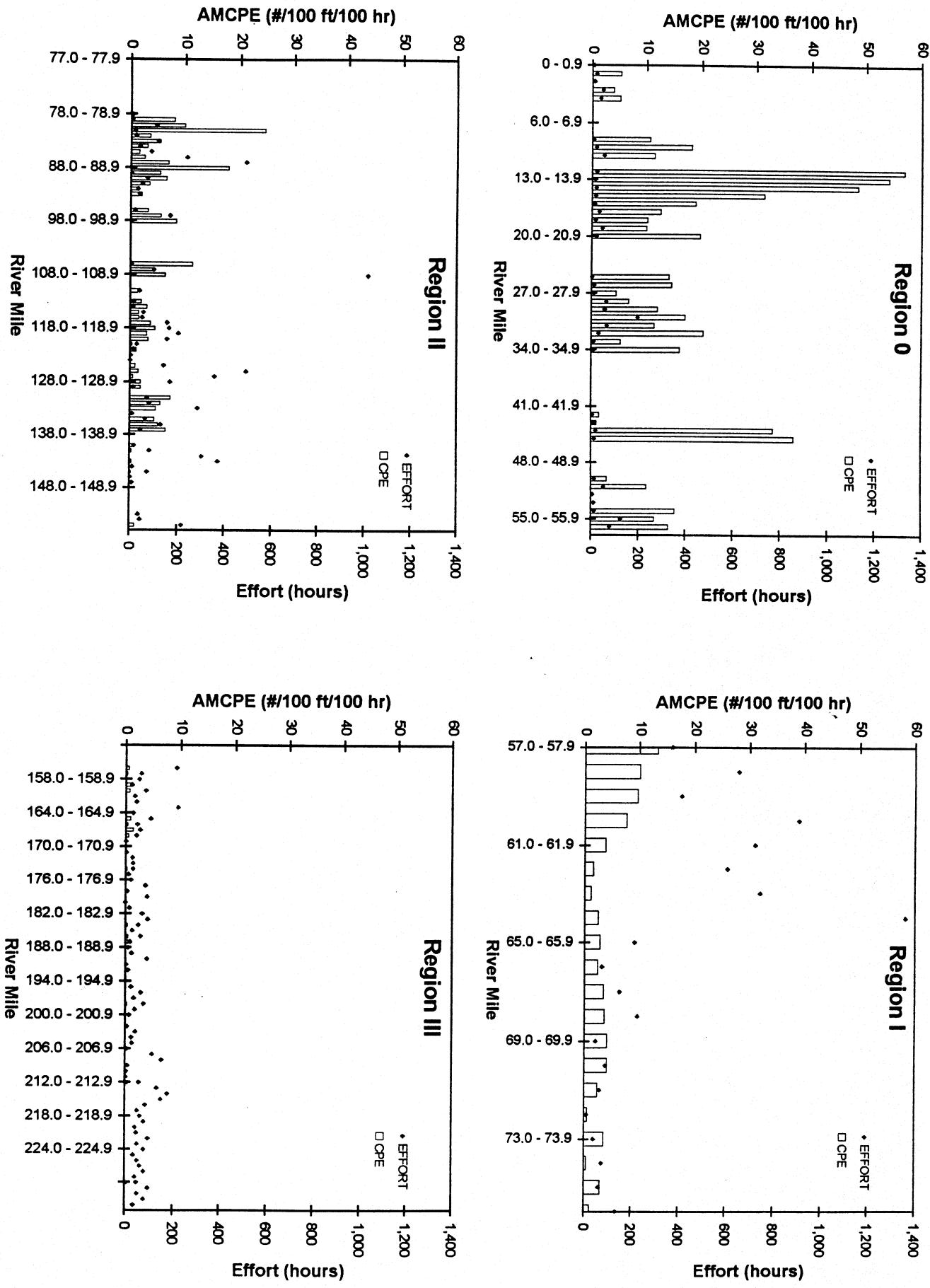
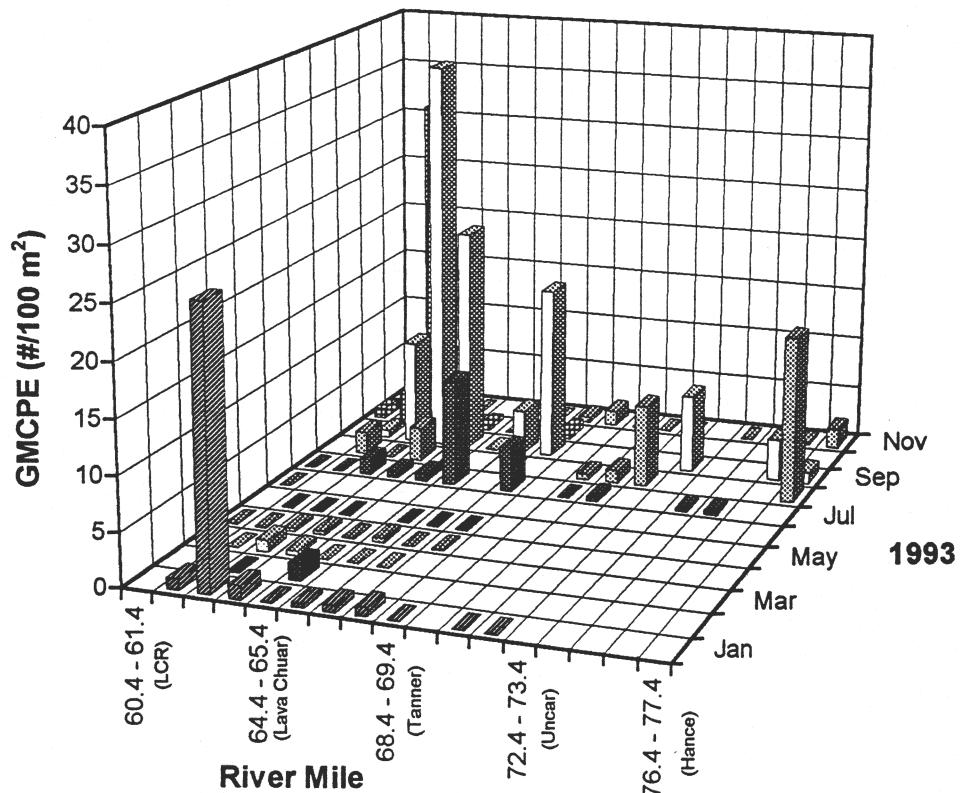


Fig. E-9. Total electrofishing effort and arithmetic mean catch per unit effort (AMCPE) of adult rainbow trout in four study regions of the Colorado River in Grand Canyon, 1990-93.

## YOY Humpback Chub



## Juvenile Humpback Chub

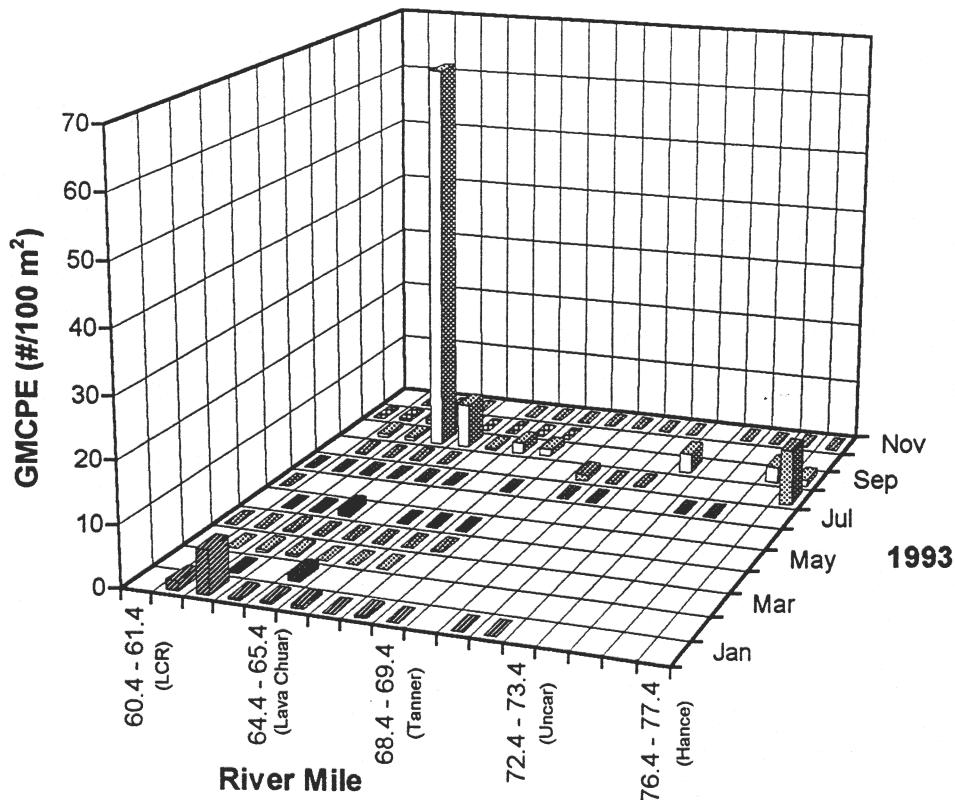
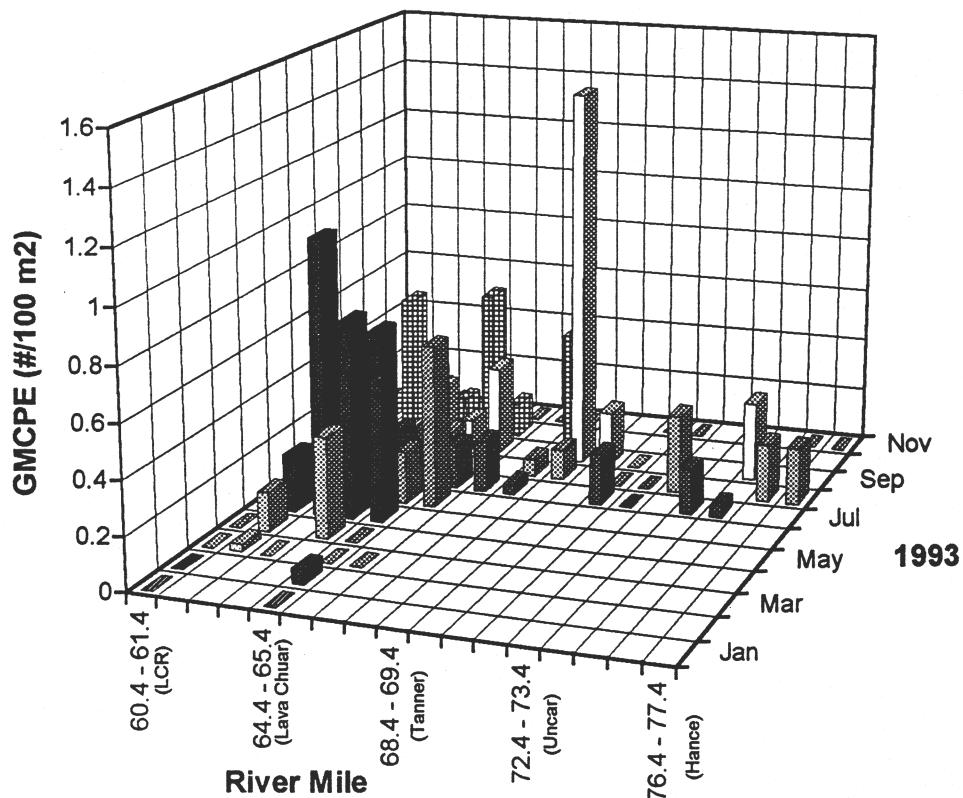


Fig. E-10. Geometric mean catch per unit effort of YOY and Juvenile humpback chub captured seining in Region I, from RM 60.4 - 77.4 in the Colorado River in Grand Canyon, 1993.

## YOY Humpback Chub



## Juvenile Humpback Chub

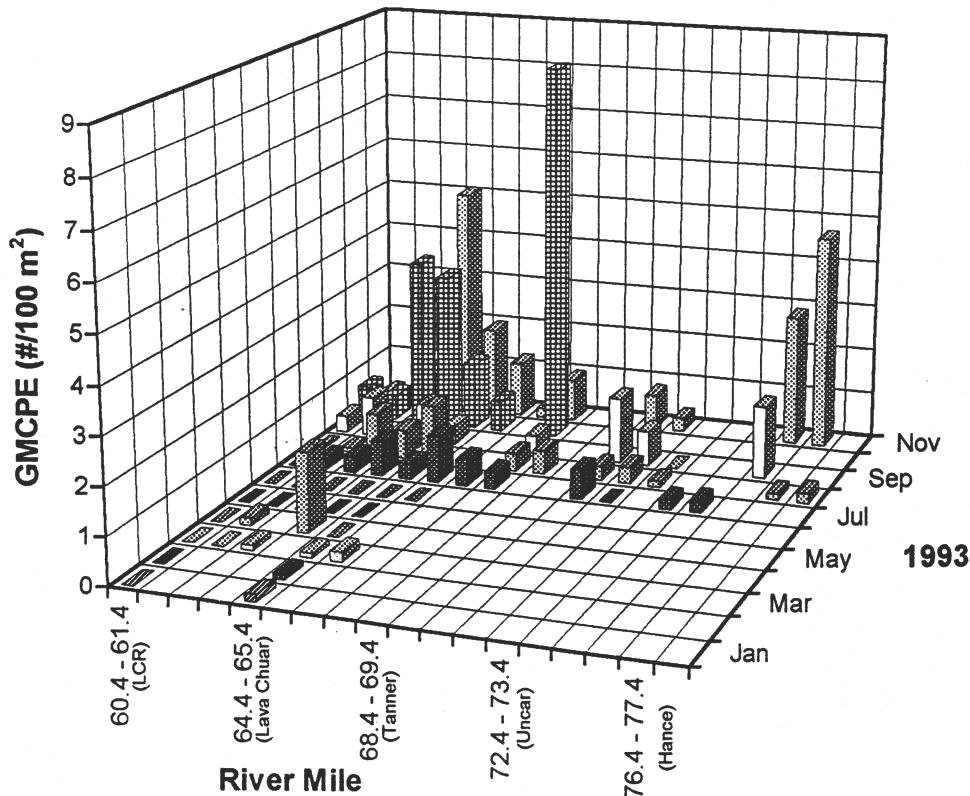
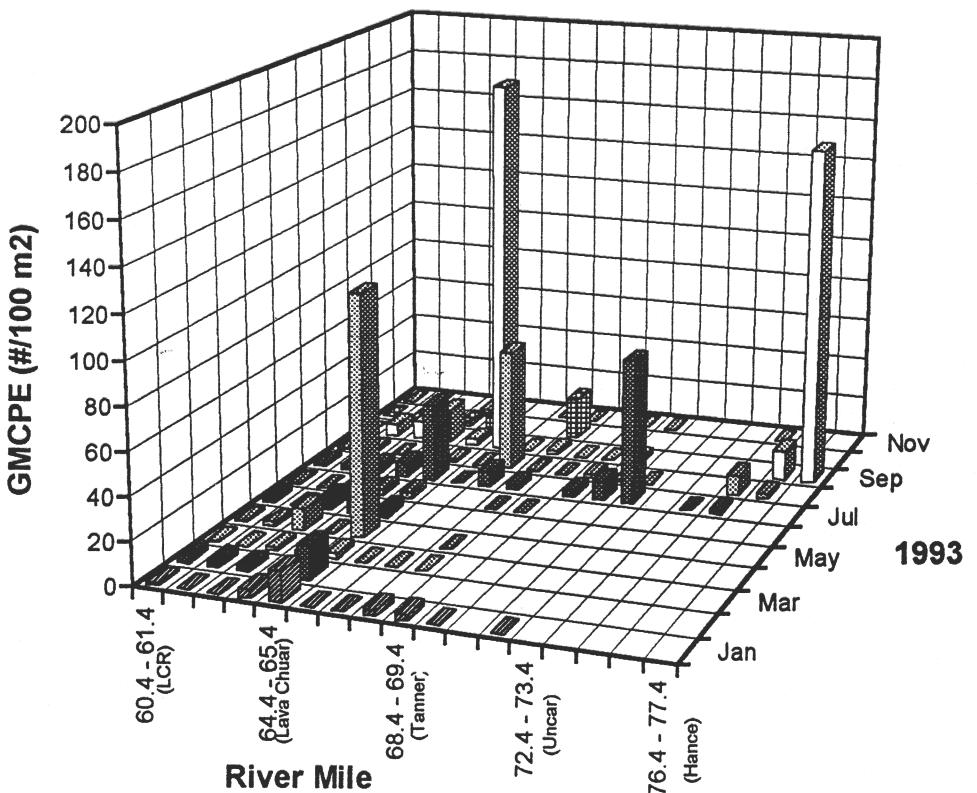


Fig. E-11. Geometric mean catch per unit effort of YOY and Juvenile humpback chub captured in minnow traps in Region I, from RM 60.4 - 77.4 in the Colorado River in Grand Canyon, 1993.

## YOY Humpback Chub



## Juvenile Humpback Chub

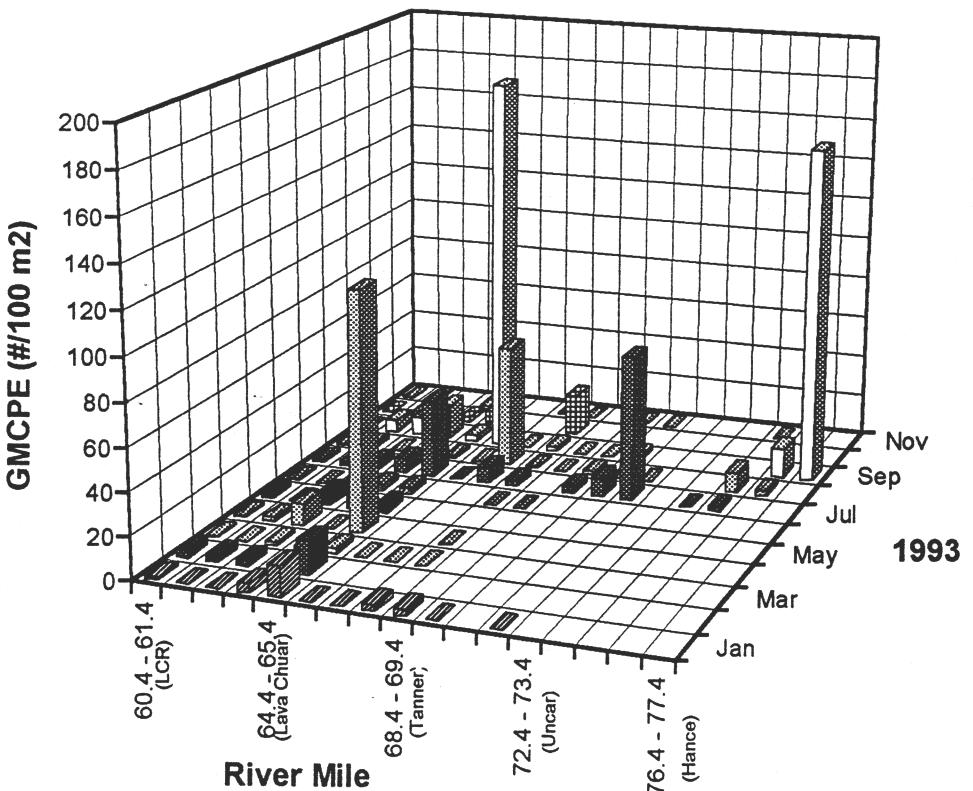


Fig. E-12. Geometric mean catch per unit effort of YOY and Juvenile humpback chub captured electrofishing in Region I, from RM 60.4 - 77.4 in the Colorado River in Grand Canyon, 1993.

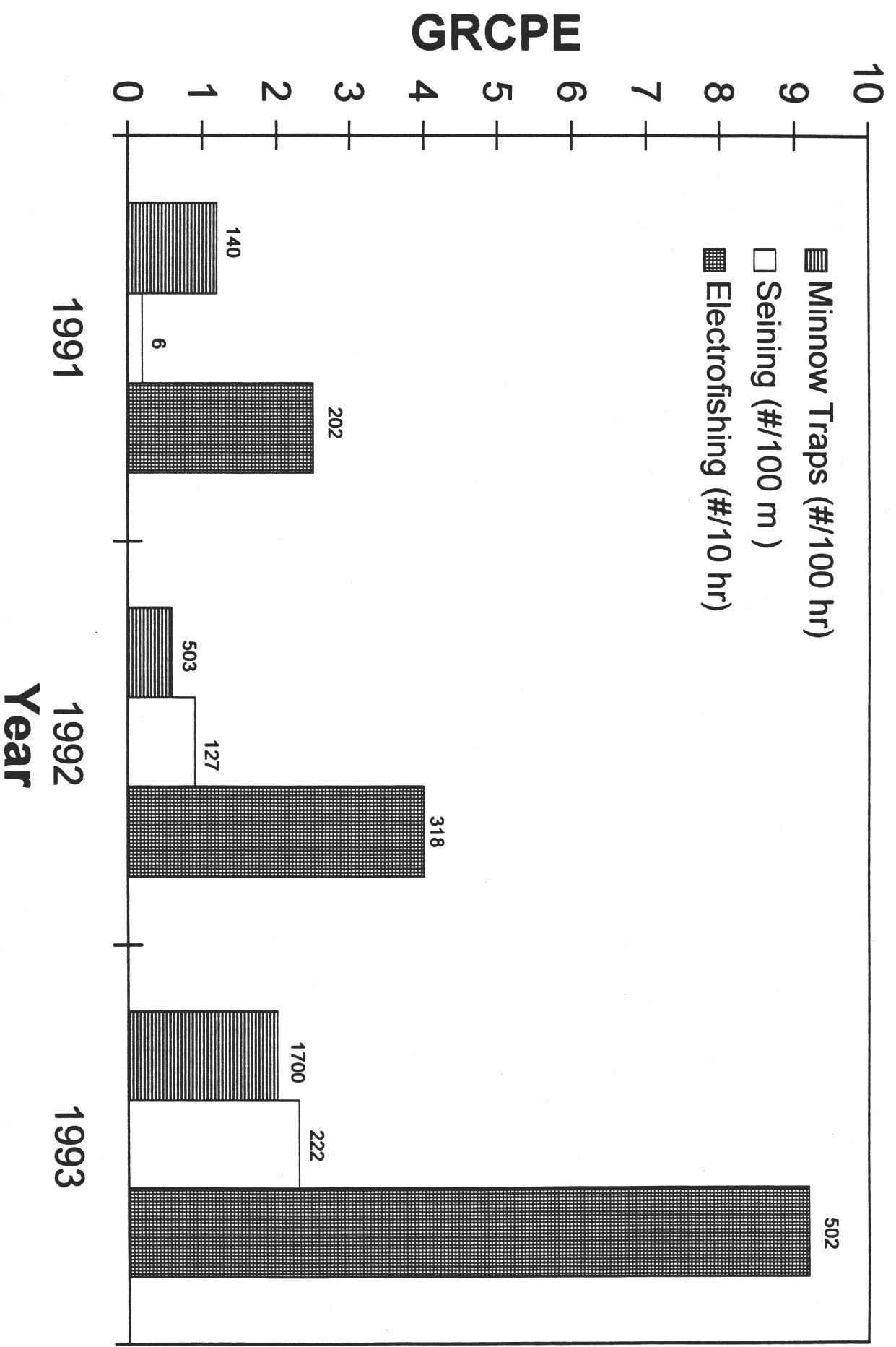


Fig. E-13. Gross catch per unit effort (GRCP) of sub adult humpback chub captured with three gear types within Region I in the Colorado River in Grand Canyon, 1991-93. Total sample site is listed above each bar.

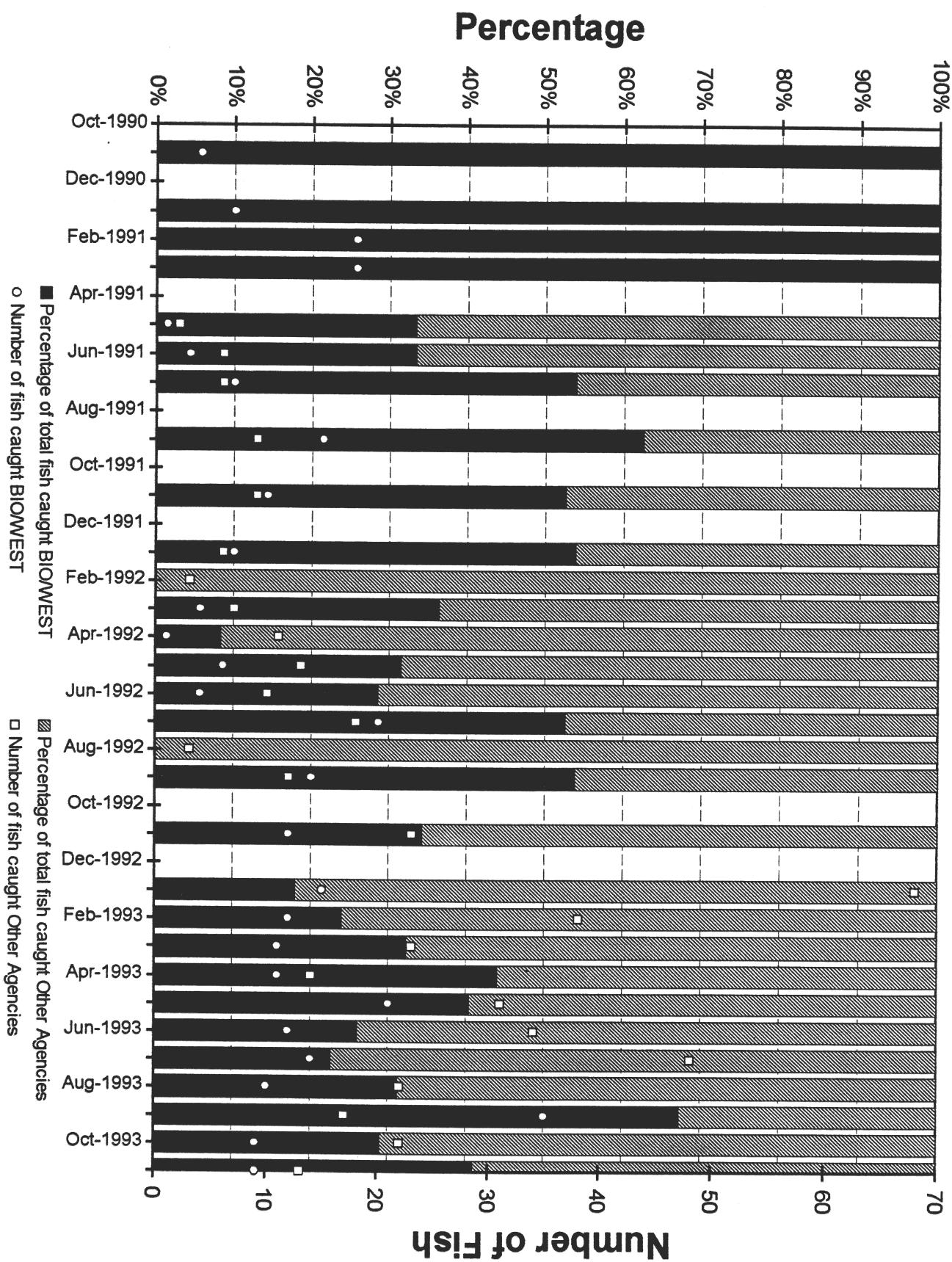
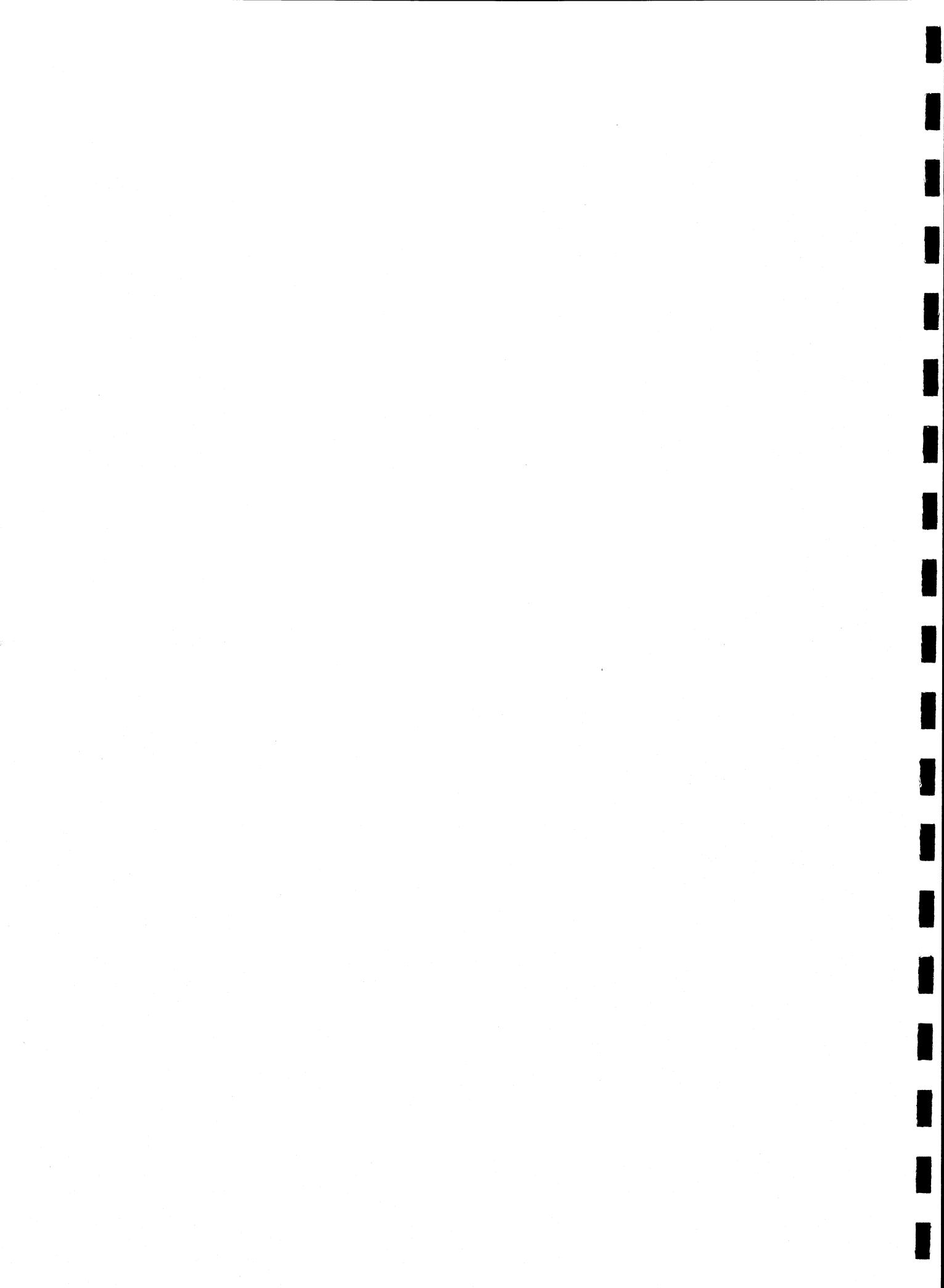


Fig. E-14. BIOWEST and other agency humpback chub recapture rate per month in Grand Canyon, October 1990 - November 1993. Number of fish captured per bar are identified.



## **Appendix F**

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**Table F-1. Summary of humpback chub captured and new marks given by BIO/WEST, per trip, in the Colorado River In Grand Canyon, October 1990 - November 1993.**

Trip	Age	Tags		Fin Punch		Total
		PIT	Radio*	Dorsal	Caudal	
90-01	Adult	33	10	-	-	33
	Juvenile	-	-	-	-	-
	YOY	-	-	-	-	-
90-02	Adult	36	7	-	-	36
	Juvenile	-	-	-	-	-
	YOY	-	-	-	-	-
<b>1990 Total</b>		<b>69</b>	<b>17</b>	-	-	<b>69</b>
91-01	Adult	64	7	-	-	64
	Juvenile	2	-	-	-	2
	YOY	-	-	-	-	-
91-02	Adult	1	-	-	-	1
	Juvenile	-	-	-	-	-
	YOY	-	-	-	-	-
91-03	Adult	86	7	-	-	86
	Juvenile	3	-	-	-	3
	YOY	-	-	-	-	-
91-04	Adult	7	-	-	-	7
	Juvenile	-	-	-	-	-
	YOY	-	-	-	-	-
91-05	Adult	29	3	-	-	29
	Juvenile	1	-	-	-	1
	YOY	-	-	-	-	-
91-06	Adult	22	4	-	-	22
	Juvenile	2	-	-	-	2
	YOY	-	-	-	-	-
91-07	Adult	54	4	-	-	54
	Juvenile	4	-	-	-	4
	YOY	-	-	-	-	-
91-08	Adult	-	-	-	-	-
	Juvenile	-	-	-	-	-
	YOY	-	-	-	-	-

Table F-1. continued

Trip	Age	Tags		Fin Punch		Total
		PIT	Radio*	Dorsal	Caudal	
91-09	Adult	66	6	-	-	66
	Juvenile	3	-	-	5	8
	YOY	-	-	-	2	2
91-10	Adult	-	-	-	-	-
	Juvenile	-	-	-	-	-
	YOY	-	-	-	-	-
91-11	Adult	21	5	-	-	21
	Juvenile	-	-	-	-	-
	YOY	-	-	-	-	-
<b>1991 Total</b>		<b>365</b>	<b>36</b>	-	<b>7</b>	<b>372</b>
92-01	Adult	12	5	-	-	12
	Juvenile	4	-	-	-	4
	YOY	-	-	-	4	4
92-02	Adult	4	-	-	-	4
	Juvenile	-	-	-	-	-
	YOY	-	-	-	-	-
92-03	Adult	28	3	-	-	28
	Juvenile	1	-	-	-	1
	YOY	-	-	-	-	-
92-04	Adult	20	1	-	-	20
	Juvenile	1	-	-	-	1
	YOY	-	-	-	-	-
92-05	Adult	33	2	-	-	33
	Juvenile	10	-	-	10	20
	YOY	-	-	-	-	-
92-06	Adult	20	3	-	-	20
	Juvenile	-	-	-	-	-
	YOY	-	-	-	-	-
92-07	Adult	56	4	-	-	56
	Juvenile	8	-	-	-	8
	YOY	-	-	-	-	-

Table F-1. continued

Trip	Age	Tags		Fin Punch		Total
		PIT	Radio*	Dorsal	Caudal	
92-08	Adult	3	-	-	-	3
	Juvenile	5	-	-	-	5
	YOY	-	-	-	-	-
92-09	Adult	18	4	-	-	18
	Juvenile	3	-	-	-	3
	YOY	-	-	-	-	-
92-10	Adult	-	-	-	-	-
	Juvenile	-	-	-	-	-
	YOY	-	-	-	-	-
92-11	Adult	18	-	-	-	18
	Juvenile	9	-	13	-	22
	YOY	-	-	16	-	16
<b>1992 Total</b>		<b>253</b>	<b>22</b>	<b>29</b>	<b>14</b>	<b>296</b>
93-01	Adult	21	-	-	-	21
	Juvenile	5	-	36	4	45
	YOY	-	-	86	8	94
93-02	Adult	21	1	-	-	21
	Juvenile	3	-	14	-	17
	YOY	-	-	15	-	15
93-03	Adult	21	2	-	-	21
	Juvenile	12	-	12	-	24
	YOY	-	-	29	2	31
93-04	Adult	19	-	-	-	19
	Juvenile	4	-	31	2	37
	YOY	-	-	47	-	47
93-05	Adult	38	-	-	-	38
	Juvenile	6	-	122	2	130
	YOY	-	-	-	-	-
93-06	Adult	20	-	-	-	20
	Juvenile	4	-	39	1	44
	YOY	-	-	-	-	-

Table F-1. continued

Trip	Age	Tags		Fin Punch		Total
		PIT	Radio <sup>a</sup>	Dorsal	Caudal	
93-07	Adult	28	-	-	-	28
	Juvenile	13	-	43	22	78
	YOY	-	-	33	2	35
93-08	Adult	5	-	-	-	5
	Juvenile	3	-	25	60	88
	YOY	-	-	8	6	14
93-09	Adult	31	-	-	-	31
	Juvenile	17	-	147	103	267
	YOY	-	-	32	29	61
93-10	Adult	10	-	-	-	10
	Juvenile	5	-	43	1	49
	YOY	-	-	8	-	8
93-11	Adult	10	-	-	-	10
	Juvenile	-	-	-	-	-
	YOY	-	-	1	-	1
<b>1993 Total</b>		<b>296</b>	<b>3</b>	<b>771</b>	<b>242</b>	<b>1309</b>
<b>Grand Total</b>		<b>983</b>	<b>78</b>	<b>800</b>	<b>263</b>	<b>2046</b>

<sup>a</sup>Radiotagged fish are a subset of PIT tagged fish.

**Table F-2. Summary of humpback chub recaptures by BIO/WEST and other agencies (combined) per trip, in the Colorado River in Grand Canyon, October 1990 - November 1993.**

Table F-2. continued

Table F-2, continued

Table F-2. continued

Trip	Age	PIT			Radio tag <sup>b</sup>	Fin		Carlin Tag	Floy Tag	PIT Scar	Carlin/Floy Scar	Total
		B/W	Other	Unknown <sup>a</sup>		Punch	Clip					
93-07	Adult	12	48	5	-	-	-	-	-	1	-	66
	Juvenile	-	1	1	-	-	1	-	-	-	-	3
	YOY	-	-	-	-	-	-	-	-	-	-	-
93-08	Adult	10	22	2	-	-	-	1	-	-	-	5
	Juvenile	-	-	-	-	-	1	-	-	-	-	1
	YOY	-	-	-	-	-	-	-	-	-	-	-
93-09	Adult	34	17	4	-	-	-	1	-	-	-	6
	Juvenile	-	-	-	-	4	-	-	-	1	-	5
	YOY	-	-	-	-	-	-	-	-	-	-	-
93-10	Adult	9	21	4	-	-	-	-	-	-	-	34
	Juvenile	-	1	-	-	-	2	-	-	-	-	3
	YOY	-	-	-	-	1	-	-	-	-	-	1
93-11	Adult	9	13	6	-	-	-	-	-	-	1	9
	Juvenile	-	-	-	-	-	-	-	-	-	-	-
	YOY	-	-	-	-	-	-	-	-	-	-	-
<b>1993 Total</b>		<b>151</b>	<b>331</b>	<b>49</b>	<b>2</b>	<b>11</b>	<b>13</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>569</b>
<b>Grand Total</b>		<b>279</b>	<b>463</b>	<b>102</b>	<b>23</b>	<b>12</b>	<b>26</b>	<b>50</b>	<b>27</b>	<b>4</b>	<b>16</b>	<b>979</b>

<sup>a</sup>PIT tags that do not match up with any agencies initial capture records.<sup>b</sup>Radiotagged fish are a subset of all tagged fish.

Total is sum of everything except radiotags

**Table F-3. Summary of captures and new marks given by BIO/WEST to flannelmouth sucker (FM), flannelmouth variant (FV) and bluehead sucker (BH) per trip in the Colorado River in Grand Canyon, October 1990 - November 1993.**

Trip	Total Catch			PIT Tags Given			Total
	FV	FM	BH	FV	FM	BH	
90-01	0	11	5	0	0	0	16
90-02	0	42	0	0	0	0	42
<b>1990 Total</b>	<b>0</b>	<b>53</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>58</b>
91-01	0	43	5	0	1	0	49
91-02	0	14	0	0	0	0	14
91-03	0	91	80	0	1	1	173
91-04	0	13	11	0	0	0	24
91-05	2	330	76	2	1	0	411
91-06	0	36	2	0	0	0	38
91-07	0	103	7	0	0	0	110
91-08	0	0	0	0	0	0	0
91-09	3	106	16	3	62	10	200
91-10	0	0	0	0	0	0	0
91-11	2	54	11	2	35	6	110
<b>1991 Total</b>	<b>7</b>	<b>790</b>	<b>208</b>	<b>7</b>	<b>100</b>	<b>17</b>	<b>1,129</b>
92-01	1	36	6	1	27	4	75
92-02	0	7	1	0	3	1	12
92-03	5	137	78	5	97	66	388
92-04	1	24	10	1	21	8	65
92-05	1	202	68	1	113	34	419
92-06	0	19	2	0	15	2	38
92-07	0	117	25	0	47	7	196
92-08	0	8	0	0	3	0	11
92-09	0	105	18	0	63	10	196
92-10	0	0	0	0	0	0	0
92-11	0	76	25	0	42	12	155
<b>1992 Total</b>	<b>8</b>	<b>731</b>	<b>233</b>	<b>8</b>	<b>431</b>	<b>144</b>	<b>1,555</b>
93-01	0	46	7	0	26	4	83
93-02	0	23	5	0	14	3	45
93-03	0	50	154	0	35	100	339
93-04	0	69	13	0	46	4	132

Table F-3. continued

Trip	Total Catch			PIT Tags Given			Total
	FV	FM	BH	FV	FM	BH	
93-05	0	365	125	0	168	52	710
93-06	0	44	4	0	29	4	81
93-07	1	137	41	1	81	18	279
93-08	1	48	68	1	13	4	135
93-09	0	139	110	0	71	35	355
93-10	0	87	18	0	25	5	135
93-11	0	77	24	0	32	4	137
<b>1993 Total</b>	<b>2</b>	<b>1,085</b>	<b>569</b>	<b>2</b>	<b>540</b>	<b>233</b>	<b>2,431</b>
<b>Grand Total</b>	<b>17</b>	<b>2,659</b>	<b>1,015</b>	<b>17</b>	<b>1,071</b>	<b>394</b>	<b>5,173</b>

**Table F-4. Summary of recaptures by BIO/WEST and other agencies (combined) for flannelmouth sucker (FM), flannelmouth variant (FV) and bluehead sucker (BH) pooled per trip in the Colorado River in Grand Canyon, October 1990 - November 1993.**

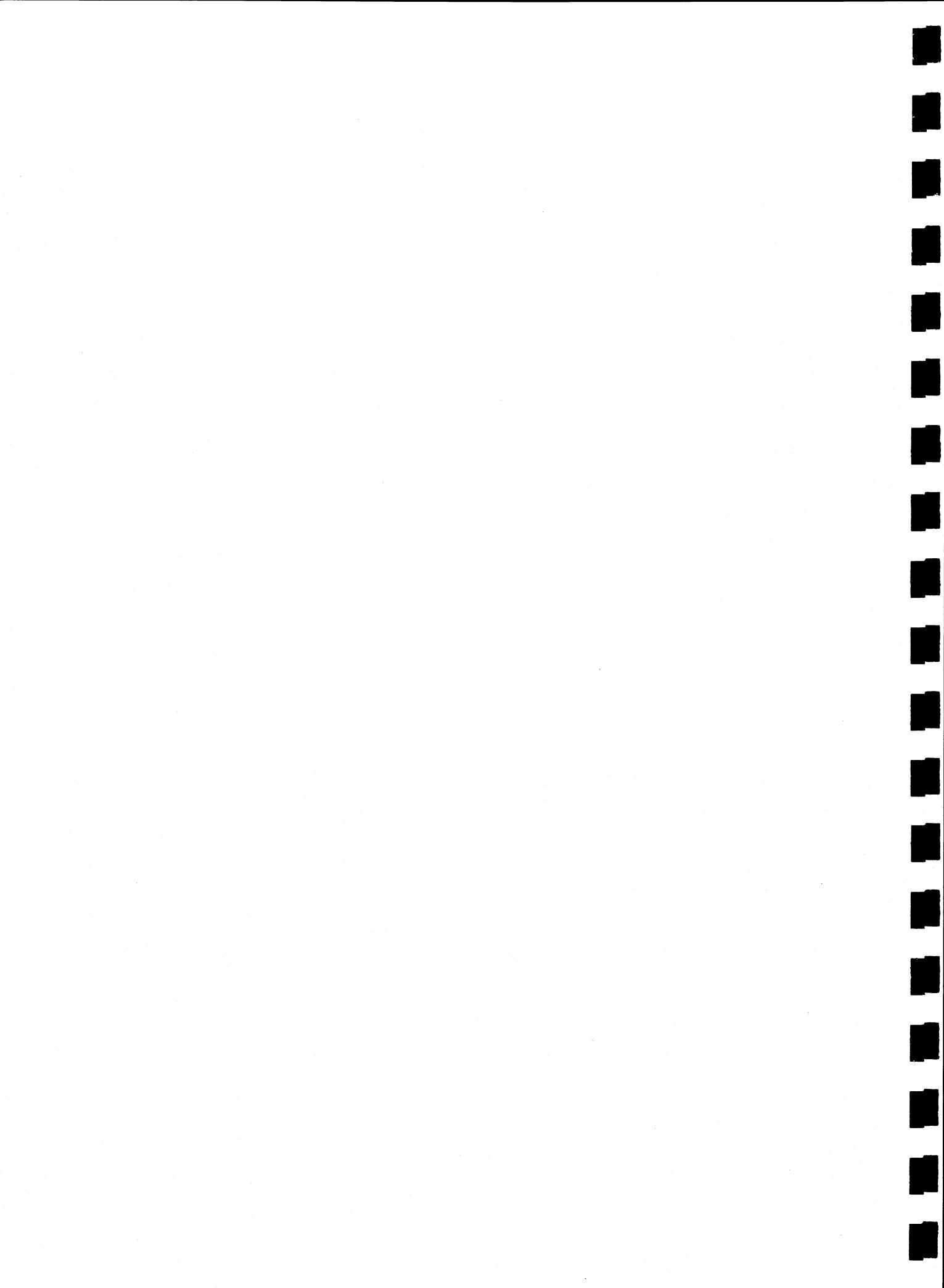
Trip	PIT Tag Recaptures						PIT Tag Scar						
	BIO/WEST			All Agencies			Carlin Tag or Scar			Floy tag or scar			
	Total Recaptured	FV	FM	BH	Total	FV	FM	BH	Total	FV	FM	BH	Total
90-01	0	0	0	0	0	0	0	0	0	0	0	0	0
90-02	1	0	0	0	1	0	0	0	0	1	0	0	1
<b>1990 Total</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>
91-01	1	0	0	0	1	0	0	0	0	1	0	0	1
91-02	0	0	0	0	0	0	0	0	0	0	0	0	0
91-03	1	0	0	0	1	0	0	0	0	1	0	0	1
91-04	1	0	0	0	1	0	0	0	0	1	0	0	1
91-05	4	1	0	0	5	1	0	0	1	3	0	0	3
91-06	1	0	0	0	1	0	0	0	0	1	0	0	1
91-07	3	0	0	0	3	0	0	0	0	3	0	0	3
91-08	0	0	0	0	0	0	0	0	0	0	0	0	0
91-09	6	0	3	0	9	0	1	0	1	2	0	0	2
91-10	0	0	0	0	0	0	0	0	0	0	0	0	0
91-11	9	0	2	0	11	0	7	0	7	0	0	0	0
<b>1991 Total</b>	<b>26</b>	<b>1</b>	<b>5</b>	<b>0</b>	<b>32</b>	<b>1</b>	<b>8</b>	<b>0</b>	<b>9</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>12</b>
92-01	3	0	2	0	5	0	1	0	1	0	0	0	0
92-02	1	0	0	0	1	0	1	0	1	0	0	0	0
92-03	30	0	11	2	43	0	11	1	12	1	4	0	5
92-04	3	0	2	0	5	0	1	0	1	0	0	0	0
92-05	21	0	7	0	28	0	13	1	14	0	0	0	0

Table F-4. continued

Trip	PIT Tag Recaptures										PIT Tag Scar					
	BIO/WEST					All Agencies					Carlin Tag or Scar			Floy tag or scar		
	Total Recaptured	FV	FM	BH	Total	FV	FM	BH	Total	FV	FM	BH	Total	FV	FM	BH
92-06	4	0	3	0	3	0	1	0	1	0	0	0	0	0	0	0
92-07	15	0	7	0	7	0	7	0	7	0	1	0	0	0	0	1
92-08	2	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0
92-09	17	0	10	0	10	0	7	0	7	0	0	0	0	0	0	0
92-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
92-11	11	1	4	0	5	1	5	0	6	0	0	0	0	0	0	0
<b>1992 Total</b>	<b>107</b>	<b>1</b>	<b>47</b>	<b>2</b>	<b>50</b>	<b>1</b>	<b>48</b>	<b>2</b>	<b>51</b>	<b>1</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>
93-01	19	0	3	0	3	0	16	0	16	0	0	0	0	0	0	0
93-02	10	0	2	0	2	0	6	2	8	0	0	0	0	0	0	0
93-03	26	0	8	7	15	0	6	4	10	0	1	0	1	0	0	2
93-04	14	0	4	0	4	0	9	0	9	0	1	0	0	0	0	1
93-05	93	0	44	2	46	0	45	1	46	0	1	0	1	0	0	2
93-06	12	0	2	0	2	0	10	0	10	0	0	0	0	0	0	0
93-07	31	0	16	1	17	0	14	0	14	0	0	0	0	0	0	0
93-08	16	0	6	0	6	0	9	1	10	0	0	0	0	0	0	1
93-09	44	0	22	0	22	0	20	2	22	0	0	0	0	0	0	0
93-10	18	0	6	0	6	0	11	0	11	0	1	0	0	0	0	1
93-11	30	0	11	1	12	0	17	0	17	0	1	0	0	0	0	1
<b>1993 Total</b>	<b>313</b>	<b>0</b>	<b>124</b>	<b>11</b>	<b>135</b>	<b>0</b>	<b>163</b>	<b>10</b>	<b>173</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>8</b>	
<b>Grand Total</b>	<b>447</b>	<b>2</b>	<b>176</b>	<b>13</b>	<b>191</b>	<b>1</b>	<b>219</b>	<b>12</b>	<b>232</b>	<b>1</b>	<b>23</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>27</b>	

**Table F-5. Summary of adult humpback chub ( $\geq 200$  mm TL) captured and recaptured, October 1990-November 1993.**

Month	No. Captured (Ct)	No. Recaptured (Rt)	Sum Rt	No. Marked
October	43	0	0	0
November	43	2	2	43
January	78	5	7	84
February	3	1	8	157
March	123	15	23	159
April	7	0	23	267
May	26	1	24	274
June	35	4	28	299
July	71	7	35	330
September	91	15	50	394
November	45	8	58	470
January	26	8	66	507
February	6	0	66	525
March	43	4	70	531
April	38	3	73	570
May	43	6	79	605
June	38	4	83	642
July	66	14	97	676
August	6	0	97	728
September	36	10	107	734
November	55	13	120	760
January	111	26	146	802
February	74	13	159	887
March	47	6	165	948
April	28	5	170	989
May	72	19	189	1012
June	65	12	201	1065
July	45	16	217	1118
August	39	17	234	1147
September	55	28	262	1169
October	36	11	273	1196
November	30	7	280	1121



## **Appendix G**

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Table G-1. Surface area ( $m^3$ ) of macrohabitats in seven map sites of the Colorado River.

Site Map	Date	Midflow	Eddy (ED)	Pool (PO)	Rapid (RA)	Return Channel (RC)	Riffle (RI)	Run (RU)	Total
<b>ESPN (RM 59.75 - 61.00)</b>									
	5/19/91 (1300-1400)	5,318-5,467 (5,385)	4374	17403	0	146	0	19680	41603
	8/19/91 (1830-1856)	11,089-11,089 (11,089)	6118	0	0	0	0	35926	42044
	5/22/91 (1130-1230)	14,792-15,502 (14,920)	8120	1370	0	154	0	35189	44833
	8/18/91 (0850-0920)	17,249-16,749 (17,148)	14955	0	0	98	274	28644	43971
	6/17/92 (1130-1245)	12,378-12,016 (12,085)	13657	3801	0	82	520	25993	44053
<b>CAMP (RM 61.00-61.25)</b>									
	5/20/91 (0830-0930)	5,318-5,268 (5,234)	668	18344	0	0	1064	19440	39516
	8/19/91 (1730-1750)	11,297-11,237 (11,250)	3039	0	0	0	506	37002	40547
	5/21/91 (1515-1630)	15,017-14,888 (14,888)	1693	0	0	0	748	39634	42075
	8/18/91 (0800-0834)	17,651-17,249 (17,500)	3218	2233	0	0	337	36836	42624
	6/17/92 (1015-1100)	12,916-12,443 (12,696)	4065	0	0	0	453	37135	41653
<b>LCRI (RM 61.25 - 61.50)</b>									
	5/19/91 (1000-1130)	5,335-5,451 (5,400)							0
	8/18/91 (1800-1830)	11,446-11,326 (11,400)							0
	5/21/91 (1330-1430)	14,856-14,984 (14,920)							0
	8/18/91 (1000-1032)	16,451-16,155 (16,300)							0
	930530	8,000 steady	8230	0	3444	0	3417	39838	54929
<b>HOP1 (RM 62.20-62.40)</b>									
	9/16/91 (1530-1618)	10,052-10,043 (10,050)	11657	18719	0	19	0	16932	47327
	8/20/91 (1030-1050)	16,122-15,762 (16,000)	17442	7609	2879	0	0	21277	49207
	6/18/92 (1215-1250)	11,979-11,643 (11,708)	17125	7862	1419	0	0	21337	47743

Table G-1. continued

Site Map	Date	Midflow	Eddy (ED)	Pool (PO)	Rapid (RA)	Return Channel (RC)	Riffle (RI)	Run (RU)	Total
<b>SALT (RM 62.40-62.60)</b>									
	5/20/91 (1720-1815)	9,257-10,266 (10,266)	16914	7178	2056	404	2930	15720	45202
	9/16/91 (1415-1508)	10,043-10,057 (10,054)	8178	11533	1926	273	0	25877	47787
	5/22/91 (0830-0930)	14,824-14,888 (14,952)	18462	9474	2853	104	0	28134	5902
	8/20/91 (1200-1230)	14,920-14,600 (14,500)	16536	10012	0	0	0	28156	5470
<b>WHAL (RM 62.6-63.00)</b>									
	5/22/91 (1810-1900)	14,920-14,920 (14,920)	14032	6855	762	0	1952	37956	6155
<b>WEEP (RM 63.00-63.25)</b>									
	9/16/91 (1630-1718)	10,033-10,023 (10,030)	17758	15997	2435	72	106	20330	56698
	8/20/91 (0830-0850)	17,517-17,115 (17,300)	15049	14281	3951	252	231	25208	5897
	930529	8,500 steady	25369	11413	3456	0	0	17916	5815

Table G-2. continued

Map Site	Date	Midflow	Cobble (CO)	Bedrock (BE)	Debris Fan (DF)	Sand (SA)	Talus (TA)	Vegetation (VE)	Total
<b>SALT (RM 62.40-62.60)</b>									
	5/20/91 (1720-1815)	9,257-10,266 (10,266)	0	0	252	659	404	31	1346
	9/16/91 (1415-1508)	10,043-10,057 (10,054)	0	0	233	560	406	34	1233
	5/22/91 (0830-0930)	14,824-14,888 (14,952)	0	0	217	541	365	73	1196
	8/20/91 (1200-1230)	14,920-14,600 (14,500)	0	0	225	457	414	53	1149
<b>WHAL (RM 62.6-63.00)</b>									
	5/22/91 (1810-1900)	14,920-14,920 (14,920)	174	224	300	256	175	105	1234
<b>WEEP (RM 63.00-63.25)</b>									
	9/16/91 (1630-1718)	10,033-10,023 (10,030)	0	223	394	65	526	24	1232
	8/20/91 (0830-0850)	17,517-17,115 (17,300)	58	226	351	107	415	22	1179
	930529		0	106	387	149	542	0	1184

Table G-2. Linear distance (m) of shoreline types in seven map sites of the Colorado River

Map Site	Date	Midflow	Cobble (CO)	Bedrock (BE)	Debris Fan (DF)	Sand (SA)	Talus (TA)	Vegetation (VE)	Total
<b>ESPN (RM 59.75 - 61.00)</b>									
	5/19/91 (1300-1400)	5,318-5,467 (5,385)	0	193	344	428	143	76	1184
	8/19/91 (1830-1856)	11,089-11,089 (11,089)	0	198	406	239	154	189	1186
	5/22/91 (1130-1230)	14,792-15,502 (14,920)	0	269	402	163	65	230	1129
	8/18/91 (0850-0920)	17,249-16,749 (17,148)	0	283	398	220	103	159	1163
	6/17/92 (1130-1245)	12,378-12,016 (12,085)	0	275	353	174	95	267	1164
<b>CAMP (RM 61.00-61.25)</b>									
	5/20/91 (0830-0930)	5,318-5,268 (5,234)	41	347	106	295	214	0	1003
	8/19/91 (1730-1750)	11,297-11,237 (11,250)	85	356	86	235	80	157	999
	5/21/91 (1515-1630)	15,017-14,888 (14,888)	28	348	91	154	289	95	1005
	8/18/91 (0800-0834)	17,651-17,249 (17,500)	61	304	93	104	141	304	1007
	6/17/92 (1015-1100)	12,916-12,443 (12,696)	93	341	83	107	209	177	1010
<b>LCRI (RM 61.25 - 61.50)</b>									
	5/19/91 (1000-1130)	5,335-5,451 (5,400)							0
	8/18/91 (1800-1830)	11,446-11,326 (11,400)							0
	5/21/91 (1330-1430)	14,856-14,984 (14,920)							0
	8/18/91 (1000-1032)	16,451-16,155 (16,300)							0
	930530		638	312	0	230	183	0	1363
<b>HOPPI (RM 62.20-62.40)</b>									
	9/16/91 (1530-1618)	10,052-10,043 (10,050)	0	0	224	136	584	257	1201
	8/20/91 (1030-1050)	16,122-15,762 (16,000)	47	0	220	0	606	269	1142
	6/18/92 (1215-1250)	11,979-11,643 (11,708)	0	0	198	177	582	178	1135

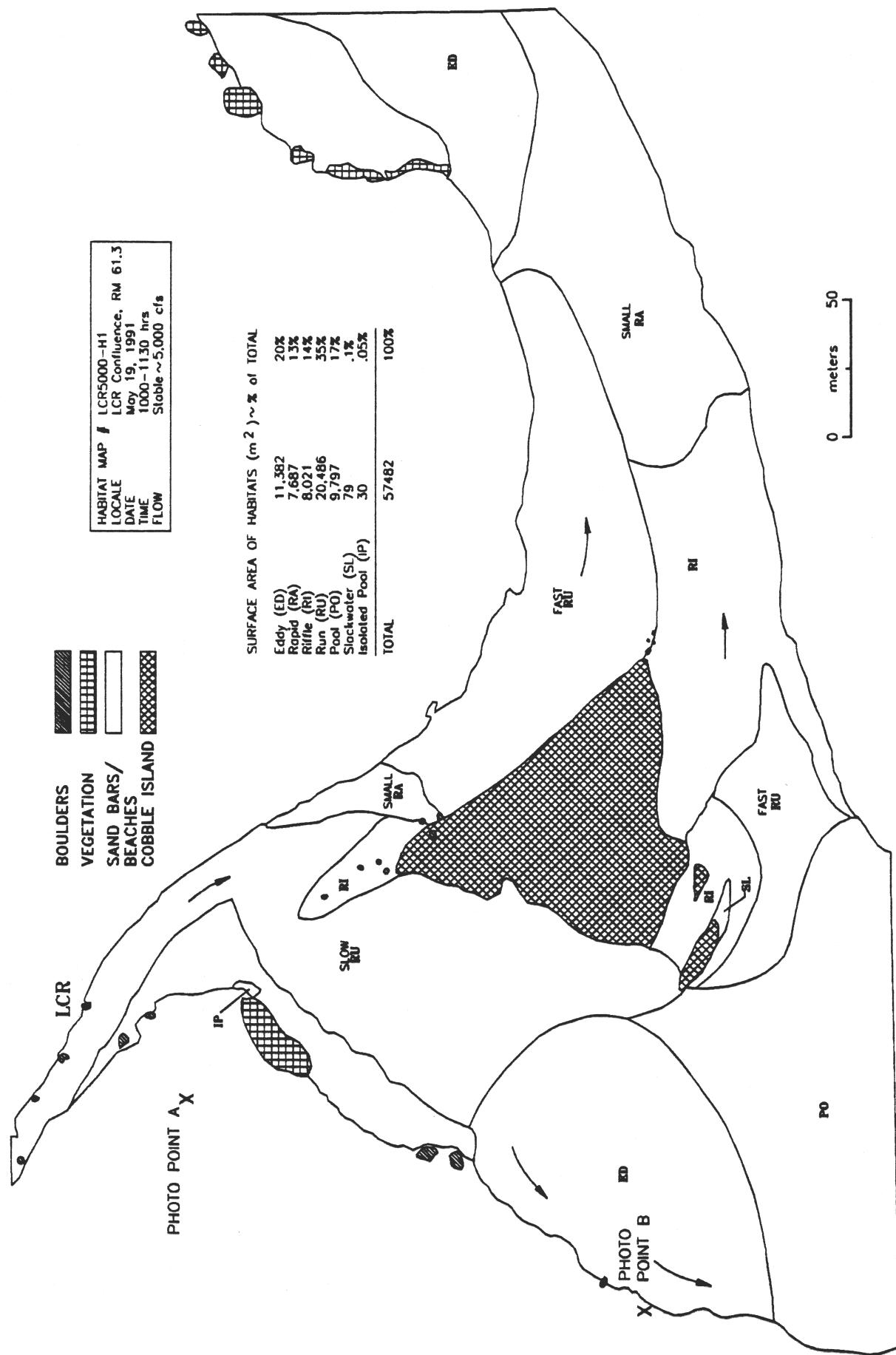
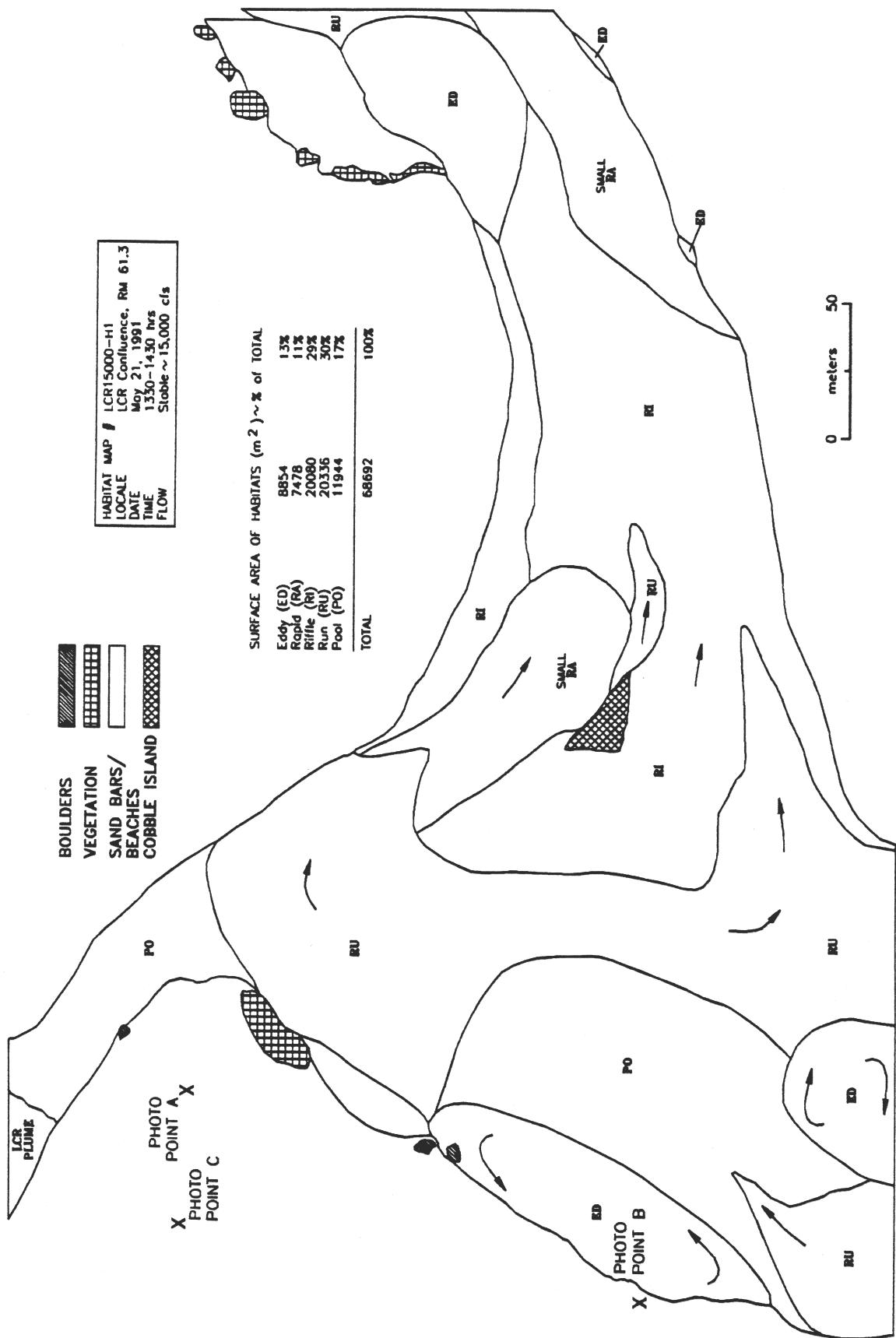


Fig. G-1. Habitat map of the Colorado River at 5,000 cfs at the LCR Inflow, RM 61.3, May 19, 1991.



**Fig. G-2.** Habitat map of the Colorado River at 15,000 cfs at the LCR Inflow, RM 61.3, May 19, 1991.



## **Appendix H**

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**Table H-1.** Length of contact and long-range displacement of 75 radiotagged adult humpback chub In the Colorado River, Grand Canyon, 1990-1993.

Fish No.	PIT Tag No.	Freq/Pulse	Implanted Date	Last Contact Date	Days* Between Contact	Capture Location (RM)	Final <sup>b</sup> Location (RM)	Displacement			
								Gross (km)	Net (km)	No. Contacts	
1	7F7F3F5050	40.670/60	901017	910308	143	60.40	61.35	4.51	-1.53	30	yes
2	7F7F3E2D2D	40.640/59	901017	910214	120	60.40	60.80	3.54	-0.64	10	no
3	7F7F3F5626	40.620/78	901017	910109	85	60.40	60.90	3.38	-0.08	13	no
4	7F7F3E2253 <sup>d</sup>	40.650/81	901017	901021	5	60.40	60.40	0.00	0	1 <sup>c</sup>	no
5	7F7F3F4054	40.630/39	911018	901214	58	60.40	60.60	0.32	-0.32	2	no
6	7F7F3F5044	40.680/77	901018	910213	119	60.60	59.80	1.45	1.29	7	no
7	7F7F3F4E11	40.690/40	901019	901117	30	64.60	64.60	1.93	0	6	no
8	7F7F3E2F3A <sup>a</sup>	40.660/39	901020	901215	57	64.60	64.70	3.38	-0.16	8	no
9	7F7F456B2C	40.610/58	901020	900117	90	64.60	64.65	3.46	0.08	16	no
10	7F7F3C311C	40.600/40	901020	901217	59	64.60	64.80	7.40	0.32	18	no
11	7F7F3C4452	40.600/62	901116	910411	147	60.40	61.40	7.72	-1.61	30	no
12	7F7F3C303B	40.700/62	901116	910311	116	60.10	61.30	3.86	-1.93	17	no
13	7F7F3F4E77	40.710/79	901117	910414	149	61.00	60.80	6.92	0.32	38	no
14	7F7F3E3C5C	40.730/61	901118	910310	113	61.10	61.30	1.77	-0.32	12	no
15	NO PITTAG	40.740/79	901119	910115	58	62.00	62.20	0.32	-0.32	11	no
16	7F7F3C2919	40.640/78	901121	910115	56	64.10	64.50	5.31	-0.64	13	no
17	7F7F3C4162	40.630/62	901123	910314	113	64.40	63.90	11.75	0.80	28	no
18	7F7F3C4208	40.660/64	910108	910416	99	58.80	60.60	4.18	-2.90	16	no
19	7F7F3E3030	40.680/44	910109	910518	129	58.30	0.19LC	7.18	-5.23	21	yes
20	7F7F3C3171	40.730/86	910109	910311	62	59.00	60.80	8.69	-2.90	17	no
21	7F7F4F3A5C	40.710/41	910109	910417	99	59.00	61.50	8.56	-4.02	45	yes

Table H-1. continued

Fish No.	PIT Tag No.	Freq/Pulse	Implanted Date	Last Contact Date	Days <sup>a</sup> Between Contact	Capture Location (RM)	Final <sup>b</sup> Location (RM)	Displacement			
								Gross (km)	Net (km)	No. Contacts	Movement to/from LCR
22	7FF3C2D06	40.740/42	910110	910416	97	60.50	0.20LC	3.93	-1.67	26	yes
23	7FF3E3D23	40.670/84	910110	910417	97	60.50	61.50	9.36	-1.61	24	yes
24	7FF3E2727	40.720/66	910110	910314	64	60.60	0.06LC	2.75	-1.30	27	yes
25	7FF3E362E	40.640/42	910304	910417	44	57.00	57.25	1.05	-0.40	6	no
26	7FF3E2661	40.670/39	910307	910415	39	58.80	61.50	4.99	-4.34	14	no
27	7FF3F4453	40.600/40	910309	910416	38	61.30	61.35	3.78	-0.88	7	no
28	7FF3C243E	40.620/64	910311	910814	146	61.20	58.35	6.84	4.59	33	no
29	7FF3F520D	40.630/86	910311	910613	94	61.20	0.43LC	6.73	-0.93	22	yes
30	7FF3E3B00	40.680/66	910311	910520	70	61.20	0.06LC	2.99	-0.34	21	yes
31	7FF3E372A	40.600/85	910311	910518	68	61.40	0.37LC	2.53	0.68	19	yes
32	7FF3C6F15	40.700/42	910518	910916	121	61.40	64.65	9.09	-5.23	29	no
33	7FD076050	40.650/40	910513	910914	124	60.50	60.40	4.34	0.16	39	no
34	7FD026506	40.730/41	910519	911113	178	61.40	60.50	10.65	1.45	27	yes
35	7FD075B05	40.610/82	910612	910916	96	60.20	60.80	12.58	-0.97	26	yes
36	7FF04461F	40.640/60	910612	910914	94	60.20	60.00	4.54	-0.32	37	yes
37	7FD086032	40.650/60	910613	910914	93	61.10	60.15	5.87	1.53	20	no
38	7FD07776A	40.740/59	910614	910916	94	61.40	60.40	5.15	1.61	18	yes
39	7FF3E276F	40.620/80	910713	910913	62	58.40	58.30	16.93	0.16	22	yes
40	7FD084C05	40.630/38	910715	911111	119	59.90	59.85	3.78	0.08	23	no
41	7FD08545E	40.610/59	910715	911109	117	60.30	60.15	8.61	0.24	25	no
42	7FF3F4E45	40.720/80	910716	910916	62	60.90	60.80	6.63	0.16	22	yes

Table H-1. continued

Fish No.	PIT Tag No.	Freq/Pulse	Implanted Date	Last Contact Date	Days* Between Contact	Capture Location (RM)	Final <sup>b</sup> Location (RM)	Displacement		
								Gross (km)	Net (km)	No. Contacts
43	7F7D081904	40.700/87	910908	911113	65	58.30	62.10	6.44	-6.11	26
44	7F7D08552A	40.660/87	910908	911109	62	58.30	58.90	3.22	-0.97	7
45	7F7D09067B <sup>d</sup>	40.670/61	910910	910916	6	60.10	60.80	5.47	-1.13	8
46	7F7F3F3764	40.600/60	910914	911113	60	64.70	64.60	1.61	0.16	10
47	7F7F3E3149	40.710/80	910915	920116	123	64.40	61.80	4.34	-4.18	10
48	7F7F3E3542	40.680/78	910915	911113	59	64.40	64.40	0.32	0	5
49	7F7F456D61 <sup>d</sup>	40.740/80	911107	911108	1	58.8	58.9	0.16	-0.16	1
50	7F7F095814	40.640/82	911108	920413	157	58.8	61.5	7.14	-4.34	21
51	7F7F21747D	40.630/62	911109	920314	126	60.1	60.4	3.22	-0.48	29
52	7F7F1F6A79	40.621/44	911109	920414	157	60.1	0.7LCR	8.83	-3.11	36
53	7F7F21741B	40.610/83	911112	920305	124	64.8	63.9	1.51	1.45	9
54	7F7E431037	40.650/82	920111	920516	126	58.3	60.75	11.18	-3.94	33
55	7F7E432514	40.601/61	920113	920414	92	60.45	0.6LCR	3.81	-2.41	23
56	7F7D140108	40.730/62	920114	920314	60	60.7	61.5	2.77	-1.29	18
57	7F7E430D1E	40.710/60	920114	920414	91	60.8	0.53LCR	3.70	-1.74	45
58	7F7F1E514C <sup>d</sup>	40.660/62	920120	920616	148	65.3	9.3LCR	24.46	31.00	31
59	7F7F475E72	40.680/44	920308	920818	163	61.5	60.4	6.76	1.77	27
60	7F7E432641	40.720/62	920311	920515	65	61.1	2.4LCR	6.87	-4.30	13
61	7F7F271C57	40.700/83	920311	920516	66	61.3	62.3	4.02	-1.61	25
62	7F7F1E7A65	40.630/84	920408	920818	132	61.75	62.2	9.07	-0.72	22
63	7F7F217E36 <sup>d</sup>	40.610/42	920508	920515	7	61.9	64.4	4.18	-4.02	6

Table H-1. continued

Fish No.	PIT Tag No.	Freq/Pulse	Implanted Date	Last Contact Date	Days <sup>a</sup> Between Contact	Capture Location (RM)	Final <sup>b</sup> Location (RM)	Displacement			
								Gross (km)	Net (km)	No. Contacts	
64	7F7D080024 <sup>d</sup>	40.730/83	920509	920516	7	61.5	61.7	0.80	-0.32	10	no
65	7F7F3E6117	40.670/80	920614	920910	88	62.7	62.2	4.34	0.80	8	no
66	7F7F3E5B39	40.640/40	920615	920718	33	62.7	62.95	4.10	-0.40	18	no
67	7F7E431B2C	40.740/42	920616	920911	87	61.4	61.85	5.07	-0.72	25	no
68	7F7F3E506C	40.620/62	920709	921105	119	58.3	58.35	9.57	-0.08	27	no
69	7F7F3E5133	40.710/41	920709	921103	117	58.3	59.0	4.02	-1.13	23	no
70	7F7D085A33	40.600/84	920713	921105	115	61.2	60.15	2.98	1.69	20	no
71	7F7F321C62	40.650/60	920713	920912	61	61.2	60.4	3.70	1.29	14	no
72	7F7F206B7B	40.680/60	920909	921104	56	58.2	58.85	1.37	-1.05	14	no
73	7F7F477F56	40.740/60	920909	921109	61	58.3	58.25	0.56	-0.08	20	no
74	7F7E430660	40.610/59	920912	921109	58	60.4	60.80	3.06	-0.64	33	no
75	7F7F333715	40.720/83	920915	921105	51	61.3	60.35	1.69	1.53	17	no
		Mean			87.56			5.19	1.73	19.73	
		Standard Deviation			41.21			3.98	2.74	10.24	
		Minimum			1			0.00	0	1	
		Maximum			178			24.46	21.35	45	

<sup>a</sup>Days between implant and last contact.<sup>b</sup>0.30LC = 0.30 km upstream into LCR.<sup>c</sup>Fish not positively located; two "probable" signals contacts received.<sup>d</sup>Excluded from movement analysis<sup>e</sup>Recaptured at RM 127.0 on 910718.

**Table H-2. Length of contact and long-range displacement of 3 radiotagged adult humpback chub in the Middle Granite Gorge, Colorado River, Grand Canyon, 1990-1993.**

Fish No.	PIT Tag No.	Freq/Pulse	Implanted Date	Last Contact Date	Days Between Contact	Capture Location (RM)	Final Location (RM)	Displacement		
								Gross (km)	Net (km)	No. Contacts
1	7F7B081768	40.600/43	930223	930319	24	125.4	126.7	1.13	-1.13	5
2	7F7D084D41	40.660/36	930316	930521	66	127.1	128.5	3.86	-2.25	31
3	7F7D073D4A	40.730/40	930319	930716	119	127.1	128.5	5.15	-2.09	21
<b>Mean</b>				<b>69.67</b>			<b>3.38</b>	<b>1.88</b>	<b>19.0</b>	

**Table H-3. Gross and net displacement of migratory and non-migratory radiotagged adult humpback chub in the Colorado River in Grand Canyon, 1990-1993.**

PIT Tag No.	MIGRATORY			PIT Tag No.	NON-MIGRATORY		
	GROSS (km)	NET (km)	No. of Contacts		GROSS (km)	NET (km)	No. of Contacts
7F7F3F5050	4.51	1.53	30	7F7F3F3626	3.38	0.80	13
7F7F3E2D2D	3.54	0.64	10	7F7F3F4054	0.32	0.32	2
7F7F3C4452	7.72	-1.61	30	7F7F3F5044	1.45	1.29	7
7F7F3E3C5C	1.77	-0.32	12	7F7F3F4E11	1.93	0	6
7F7F3E3030	7.18	-5.23	21	7F7F3E2F3A	3.38	-0.16	8
7F7F3C3171	8.69	-2.90	17	7F7F456B2C	3.46	0.08	16
7F7F3F3A5C	8.56	-4.02	45	7F7F3C311C	7.40	0.32	18
7F7F3C2D06	3.93	-1.67	26	NO PITTAG	0.32	-0.32	11
7F7F3E3D23	9.36	-1.61	24	7F7F3C2919	5.31	-0.64	13
7F7F3E2727	2.75	-1.30	27	7F7F3C4162	11.75	0.80	28
7F7F3E2661	4.99	-4.34	14	7F7F3C4208	4.18	-2.90	16
7F7F3F4453	3.78	-0.88	7	7F7F3E362E	1.05	-0.40	6
7F7F3F520D	6.73	-0.93	22	7F7F3C243E	6.84	4.59	33
7F7F3E3B00	2.99	-0.34	21	7F7D076050	4.34	0.16	39
7F7F3E372A	2.53	0.68	19	7F7D086032	5.87	1.53	20
7F7F3C6F15	9.09	-5.23	29	7F7D084C05	3.78	0.08	23
7F7D026506	10.65	1.45	27	7F7D08545E	8.61	0.24	25
7F7D075B05	12.58	-0.97	26	7F7D081904	6.44	-6.11	26
7F7F04461F	4.54	-0.32	37	7F7D08552A	3.22	-0.97	7
7F7D07776A	5.15	1.61	18	7F7F3F3764	1.61	0.16	10
7F7F3E276F	16.93	0.16	22	7F7F3E3149	4.34	-4.18	10
7F7F3F4E45	6.63	0.16	22	7F7F3E3542	0.32	0	5
7F7E431037	11.18	-3.94	33	7F7F21747D	3.22	-0.48	29
7F7E432514	3.81	-2.41	23	7F7F21741B	1.51	1.49	9
7F7F095814	7.14	-4.34	21	7F7F475E72	6.76	1.77	27
7F7F1F6A79	8.83	-3.11	36	7F7F3E6117	4.34	0.80	8
7F7D140108	2.77	-1.29	18	7F7F3E5B39	4.10	-0.40	18
7F7E430D1E	3.70	-1.74	45	7F7E431B2C	5.07	-0.72	25
7F7E432641	6.87	-4.30	13	7F7F3E506C	9.57	-0.08	27
7F7F271C57	4.02	-1.61	25	7F7F3E5133	4.02	-1.13	23
7F7F1E7A65	9.07	-0.72	22	7F7D085A33	2.98	1.69	20

Table H-3. continued

<b>PIT Tag No.</b>	<b>MIGRATORY</b>			<b>PIT Tag No.</b>	<b>NON-MIGRATORY</b>		
	<b>GROSS (km)</b>	<b>NET (km)</b>	<b>No. of Contacts</b>		<b>GROSS (km)</b>	<b>NET (km)</b>	<b>No. of Contacts</b>
7F7F321C62	3.70	1.29	14	7F7F206B7B	1.37	-1.05	14
7F7F333715	1.69	1.53	17	7F7F477F56	0.56	-0.08	20
7F7F3C303B	3.86	-1.93	17	7F7E430660	3.06	-0.64	33
7F7F3F4E77	6.92	0.32	38				
<b>Mean</b>	<b>6.23</b>	<b>1.99</b>	<b>23.66</b>		<b>4.00</b>	<b>1.07</b>	<b>17.50</b>
<b>STD DEV.</b>	<b>3.48</b>	<b>1.51</b>	<b>9.12</b>		<b>2.70</b>	<b>1.38</b>	<b>9.50</b>
<b>MIN</b>	<b>1.69</b>	<b>0.16</b>	<b>7</b>		<b>0.32</b>	<b>0</b>	<b>2</b>
<b>MAX</b>	<b>16.93</b>	<b>5.23</b>	<b>45</b>		<b>1.75</b>	<b>6.11</b>	<b>39</b>
<b>N</b>	<b>35</b>	<b>35</b>	<b>35</b>		<b>34</b>	<b>34</b>	

**Table H-4. Radiotagged adult humpback chub contacted by the KLCR remote telemetry station in 1990 and 1991 with estimated dates in and out of the LCR.**

Fish No.	PIT Tag No.	Implant Date (ymd)	Initial Contact (ymd)	Last Contact (ymd)	Last Surveillance Contact (ymd)	Days w/in Range	Estimated Date In (ymd)	Estimated Date Out (ymd)	Observed Movement Into LCR
1	7F7F3F3626	901017	910214	910227	910109	14	-	-	N
2	7F7F3E2D2D	901017	910213	910228	910214	13	-	-	N
3	7F7F3F5050	901017	910218	910308	910318	1	-	910218	Y
"	"	"	"	"	"	"	-	910304-910305	Y
4	7F7F3C4452	901116	910216	910226	910411	7	-	-	N
5	7F7F3C303B	901116	910216	910314	910311	10	-	-	N
6	7F7F3F4E77	901117	910318	910323	910414	5	-	-	N
7	7F7F3E3C5C	901118	910215	910324	910310	25	-	-	N
8	7F7F3F3A5C	910109	910219	910524	910417	29	910311-910313	910314-910414	Y
9	7F7F3E3030	910109	910214	910424	910518	27	910310-910314	-	Y
10	7F7F3C3171	910109	910213	910324	910311	13	-	-	N
11	7F7F3E3D23	910110	910312	910424	910417	14	910311-910313	-	Y
12	7F7F3E2727	910110	910213	910519	910314	30	910310-910313	-	Y
13	7F7F3C2D06	910110	910213	910524	910416	29	910213	-	Y
"	"	"	"	"	"	"	910314	-	
"	"	"	"	"	"	"	910416	-	
14	7F7F3F4453	910309	910312	910501	910416	19	-	-	N
15	7F7F3E2661	910309	910318	910423	910415	18	-	-	N

Table H-4. continued

Fish No.	PIT Tag No.	Implant Date (ymd)	Initial Contact (ymd)	Last Contact (ymd)	Last Surveillance Contact (ymd)	Days w/in Range	Estimated Date In (ymd)	Estimated Date Out (ymd)	Observed Movement Into LCR
16 <sup>a</sup>	7F7F3E372A	910311	910312	910323	910518	11	910323	-	Y
17	7F7F3C243E	910311	910314	910615	910814	23	-	-	N
18 <sup>a</sup>	7F7F3F520D	910311	910313	910516	910613	28	910314	-	Y
"	"	"	"	"	"	"	910416	910419	Y
19	7F7F3E3B00	910311	910312	910811	910520	40	910416-910509	-	Y
20	7F7D026506	910519	910801	911113	911113	11	910519-910615	-	Y
21 <sup>a</sup>	7F7D075B05	910612	910614	910724	910916	5	910617	910723	Y
22 <sup>a</sup>	7F7F04461F	910613	910616	910727	910914	3	910616	910726	Y
23	7F7D086032	910613	910614	910802	910914	6	-	-	N
24 <sup>a</sup>	7F7D07776A	910614	910615	910616	910916	2	910616	-	Y
25 <sup>a</sup>	7F7F3E276F	910713	910726	910726	910913	1	910716	910726	Y
26	7F7D084C05	910715	910720	910805	911024	5	-	-	N
27 <sup>a</sup>	7F7F3F4E45	910716	910723	910814	910916	10	910716-910717	-	Y
28	7F7F095814	911108	920412	920413	920413	2	-	920412	Y
29	7F7F1F6A79	911109	920217	920407	920414	42	920330	-	Y
30	7F7F21747D	911109	920319	920329	920314	7	-	-	N
31	7F7E431037	920111	920214	920515	920516	62	-	-	N
32	7F7E430D1E	920114	920214	920412	920414	58	920410	-	Y

Table H-4. continued

Fish No.	PIT Tag No.	Implant Date (ymd)	Initial Contact (ymd)	Last Contact (ymd)	Last Surveillance Contact (ymd)	Days w/in Range	Estimated Date In (ymd)	Estimated Date Out (ymd)	Observed Movement Into LCR
33	7F7D140108	920114	920306	920413	920314	29	-	920305	Y
34 <sup>b</sup>	7F7F1E514C	920120	920525	920618	920616	3	920526	920618	Y
35	7F7F271C57	920311	920513	920516	920516	30	-	-	N
36	7F7E432641	920311	920331	920408	920515	9	920408	-	Y
37 <sup>a</sup>	7F7F1E7A65	920410	920409	920711	920818	7	920414-920507	920711	Y
38	7F7E431B2C	920616	920616	920805	920911	15	-	-	N
39	7F7F321C62	920713	920801	920912	920912	3	-	-	N

<sup>a</sup>Moved into LCR within 14 days of implant.<sup>b</sup>Located ~15 km up LCR 2 days before contact by KLCCR during outbound movement.



## **Appendix I**

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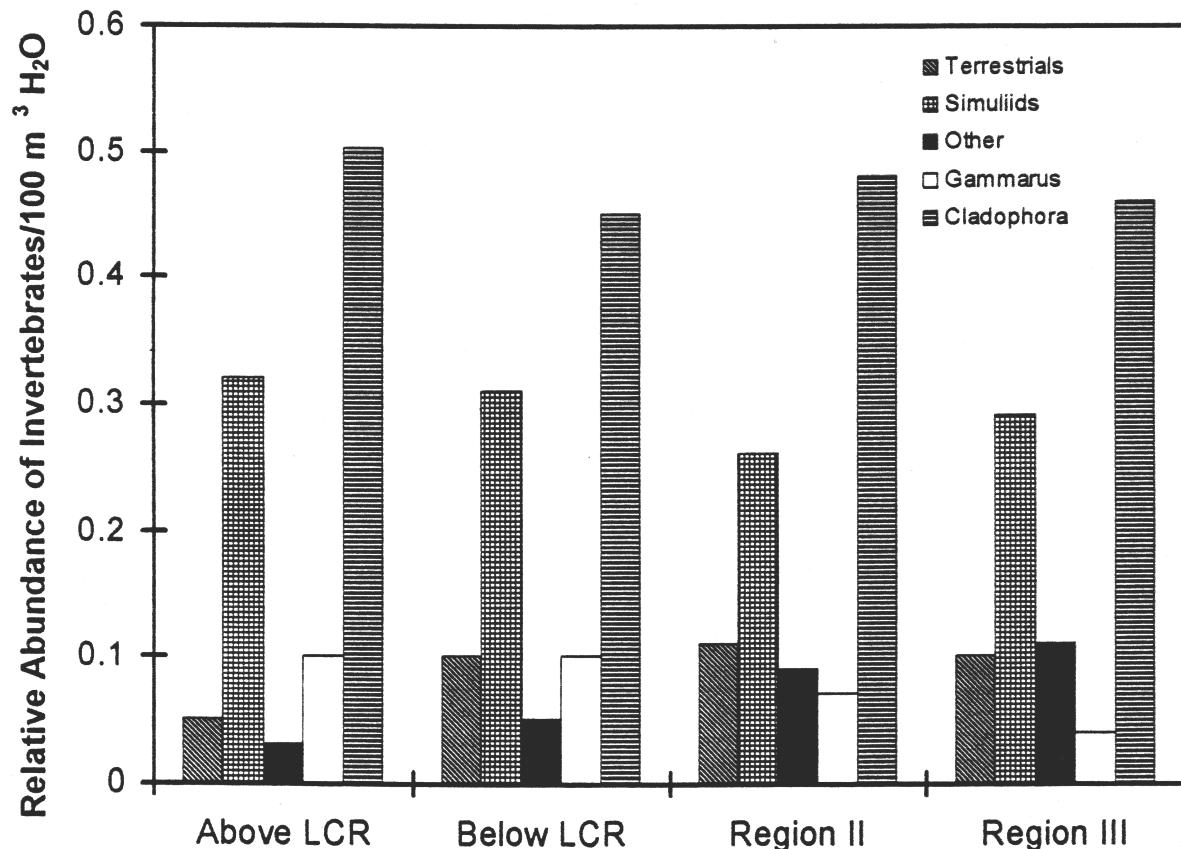
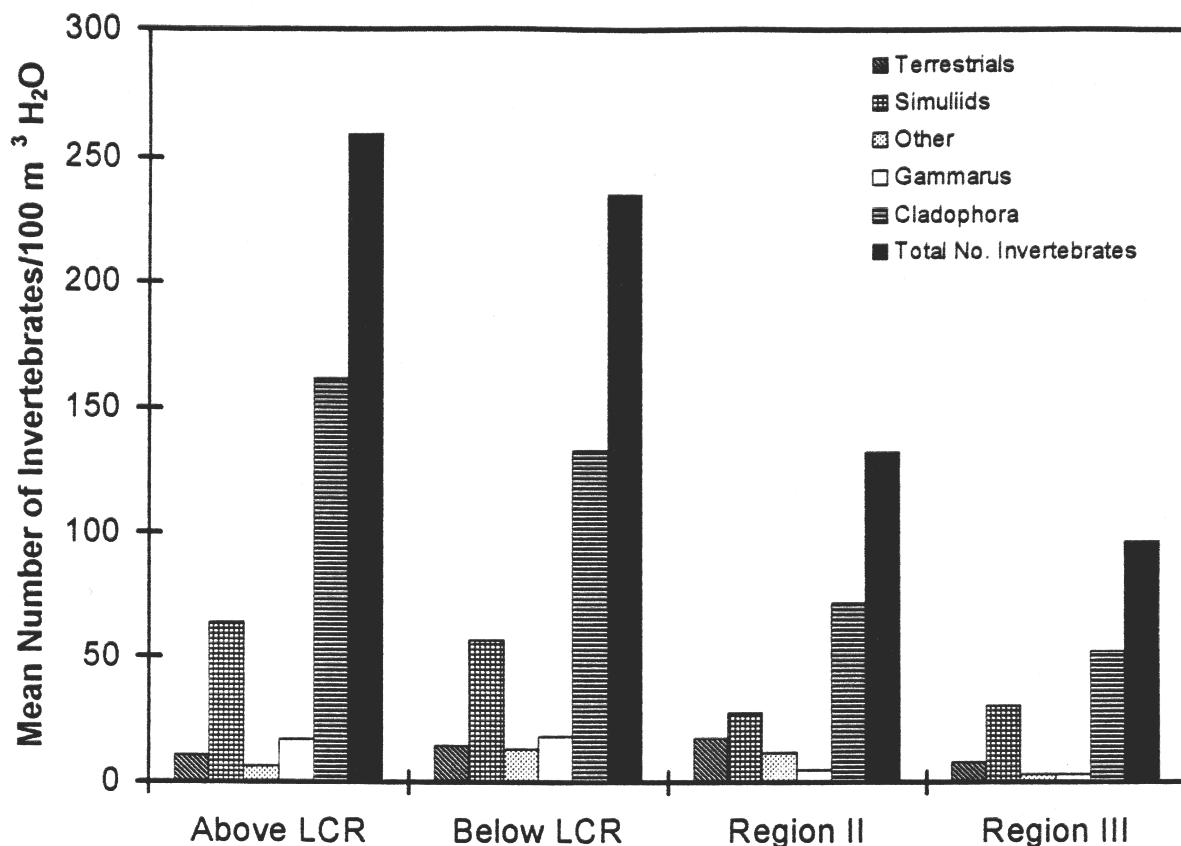
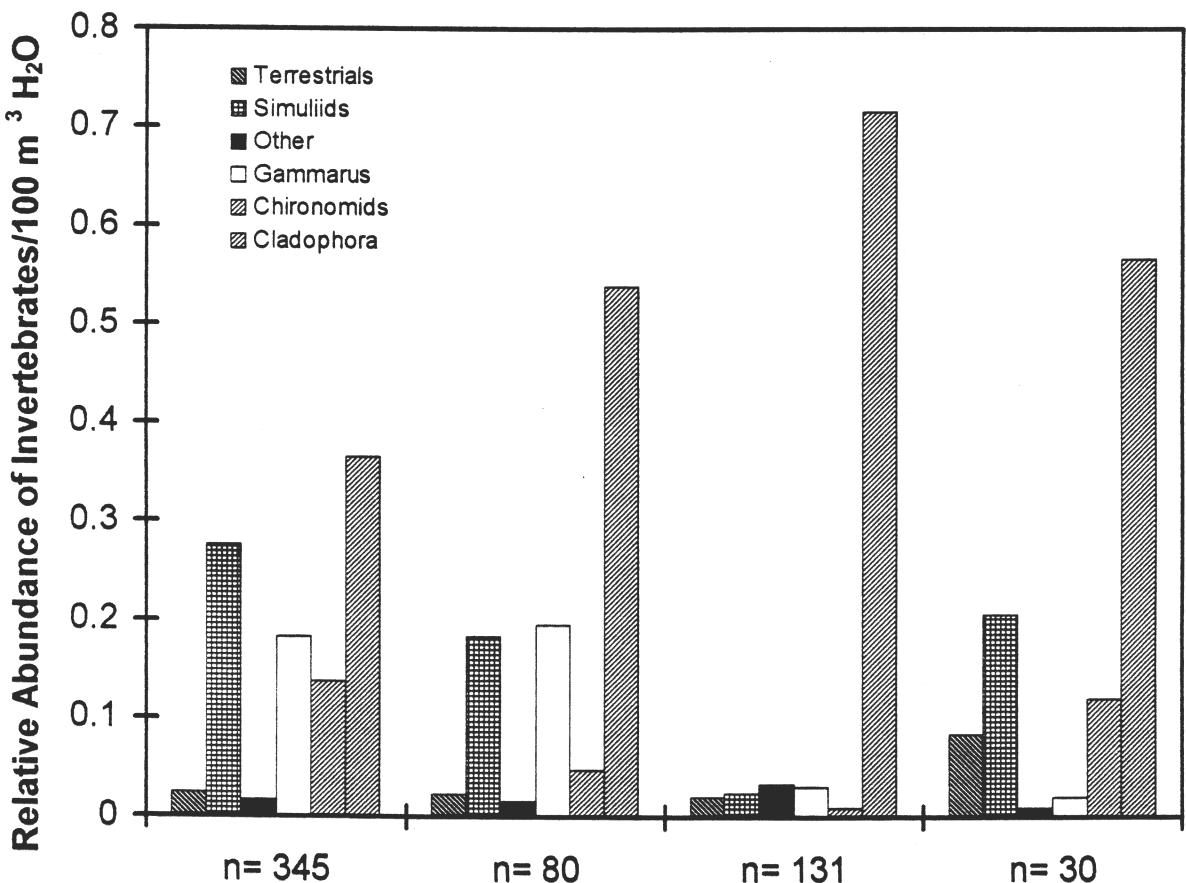
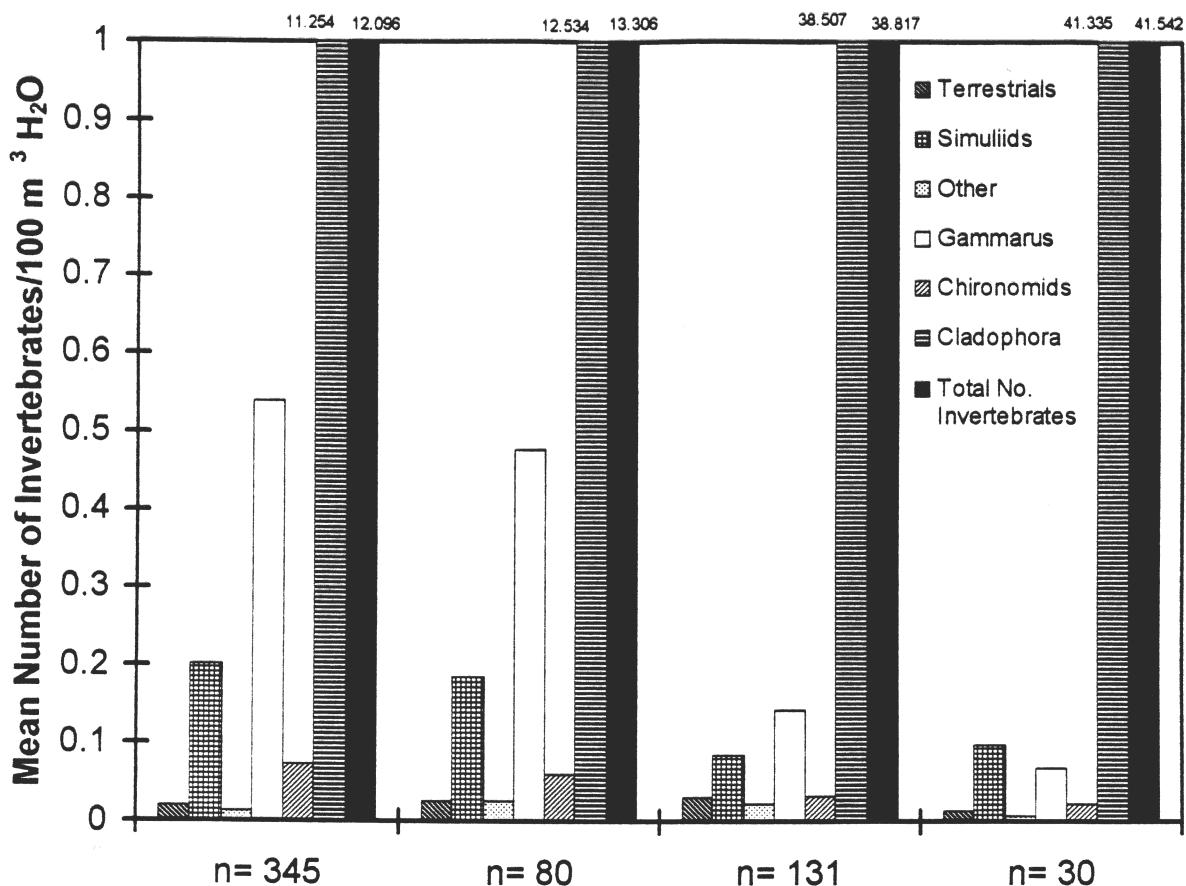


Fig. I-1. Drift density (top) and relative abundance (bottom) of drifting invertebrates by reach collected from the Colorado River, in Grand Canyon, 1991-93. (n= 586)



**Fig. I-2.** Mean (top) and relative volume (bottom) of drift by reach collected from the Colorado River, Grand Canyon, Arizona. 1991-93. (n= 586)

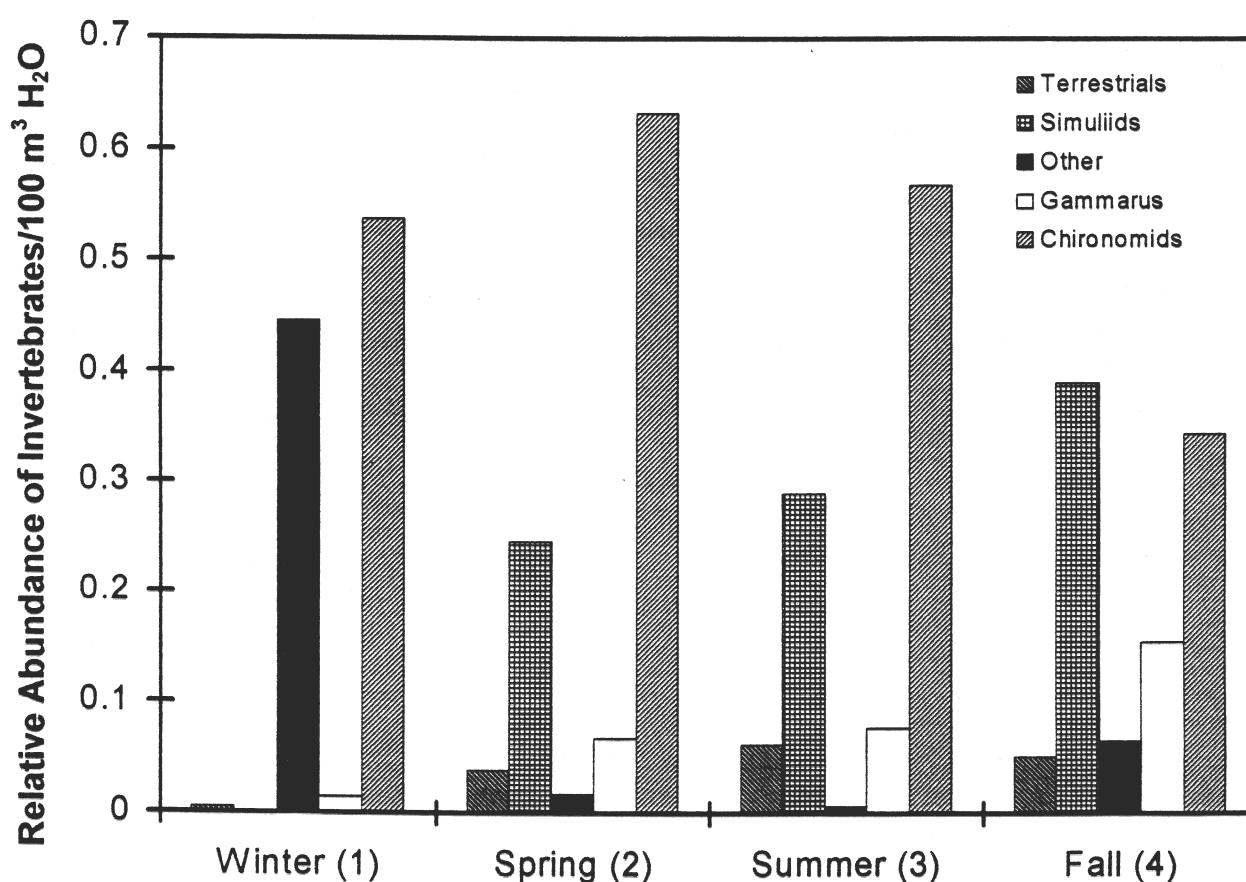
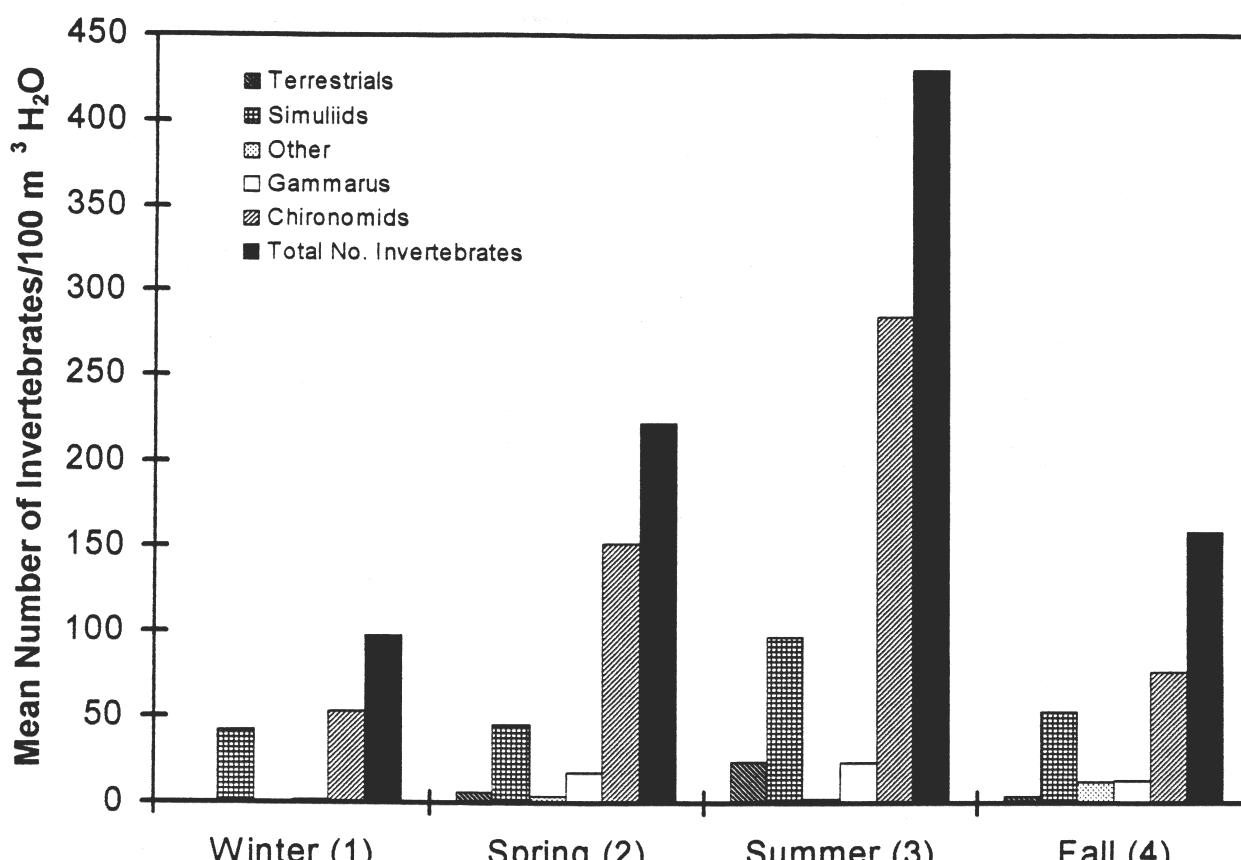


Fig. I-3. Drift density (top) and relative abundance (bottom) of drifting invertebrates by season collected above the Little Colorado River from the Colorado River, Grand Canyon, Arizona. 1991-93. (n= 345)

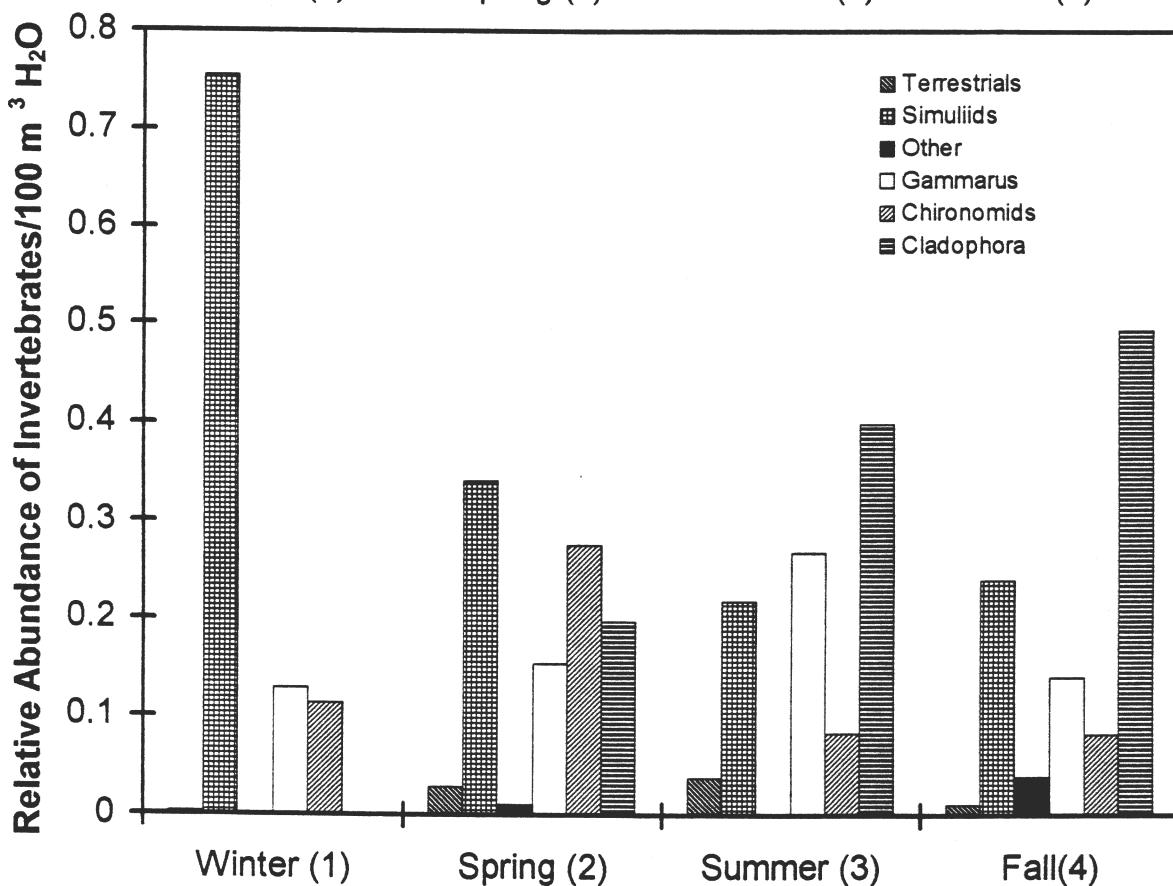
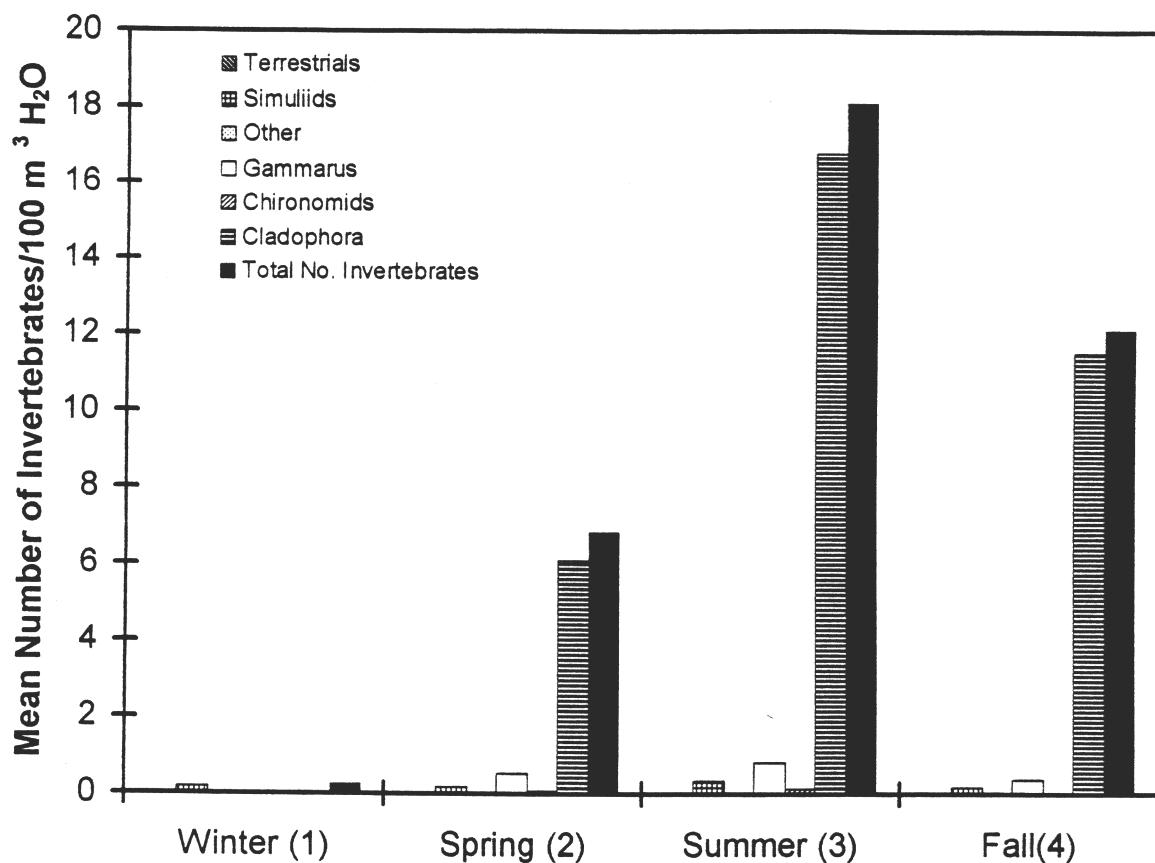


Fig. I-3a. Mean (top) and relative volume (bottom) of drift by season collected above the Little Colorado River from the Colorado River, Grand Canyon, Arizona. 1991-93. (n= 345)

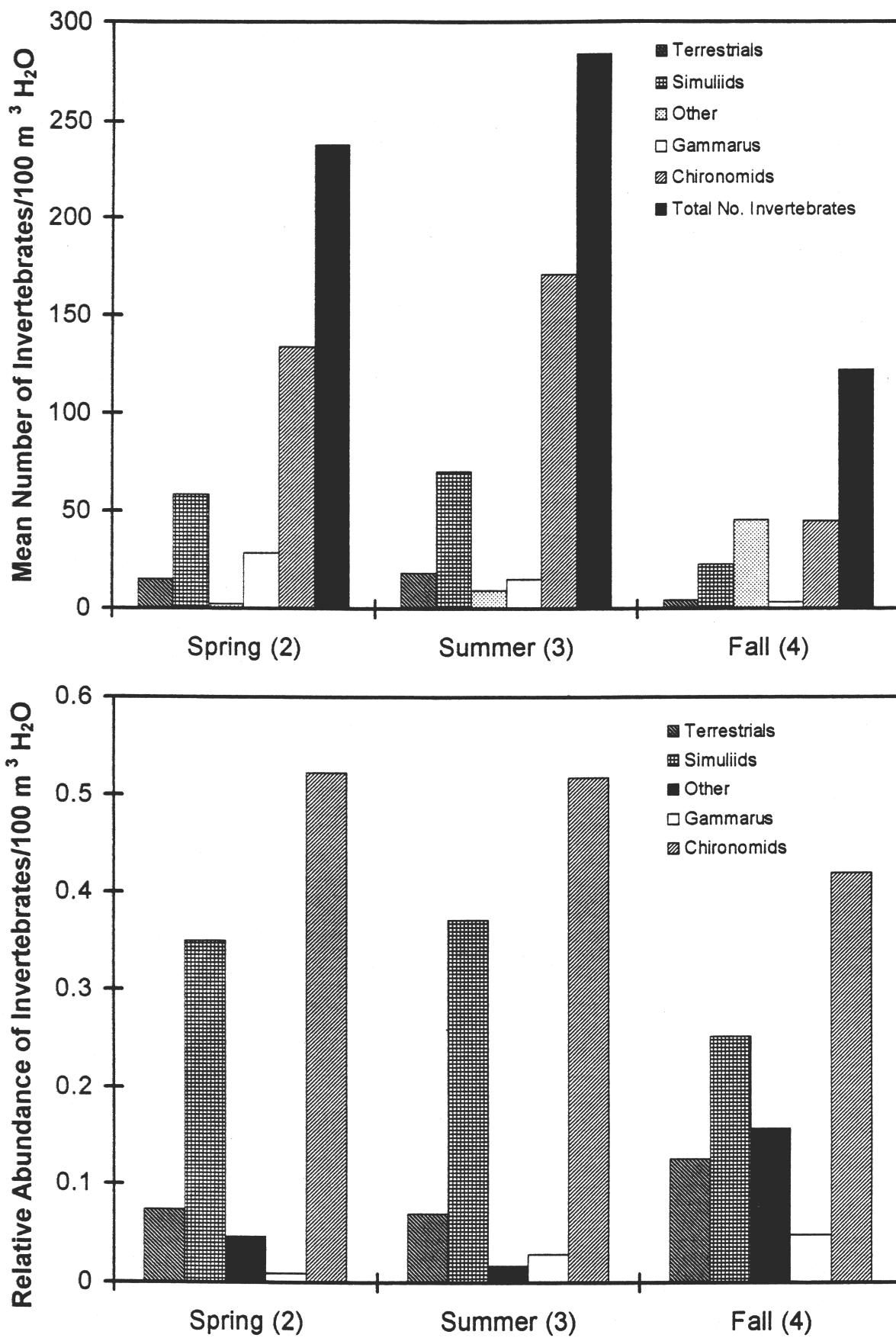


Fig. I-4. Drift density (top) and relative abundance (bottom) of drifting invertebrates by season collected between the Little Colorado River and Lava/Chuar from the Colorado River, Grand Canyon, Arizona. 1991-93. (n= 80)

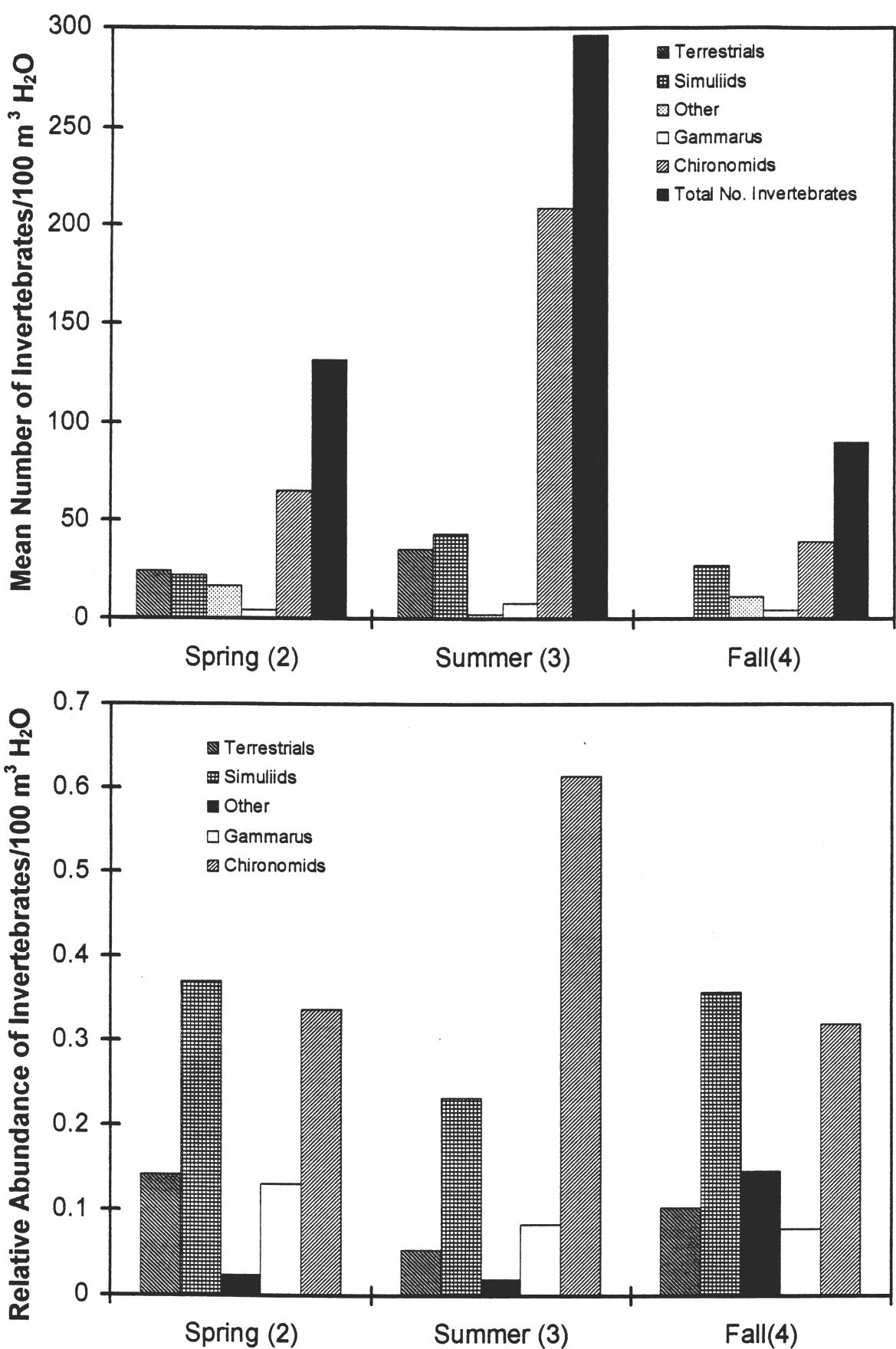


Fig. I-5. Drift density (top) and relative abundance (bottom) of drifting invertebrates by season from Region II collected from the Colorado River, Grand Canyon, Arizona. 1991-93. (n= 131)

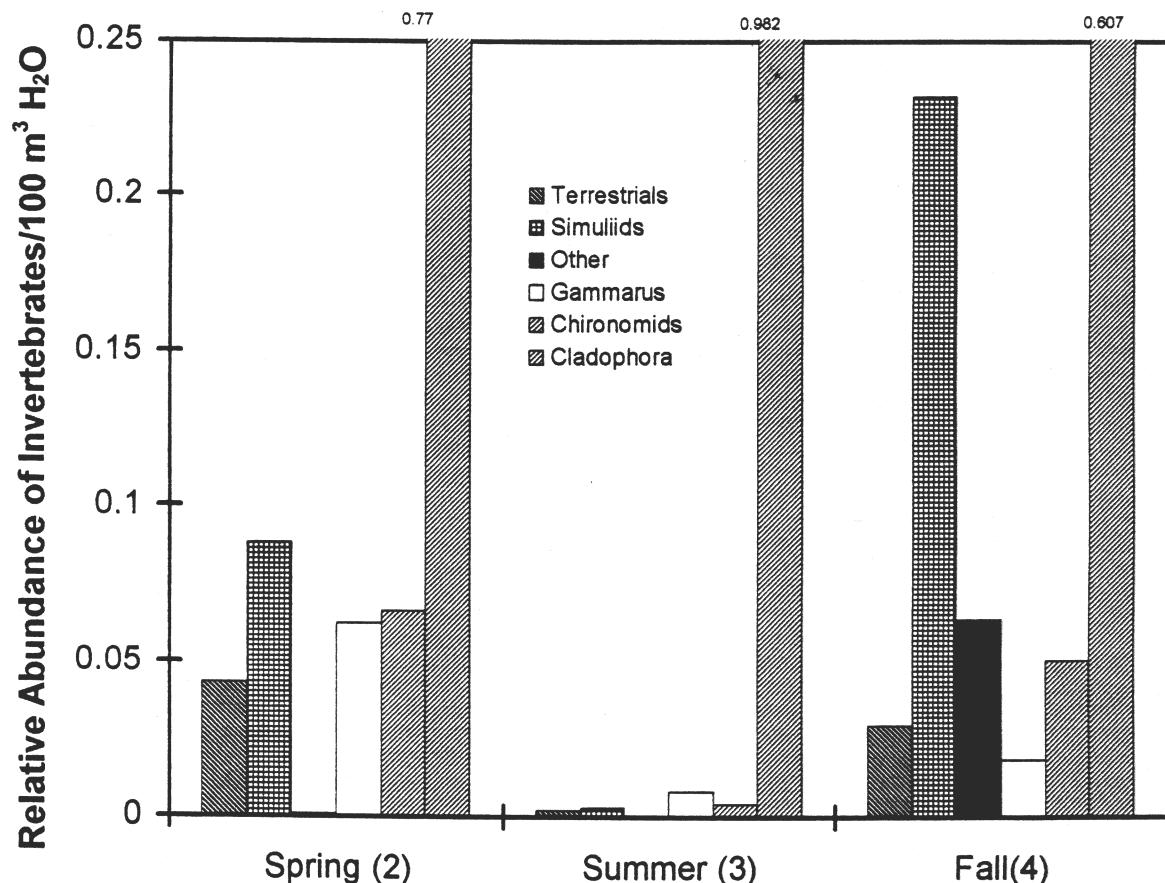
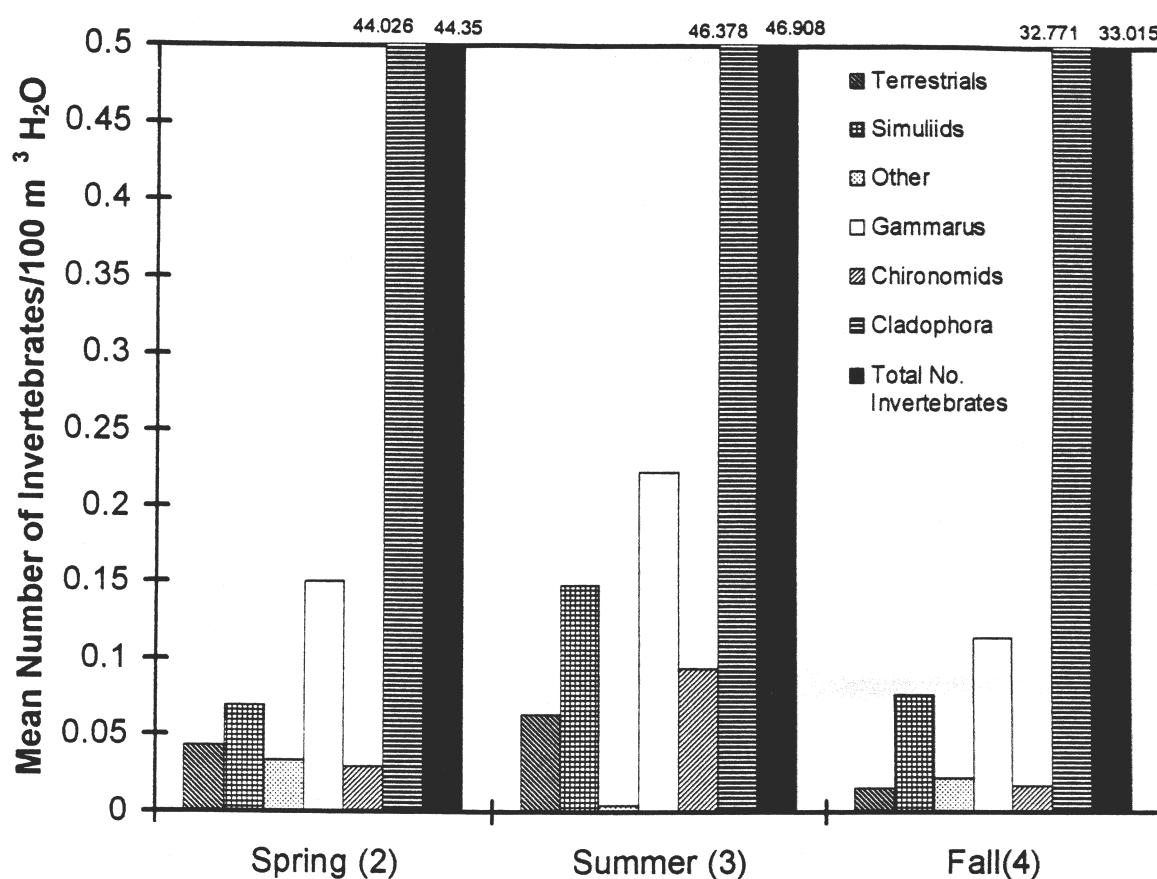


Fig. I-5a. Mean (top) and relative volume (bottom) of drift by season from Region II collected from the Colorado River, Grand Canyon, Arizona. 1991-93. (n= 131)

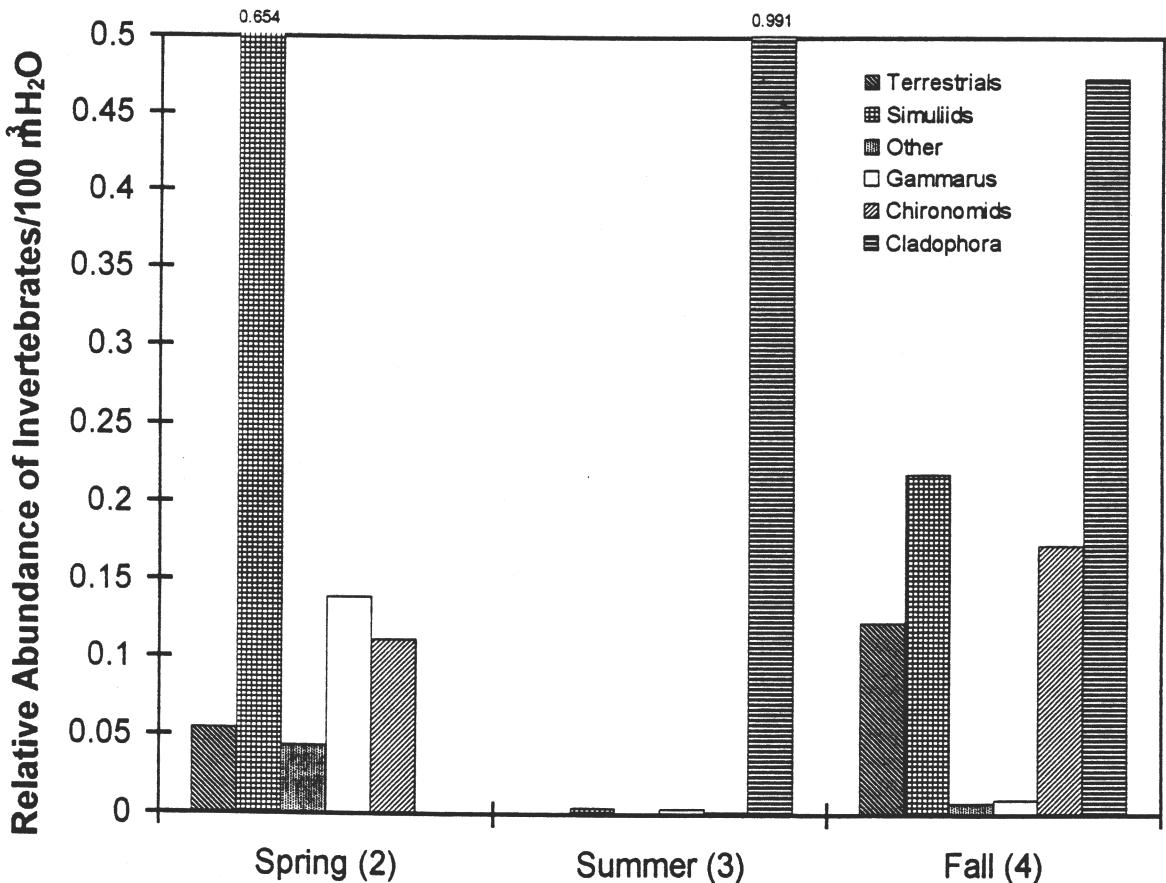
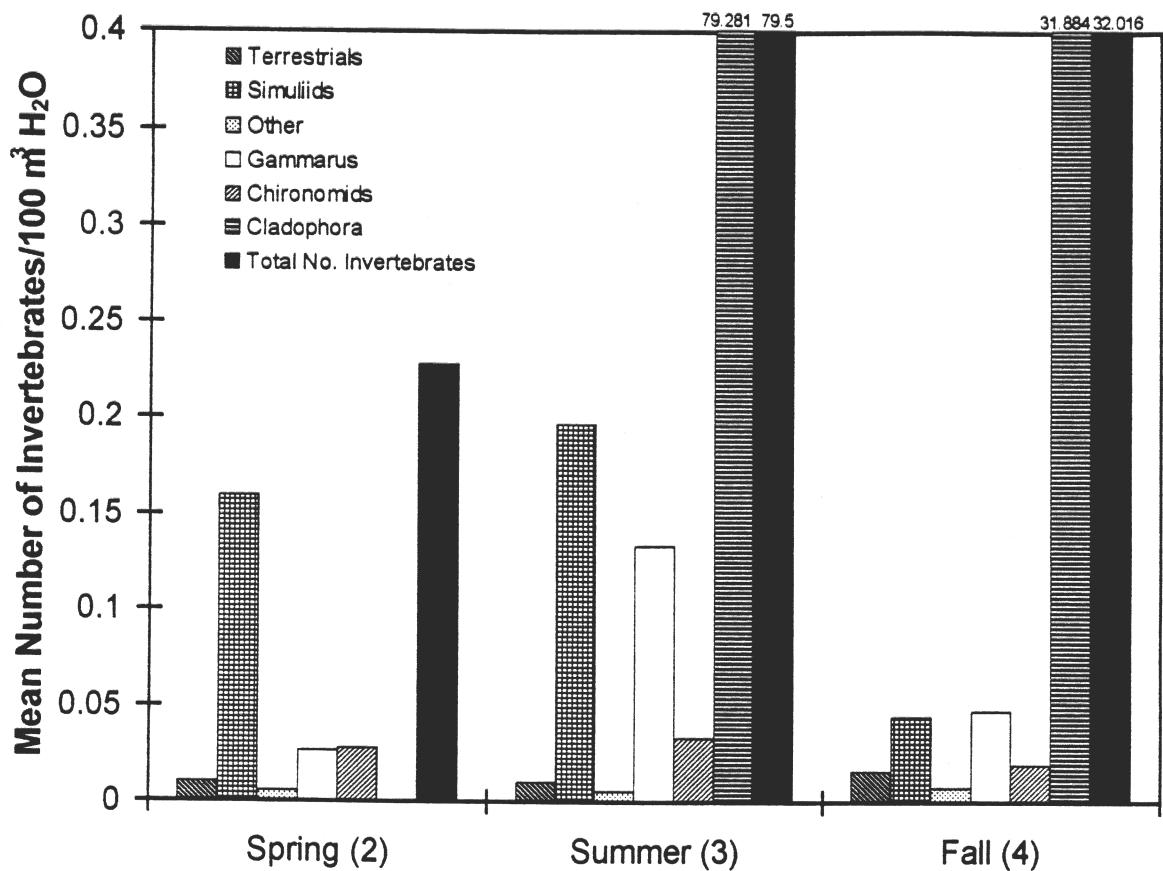


Fig. I-6. Drift density (top) and relative abundance (bottom) of drifting invertebrates by season from Region III collected from the Colorado River, Grand Canyon, Arizona. 1991-93. (n= 30)

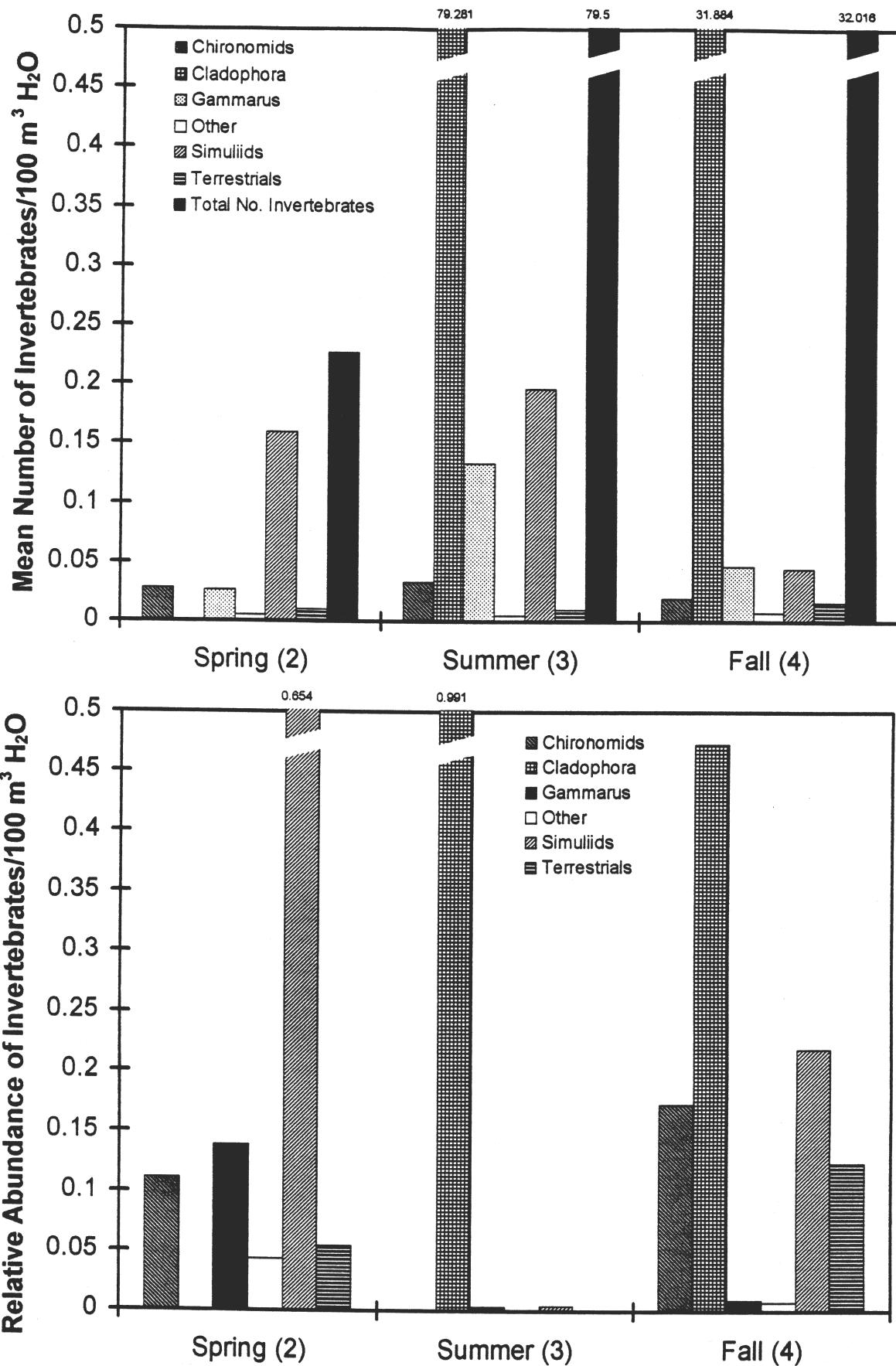


Fig. I-6a. Mean (top) and relative volume (bottom) of drift by season from Region III collected from the Colorado River, Grand Canyon, Arizona. 1991-93. (n= 30)

