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

DATA MANAGEMENT PROTOCOL
1992 - 1993

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INTRODUCTION

This report includes a description and copy of databases generated during the BIO/WEST - Hualapai Aquatic Resources Study. This report includes data from seven field trips, three in 1992 (July, September, December) and four in 1993 (March, May, September, December). This information consists of a collection of computerized datasets assimilated from field data sheets, maps, log books, photographs and electronic data loggers. The majority of the data were collected in the field and recorded on formal data sheets, structured in field specific format to facilitate computerization. BIO/WEST data are stored in dBASE IV, version 2.0.

DATASET DESCRIPTIONS

The BIO/WEST Hualapai database contains six datasets. The six datasets are (1) Fish Samples, (2) Fish Statistics, (3) Drift Samples, (4) Bentic Invertebrate Samples, (5) Water Quality, (6) Field Log Books. Each dataset contains files structured to specific data types. Numerous links exist between the data files that relate one or more data fields. For example, Net Files are linked to individual Fish Statistic Files, in that the latter present lengths, weights, tag numbers, etc. of individual fish summed by species and age in the former files.

DATASET No. 1: Fish Samples

The Fish Samples Dataset consists of three file structures, including (1) Netting and Trapping Files, (2) Electrofishing Files and, (3) Seining Files. Each structure accommodates a distinct type of data with field-specific data entries. A list of field names and codes are included in the Description of Fields Section.

Each sample file is uniquely named according to a standard nomenclature. Each file has a eight digit alpha-numeric name, followed by a three digit suffix (e.g., .dbf = dBASE file, .txt = text file). Included in each filename are Project Name (HU = Hualapai), Year (92 = 1992), Underscore (_), Trip Number (01 = Trip No. 1), Gear Category (N = Netting and Trapping, E = Electrofishing and, S = Seining). For example the file HU92_01N.dbf is the name of Hualapai dBASE file containing netting and trapping data for Trip No. 1 of 1992.

Trip files are appended annually to create an aggregate file, which represents the pool of data for the entire year. The aggregate file HU92NET.dbf is a dBASE file containing all netting and trapping data collecting in 1992. The aggregate files are used for analysis and errors are corrected only in these aggregate files. The original trip files are archived with the original field data sheets as legal record of collection, but not used in analysis. The computer diskette included with this report contains only aggregate files.

Netting and Trapping Files. Net and trap files are stored according to the file structure presented in the File Structures Section - File Structure No. 1 (Netting and Trapping Files).

1992 (JUL - DEC)	1993 (MAR - DEC)
HU92_01N.dbf	HU93_04N.dbf
HU92_02N.dbf	HU93_05N.dbf
HU92_03N.dbf	HU93_06N.dbf
-	HU93_07N.dbf
HU92NET.dbf[1]	HU93NET.dbf[1]

[1]- Aggregate Files

Electrofishing. Electrofishing files are stored according to the file structure presented in the File Structures Section - File Structure No. 2 (Electrofishing Files).

1992 (JUL - DEC)	1993 (MAR - DEC)
HU92_01E.dbf	HU93_04E.dbf
HU92_02E.dbf	HU93_05E.dbf
HU92_03E.dbf	HU93_06E.dbf
-	HU93_07E.dbf
HU92ELEC.dbf[1]	HU93ELEC.dbf[1]

[1]- Aggregate Files

Seining Files. Seining files are stored according to the file structure presented in the File Structures Section - File Structure No. 3 (Seining Files).

1992 (JUL - DEC)	1993 (MAR - DEC)
HU92_01S.dbf	HU93_04S.dbf
HU92_02S.dbf	HU93_05S.dbf
HU92_03S.dbf	HU93_06S.dbf
-	HU93_07S.dbf
HU92SEIN.dbf[1]	HU93SEIN.dbf[1]

[1]- Aggregate Files

DATASET No. 2: Fish Statistics

The Fish Statistics Dataset includes one file structure; Individual Fish Statistics Files. A list of field names and codes are included in the Description of Fields Section.

Each sample file is uniquely named according to a standard nomenclature. Each file has a eight digit alpha-numeric name, followed by a three digit suffix (e.g., .dbf = dBASE file, .txt = text file). Included in each filename are Project Name (HU = Hualapai), Year (92 = 1992), Underscore (_), Trip Number (01 = Trip number 1), Gear Category (F = Fish Statistics). For example the file HU92_01F.dbf is the name of Hualapai dBASE file containing individual fish statistics data for trip 1 of 1992. This file is linked with the Fish Sample Files. Like fish sample files, fish statistic files are appended annually to create aggregate files.

Individual Fish Statistic Files. Seining files are stored according to the file structure presented in the File Structures Section - File Structure No. 4 (Individual Fish Statistic Files).

1992 (JUL - DEC)	1993 (MAR - DEC)
HU92_01F.dbf	HU93_04F.dbf
HU92_02F.dbf	HU93_05F.dbf
HU92_03F.dbf	HU93_06F.dbf
-	HU93_07F.dbf
HU92FISH.dbf[1]	HU93FISH.dbf[1]

[1]- Aggregate Files

DATASET No. 3: Drift Samples

The Drift Samples Dataset includes one file structure for drift data (filenames and database structure are not available at this time).

DATASET No. 4: Bentic Invertebrate Samples

The Bentic Invertebrate Dataset includes one file structure for bentic invertebrate data (filenames and database structure are not available at this time).

DATASET No. 5: Water Quality

The Water Quality Dataset consists of two file structures, including (1) Surveyor2 files, and (3) Surveyor3 (remote recording) files. The Surveyor2 data a taken from field logs containing data recorded directly from periodic field readings from a Hydrolab Surveyor2. The Surveyor3 files are

remote recording water quality files from a Hydrolab Surveyor3 located at strategic mainchannel and tributary locations (filenames and database structure are not available at this time).

DATASET No. 6: Field Log Books

Log books from Field Biologist are part of the BIO/WEST Hualapai Database. These logs provide a written diary-like record of activities, not necessarily described in datasheets. Log books from the Surveyor2 water quality stations are also part of this database.

DATABASE STRUCTURES

File Structure No. 1 (Netting and Trapping Files)

Field	Field Name	Type	Width	Dec	Index
1	TYPE	Character	1		N
2	TRIP	Character	5		N
3	REACH	Character	1		N
4	CLIPBOARD	Character	1		N
5	DATE	Character	6		N
6	RIVER	Character	2		N
7	RM	Numeric	6	2	N
8	METER	Numeric	4		N
9	GEAR	Character	2		N
10	HAB1	Character	2		N
11	HAB2	Character	2		N
12	HAB3	Character	2		N
13	SIDE	Character	1		N
14	SUB1	Character	2		N
15	SUB2	Character	2		N
16	FISH_PRES	Character	1		N
17	NO_BOTTLES	Numeric	1		N
18	CAMERA_NUM	Character	2		N
19	PHOTO_ROLL	Character	2		N
20	FRAME_NUM	Character	5		N
21	CREW	Character	8		N
22	SAMPLE_NUM	Character	3		N
23	START_DATE	Character	6		N
24	TIME_SET	Numeric	4		N
25	TIME_PULL	Numeric	4		N
26	END_DATE	Character	6		N
27	TURB	Character	1		N
28	TEMP_AIR	Numeric	4	1	N
29	TEMP_MC	Numeric	4	1	N
30	TEMP_HAB	Numeric	4	1	N
31	FLUCT	Character	2		N
32	SPECIES	Character	2		N
33	YOY	Numeric	4		N
34	JUV	Numeric	4		N
35	ADU	Numeric	4		N
36	TOTAL	Numeric	4		N
37	COMMENTS	Character	60		N
38	TIME_ELAPS	Numeric	5	2	N

File Structure No. 2 (Electrofishing Files)

Field	Field Name	Type	Width	Dec	Index
1	TYPE	Character	1		N
2	SAMPLE_NUM	Character	3		N
3	TRIP	Character	5		N
4	REACH	Character	1		N
5	CLIPBOARD	Character	1		N
6	DATE	Character	6		N
7	GEAR	Character	2		N
8	RIVER	Character	2		N
9	START_RM	Numeric	6	2	N
10	END_RM	Numeric	6	2	N
11	METER	Numeric	4		N
12	TIME_START	Numeric	4		N
13	TIME_END	Numeric	4		N
14	SECONDS	Numeric	5		N
15	VOLTS	Numeric	3		N
16	AMPS	Numeric	4	1	N
17	HAB1	Character	2		N
18	HAB2	Character	2		N
19	HAB3	Character	2		N
20	SUB1	Character	2		N
21	SUB2	Character	2		N
22	TEMP_AIR	Numeric	4	1	N
23	TEMP_MC	Numeric	4	1	N
24	TEMP_HAB	Numeric	4	1	N
25	TURBIDITY	Character	2		N
26	TURB	Character	1		N
27	FLUCT	Character	2		N
28	FISH_PRES	Character	1		N
29	NO_BOTTLES	Numeric	1		N
30	CAMERA_NUM	Character	2		N
31	PHOTO_ROLL	Character	2		N
32	FRAME_NUM	Character	5		N
33	CREW	Character	8		N
34	SPECIES	Character	2		N
35	YOY	Numeric	4		N
36	JUV	Numeric	4		N
37	ADU	Numeric	4		N
38	TOTAL	Numeric	4		N
39	COMMENTS	Character	60		N
40	SIDE	Character	1		N
41	PASS	Character	1		N

File Structure No. 3 (Seining Files).

Field	Field Name	Type	Width	Dec	Index
1	TYPE	Character	1		N
2	SAMPLE_NUM	Character	3		N
3	TRIP	Character	5		N
4	REACH	Character	1		N
5	CLIPBOARD	Character	1		N
6	DATE	Character	6		N
7	RIVER	Character	2		N
8	RM	Numeric	6	2	N
9	METER	Numeric	4		N
10	GEAR	Character	2		N
11	TIME_START	Numeric	4		N
12	HAB1	Character	2		N
13	HAB2	Character	2		N
14	HAB3	Character	2		N
15	SUB1	Character	2		N
16	SUB2	Character	2		N
17	TEMP_AIR	Numeric	4	1	N
18	TEMP_MC	Numeric	4	1	N
19	TEMP_HAB	Numeric	4	1	N
20	TURBIDITY	Character	2		N
21	TURB	Character	1		N
22	FLUCT	Character	2		N
23	HABL	Numeric	5	1	N
24	HABW	Numeric	5	1	N
25	SAMP_LN	Numeric	5	1	N
26	SAMP_WID	Numeric	5	1	N
27	SAMP_AREA	Numeric	7	2	N
28	MAX_DEPTH	Numeric	4	1	N
29	DEPTH_1	Numeric	4	1	N
30	DEPTH_2	Numeric	4	1	N
31	FISH_PRES	Character	1		N
32	NO_BOTTLES	Numeric	1		N
33	CAMERA_NUM	Character	2		N
34	PHOTO_ROLL	Character	2		N
35	FRAME_NUM	Character	5		N
36	CREW	Character	8		N
37	SPECIES	Character	2		N
38	LAR	Numeric	4		N
39	YOY	Numeric	4		N
40	JUV	Numeric	4		N
41	ADU	Numeric	4		N
42	TOTAL	Numeric	4		N
43	COMMENTS	Character	60		N
44	SIDE	Character	1		N

File Structure No. 4 (Individual Fish Statistic Files).

Field	Field Name	Type	Width	Dec	Index
1	TYPE	Character	1		N
2	SAMPLE_NUM	Character	3		N
3	TRIP	Character	5		N
4	REACH	Character	1		N
5	CLIPBOARD	Character	1		N
6	DATE	Character	6		N
7	GEAR	Character	2		N
8	HAB1	Character	2		N
9	HAB2	Character	2		N
10	HAB3	Character	2		N
11	SUB1	Character	2		N
12	SUB2	Character	2		N
13	SPECIES	Character	2		N
14	TL	Numeric	3		N
15	SL	Numeric	3		N
16	LB	Numeric	2		N
17	OZ	Numeric	2		N
18	WT	Numeric	4		N
19	PIT_TAG	Character	10		N
20	RECAPTURE	Character	1		N
21	OLD_TAG	Character	10		N
22	AGENCY	Character	5		N
23	PHOTO	Character	1		N
24	VIDEO	Character	1		N
25	SEX	Character	1		N
26	RIPE	Character	2		N
27	DISP	Character	2		N
28	RIVER	Character	2		N
29	METER	Numeric	4		N
30	RM	Numeric	6	2	N
31	RM_RELEASE	Numeric	6	2	N
32	COMMENTS	Character	60		N

DESCRIPTION OF DATABASE FIELDS

DESCRIPTION OF FIELDS
(Colorado River Mainstem)

Fish Sampling Dataset

Field	Width	Type	Description
AirT	3	numeric	1-3 = air temperature in °C
Amps	4.1	decinumeric	1-4 = amperage level from Mark-XX
CB#	1	numeric	1 = clipboard #
Crew	6	alphanumeric	1-2 = principal crew member 3-4 = recorder 5-6 = assistant i.e. RV = Rich Valdez BC = Bryan Cowdell BL = Bill Leibfried EP = Erika Prats
Date	6	numeric	1-2 = Year, 1994 = 94 3-4 = Month, June = 06 5-6 = Day of Month
D_1	3.1	decinumeric	1-3 = depth halfway to one side of backwater from max depth, or depth 1/3 distance from shoreline
D_2	3.1	decinumeric	1-3 = depth halfway to other side of backwater from max depth, or depth 2/3 distance from shoreline
Disposition	2	alphanumeric	2 = disposition of fish RA = returned alive (no radio implant) RI = returned with newly implanted radio RR = returned with active radio transmitter RN = returned with non-active radio transmitter (removed external antennae but did not reimplant) RS = returned alive with stomach contents removed DR = dead released (non-native fish) DP = dead, preserved DS = dead, stomach contents preserved
End Time	4	numeric	1-4 = end of sample time

Field	Width	Type	Description
End RM	5.1	decimumeric	1-5 = river mile downstream of Lee's Ferry at which electofishing sample ends
Fish Pres(Y/N)	1	alphanumeric	1 = were fish preserved Y = yes, N = no
Fluctuations or Fluct.	2	alphanumeric	1-2 = Stage change between start time and end time RI = rising FA = falling SL = steady at a low stage SH = steady at a high stage
Gear	2	alphanumeric	1-2 = EL = boat electrofishing BP = backpack electofishing SA = 10'x4'x1/8" seine SC = 15'x4'x1/8" seine SB = 30'x4'x1/4" seine SG = 30'x5'x1/4" seine DL = larval fish drift net DR = invert drift net SU = surber AQ = aquarium net KS = kick screen TK = 75'x6'x1"x12" Trammel net TL = 75'x6'x1 1/2"x12" Trammel net TF = Floated Trammel net TM = 50'x6'x1'x12' Trammel net TN = 50'x6'x1.5"x12' Trammel net GM = 100'x6'x2" Gill net GP = 100'x6'x1 1/2" Gill net GX = experimental gill net GZ = 60' experimental gill net GY = 50'x6'x1.5" gill net GS = 300'X6'X2" gill net GF = Floated gill net AN = Angling MT = Minnow trap HL = Large hoop net (4' diam.) HM = medium hoop net (3' diam.) HS = Small hoop net (2' diam.)

Field	Width	Type	Description
Habitat Photo	(Compound Field)		
Camera	2	alphanumeric	1-2 = camera identifier 01 = B/W camera #1 02 = B/W camera #2
Roll	2	numeric	1-2 = photo roll number
Frame	2	numeric	1-2 = photo frame numbers
Hab1	2	alphanumeric	1-2 = general habitat MC = main channel TS = tributary stream SC = side channel LK = lake
Hab2	2	alphanumeric	1-2 = specific habitat BA = backwater ED = eddy EM = embayment RI = riffle RU = run SH = shoreline PO = pool RC = return channel VA = variable
Hab3	2	alphanumeric	1-2 = shoreline habitat TS = talus scree SW = shear wall LE = ledge BE = bedrock SI = silt SA = sand TV = travertine CO = cobble BO = boulder CB = cutbank VG = vegetation DF = debris flow GR = gravel
HabL	4.1	decinumeric	1-4 = habitat length (in meters)
HabW	4.1	decinumeric	1-4 = habitat width (in meters)

Field	Width	Type	Description
HabMaxDepth	4.1	decinumeric	1-4 = maximum depth of habitat (in feet)
HabT	4.1	decinumeric	1-4 = temperature of habitat sampled
McT	4.1	decinumeric	1-4 = main channel temperature
Meters	4	decinumeric	1-4 = distance in meters upstream in tributary from high water line
No. Bottles	1	numeric	1 = number of bottles with preserved fish
Old Tag	8	alphanumeric	1-8 = old tag number. PIT = recapture PIT tag or other tag types where: (_ _ _ _ __ _\ _ _ _) Number Type Color Agency
P[1]	1	alphanumeric	1 = photo taken Y = yes, N = no
Reach	1	numeric	1 = Reach (3=National to Diamond, 4=Diamond to Pearce)
Recap(Y/N)	1	alphanumeric	1 = fish is a recapture Y = yes, N = no
Rel. Loc.	4.1	decinumeric	1-4 = point of release of fish in RM to the tenth of a mile below Lee's Ferry
Ripe	2	alphanumeric	2 = state of gonadal maturity of fish TU = tubercled only TC = tubercled and colored MI = running milt EG = expressible eggs SP = spent CO = colored only
River	2	alphanumeric	2 = code to indicate river or stream the sample was taken in CO = Colorado River DI = Diamond Creek (225.7) SP = Spencer Creek (246.0) SU = Surprise Creek (248.4) LO = Lost Creek (248.9) QM = Quartermaster Creek (259.8)

Field	Width	Type	Description
RM	6.2	decinumeric	1-6 = miles downstream from Lees Ferry
SA L	4.1	decinumeric	1-4 = sample length (in meters)
SA W	4.1	decinumeric	1-4 = sample width (in meters)
Sample No or Sample #	7	alphanumeric	1-3 = sequential sample no.
Sample Type	1	alphanumeric	1 = Sample type E = Electrofishing N = Gill/Trammel nets S = Seining T = Traps, i.e. hoop nets, minnow traps
Seconds	5	numeric	1-5 = total time from Mark-XX clock
Sex	1	alphanumeric	1 = gender of fish M = male F = female I = immature U = undetermined
Side	1	alphanumeric	1 = side of river channel where net or trap is anchored R = river right (looking downstream) L = river left (looking downstream) C = center (tributary hoop net sets)
SL	3	numeric	1-3 = standard length of fish
Species Code or Species	2	alphanumeric	1-2 = code for fish species BB = black bullhead BC = black crappie BG = bluegill BH = bluehead sucker BR = brown trout CC = channel catfish CP = carp FH = fathead minnow FM = flannelmouth sucker FR = flannelmouth X razorback hybrid GA = Gambusia (mosquitofish) GO = golden shiner

Field	Width	Type	Description
Species (continued)			GS = green sunfish HB = humpback chub LG = largemouth bass NP = northern pike PK = plains killifish (Fundulus zebrinus) RB = rainbow trout RT = roundtail chub RS = red shiner RZ = razorback sucker SB = striped bass SD = speckled dace SH = shiner (red or sand) SM = smallmouth bass SS = sand shiner SU = unidentified sucker TS = threadfin shad WE = walleye
SPECIES SUMMARY (Compound Field)			
ADU	4	numeric	1-4 = number of adults caught
JUV	4	numeric	1-4 = number of juveniles caught
LAR	4	numeric	1-4 = number of larval caught
YOY	4	numeric	1-4 = number of YOY caught
Total	4	numeric	1-4 = total number caught by species
Start Time	4	numeric	1-4 = start of sample time 6am = 0600 6pm = 1800
Start RM	6.2	decinumeric	1-6 = river mile downstream of Lee's Ferry at which electrofishing run is initiated
Sub1	2	alphanumeric	1-2 = dominant substrate SI = silt SA = sand GR = gravel CO = cobble BO = boulder BE = bedrock OR = organic matter

Field	Width	Type	Description
Sub2	2	alphanumeric	1-2 = secondary substrate
Tag No.	10	alphanumeric	1-10 = unique PIT tag number or Floy\Carlin tag number where: (_ _ _ _ __ _\ _ \ _ _) Number Type Color Agency
TL	3	numeric	1-3 = total length of fish in mm
Trip	2	Numeric	1-2 = Trip No. for year (0-12)
Turbidity or Turb	1	alphanumeric	1 = turbidity L = low (secchi depth >= 0.5m) H = high (secchi depth < 0.5m)
Volts	3	numeric	1-3 = voltage setting for Mark-XX
WT	4	numeric	1-4 = weight of fish in grams if using pounds specify LB - OZ (ie. 1-08)