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

**Quarterly Report No. 4**
**(Trip No. 4: March 25 - April 6, 1993)**

**Submitted To**

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## INTRODUCTION

This report presents pertinent details associated with Trip 4, 1993. Included in the report are a summary of trip logistics, personnel and research schedule, data collected, problems encountered, pertinent observations and recommendations. Most information is presented in a tabular format to provide a quick synopsis of pertinent trip details and results. We emphasize that these data are hand tabulated and should be considered provisional. The data are later computerized and checked for accuracy. The purpose of these trip reports is to provide information from BIO/WEST trips as quickly as possible to aid other researchers.

## LOGISTICS, RESEARCH SCHEDULE AND PERSONNEL

Trip 4 of 1993 was conducted March 25-April 6 1993, from Diamond Creek (RM 225.7) to Pearce Ferry (RM 280) on Lake Mead. Five campsites were established and sampling was conducted in the areas indicated in the schedule shown in Table 1. The Colorado River near Bridge Canyon was swift and deep with fast runs and eddies. The river near Spencer Canyon was more gentle, and lined with vertical cliffs, talus slopes, and emergent shoreline vegetation. The river below Lost Creek and near Burnt Spring Canyon was slow and meandering with wide canyons and banks lined with heavily-vegetated lake sediment. During this trip the rising lake level was influencing the areas near Burnt Springs Canyon. River fluctuations were not detectable at the Burnt camp and 2 green sunfish were taken just below Burnt Springs Canyon. The campsite at RM 268.1 was at the head of the former braided area of river channel. Sites that had been seined on former trips were net sets during this trip. Inundated riparian vegetation, very little current and some settling of river sediments characterized the Lake Mead inflow areas.

Table 2 is a list of personnel who participated in research activities for Trip 4, 1993.

## DATA COLLECTED

Fish

Table 3 is a summary of gear types and codes and number samples for Trip 4, 1993. Table 4 lists number of fish captured by species during Trip 4, 1993. The endangered species, humpback chub (Gila cypha) and razorback sucker (Xyrauchen texanus) were not observed or captured during Trip 4. The only native species captured during this field trip were speckled dace and flannelmouth suckers. Of the three flannelmouth suckers captured only one was pit tagged due to malfunctions of the pit tag reader. This fish was captured at RM 245.5, weighed 106 grams and was tagged with PIT # 7F7F480106. The first rainbow trout captured during this study was taken from Spencer Creek during a backpack electrofishing effort. This fish was a small female (185 cm)extruding eggs. The four gambusia listed were captured by dip net off the boats in camp at RM 268.1. Repeated minnow trap sets in the same habitat failed to capture any fish. Minnow traps were most successful in Spencer and Lost Creeks were most fish captured were red shiners. Common carp were the most frequently taken fish of this trip. Approximately 75% of the carp captured were running milt or eggs. The small hoop net set for 48 hours in the mouth of Lost Creek captured carp and channel catfish.

Water Quality

Water quality parameters were measured with a Hydrolab Surveyor 2 and a recording Hydrolab DataSonde 2 at each campsite on the mainstem Colorado River. The DataSonde 2 was also

deployed in Spencer Creek for approximately 36 hours and Lost Creek for about 24 hours. This instrument recorded water temperature, pH, conductivity and dissolved oxygen every 15 minutes. Water samples for nutrient analysis were collected from Spencer Creek, the mainstem Colorado River above the mouth of Spencer Creek, Lost Creek and the Colorado River at the Grand Canyon National Park - Lake Mead National Recreation Area boundary buoy.

Primary/Secondary Productivity

Twelve drift net samples were taken in the mainstem Colorado River during Trip 4; six from RM 242.2 and six from RM 259.5. One Hess sample was taken from Spencer Creek but the creek was so scoured no invertebrates were apparent. Incidental samples for invertebrates and algae were collected from Travertine and Bridge Canyon Creeks as well as the clear side-channels of Spencer Creek. Plankton tows were taken from the mainstem Colorado River in conjunction with the nutrient samples mentioned above. Tows were also taken in Lost Slough and the warm springs at RM 269.1 An Eckman dredge sample was also taken from Lost Creek Slough. One crayfish (order Decapoda) was captured in a trammel net at RM 260.3.

River Stage Monitoring

Changes in river stage were monitored at the Bridge Canyon camp were the river exhibited a stage change of about 25 cm. The stage gauge was tied to the temporary bench mark at this site. No new temporary benchmarks were established during Trip 4.

Mapping

Net sets and electrofishing runs in the mainstem and in Spencer Creek were mapped on several different baselines including aerial photos and 71/2 minute USGS quads. A provisional map of GIS site 13 was used to map net sets and electrofishing efforts from RM 273-RM 276.

## OBSERVATIONS

1. Flooding during January and February 1993 has resulted in marked changes in mainchannel and tributary habitats. Sand has been deposited in many main channel areas. Spencer Creek has changed course at its mouth and much vegetation was removed from the mouth of Spencer by flash flooding in February. The gravel bar deposited by the Spencer Creek extends well into the mainstem Colorado River. The flooding of Spencer represents a unique opportunity to document the re-establishment of the creek ecosystem.

2. Other tributaries affected by the winter floods are Surprise Creek and Lost Creek. Surprise has less silt and more gravel substrate near its mouth. Silt banks are extensive on the down-canyon portion of Lost Creek Slough. An attempt to paddle the inflatable kayak across the slough revealed that it was mostly sediment with 4 to 6 inches of water over silt. This situation is probably the result of flooding in Lost Canyon combined with high water in the Colorado River. Detailed sampling of Lost Slough does not seem feasible under these conditions.

3. Main channel temperatures varied from 12°C at Bridge Canyon to 14°C at Pearce Ferry and the turbidity remained high in the main channel throughout Trip 4. These conditions were not favorable for finding juvenile or young of the year native fish in the river. Water temperature of the inundated vegetation approximated that of the main channel in most locations sampled.
4. The increase in lake level has reduced the distinction between substrata C and D. Both these strata are dominated by slow current and vegetated shorelines that are now inundated.

5. Carp were noted spawning in all tributaries downstream of Bridge Canyon. Spawning carp were observed attempting to ascend Reference Point Creek (RM 252.4) which is normally dry. No young of year or juvenile carp were captured.

## PROBLEMS ENCOUNTERED AND SOLUTIONS

1. Data from 40 net sets were lost when a clipboard fell into the water. Due to established sampling procedure, one-half of this data was recalled from recent net sets. In the future netting data sheets will removed from the clipboard when they are completed. The clipboard holder will be used when all occupants of the boat are busy removing fish or pulling nets.

2. Finding campsites below Burnt Springs Canyon is a problem. Only one suitable camp (RM 268.1) was found in the Lower Canyon after a thorough scouting and it is likely to be occupied by boaters as summer progresses. In order to conserve gas for this lower section we worked to below Lost Creek from our camp above Spencer Creek by taking the entire crew and spending the day and early evening at the downriver sites. We recommend a continuation of this practice.

3. The amount of inundated vegetation along the Lower canyon limits net setting to a few locations. Seining sites have also decreased. Electrofishing and setting minnow traps are the most effective sampling techniques for these areas and will be emphasized during future trips.

4. It was brought to our attention that this project lacked permits once beyond the boundaries of Grand Canyon National Park. The process of obtaining sampling permits for Lake Mead National Recreation Area is underway.

5. The responsibility for transporting Hualapai personnel from Pearce Ferry to Peach Springs and Kingman will be clarified prior to the departure date of the next trip.

**Table 1. Dates, campsites and sample locations for Trip No. 4, March 25-April 6, 1993.**

| Date | Camp Site | Sample Locations |
|---|---|---|
| March 25 - 26 | Bridge Canyon (RM 235.2) | Bridge Canyon Area (RM 233.8-235.2) |
| March 26 - April 1 | Above Spencer Creek (RM 242.2) | Above Spencer Creek to below Lost Creek (RM 241.8 to 250.2) including Spencer Creek (RM 246.0) Surprise Creek (RM 248.4), Lost Creek (RM 248.9) |
| April 1 - 2 | Burnt Canyon (RM 259.5) | Burnt Canyon to below Quartermaster Canyon (RM 259.5 to 261.1) |
| April 2 - 5 | RM 268.1 (above former braided area) | RM 268.1 to 276.6 |
| April 5 - 6 | Pearce Ferry (RM 280) | RM 274.3 to 280.0 |

**Table 2. Personnel participating in Trip No. 4, 1993.**

| PERSONNEL | AFFILIATION | DATES |
|---|---|---|
| Gloria Hardwick | BIO/WEST, Inc. | 03/25 - 04/06 |
| Kirstin Tinning | BIO/WEST, Inc. | 03/25 - 04/06 |
| Teresa Yates | BIO/WEST, Inc. | 03/25 - 04/06 |
| Clay Bravo | HUALAPAI WILDLIFE MANAGEMENT DEPARTMENT | 03/25 - 03/29 |
| Morris Sampson | HUALAPAI WILDLIFE MANAGEMENT DEPARTMENT | 03/29 - 04/06 |
| Jerry Cook | HUALAPAI WILDLIFE MANAGEMENT DEPARTMENT | 03/25 - 04/06 |
| Ben Zimmerman | HUALAPAI WILDLIFE MANAGEMENT DEPARTMENT | 03/25 - 04/06 |
| Allistair Bleifuss | OARS | 03/25 - 04/06 |
| Ann Cassidy | OARS | 03/25 - 04/06 |
| Tony Anderson | OARS | 03/25 - 04/06 |
| Valerie Saylor | GCES | 03/25 - 04/06 |

**Table 3. Fish sample gears, codes, descriptions, and number of samples from the Lower Grand Canyon and Lake Mead.**

| SAMPLE GEAR CODE - DESCRIPTION | TOTAL NUMBER SAMPLES |
|---|---|
| Electrofishing | |
| EL - 220-v DC (Coffelt CPS) | 39 |
| Backpack EL - Coffelt | 6 |
| Gill Nets | |
| GM - 100'x6'x2" | 8 |
| GP - 100'x6'x1.5" | 4 |
| GX - 100'x6'experimental gill net with 20' panels of 0.5, 1.0, 2.0, 2.5" mesh | 12 |
| Trammel Nets | |
| TK - 75'x6'x1"x12" | 71 |
| TL - 75'x6'x1.5"x12" | 55 |
| TM - 50'x6'x1"x12" | 9 |
| TN - 50'x6'x1.5"x12" | 34 |
| Hoop Nets | |
| HS - 2' diameter (small) | 2 |
| Minnow Traps | |
| MT - commercial minnow traps | 48 |
| Seines | |
| SX - 10'x4'x1/16" seine | 4 |
| Angling | |
| Tret Line and Rod and Line; live and artificial bait | 5 |
| Total | 297 |

**Table 4. Numbers of fish by species captured during Trip No. 4 in the Lower Grand Canyon and Lake Mead Inflow.**

| FAMILY<br>COMMON NAME (Code) | SCIENTIFIC NAME | TOTAL CAPTURED |
|---|---|---|
| CYPRINIDAE (minnows) | | |
| red shiner (RS) | Cyprinella lutrensis | 214 |
| fathead minnow (FH) | Pimephales promelas | 24 |
| common carp (CP) | Cyprinus carpio | 328 |
| speckled dace (SD) | Rhinichthys osculus | 13 |
| CATOSTOMIDAE (suckers) | | |
| flannelmouth sucker (FM) | Catostomus latipinnis | 4 |
| PERCICHTHYIDAE (temperate basses) | | |
| striped bass (SB) | Morone saxatilis | 3 |
| SALMONIDAE (trout) | | |
| rainbow trout (RB) | Oncorhynchus mykiss | 1 |
| ICTALURIDAE (catfishes, bullheads) | | |
| channel catfish (CC) | Ictalurus punctatus | 49 |
| POECILIDAE (livebearers) | | |
| mosquitofish (GA) | Gambusia affinis | 4 |
| CENTRARCHIDAE (sunfishes) | | |
| green sunfish (GS) | Lepomis cyanellus | 2 |