SOUTH TEXAS PROJECT
ELECTRIC GENERATING
STATION

REPORT #1

COLORADO RIVER ENTRAINMENT AND IMPINGEMENT MONITORING PROGRAM

PHASE TWO STUDIES – JULY, 1983 - JUNE, 1984

OCTOBER, 1984

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PREPARED FOR

SOUTH TEXAS PROJECT

SUBMITTED BY

ECOLOGY DIVISION, ENVIRONMENTAL PROTECTION DEPARTMENT

HOUSTON LIGHTING & POWER COMPANY

OCTOBER 1984

PREPARED BY: DAVID C. McADEN, GEORGE N. GREENE, WILLIAM B. BAKER, JR.

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INTRODUCTION

Section 6.1.3.2 and Appendix E of the Final Environmental Statement requires Phase Two of the aquatic ecology studies to begin within one week of the start of reservoir fill pumping. The objective of Phase Two studies is to determine the number and type of aquatic organisms which are (a) impinged on the revolving screens and (b) entrained by the reservoir fill pumps during the filling of the main cooling reservoir. Phase One studies, conducted in 1975-76, resulted in predictions of impingement and entrainment losses and Phase Two is designed to confirm the accuracy of those predictions. Sampling methods remain the same as in Phase One. Phase One samples were collected at four locations in the Colorado River, designated as Stations 1,2,3 and 5. Phase Two samples are to be collected only at Station 2, i.e., in the Colorado River adjacent to the Reservoir Makeup Pumping Facility (RMPF) and in the Siltation Basin, the body of water located between the RMPF revolving screen structure and the pump structure.

On 11 July 1983, cooling reservoir filling operations began at the South Texas Project in Matagorda County, Texas. This report presents data collected during July, August and September 1983. After the third week of September, no further reservoir filling occurred in 1983 or through the first six months of 1984. The data presented in the following report therefore constitute the information collected during the period July, 1983, through June, 1984.

METHODS

SAMPLING SCHEDULE AND STATIONS

The aquatic ecology study is divided into two distinct types of studies, impingement and entrainment, requiring different gear types and methodologies. The impingement study is conducted on the revolving screen structure, which extends 423.5 ft along the west bank of the Colorado River at River Mile 14.6. The entrainment study is conducted at two locations: 1) in the Colorado River adjacent to and slightly downstream of the screen structure, and 2) in the siltation basin between the pump structure and the submerged weir.

FIELD AND LABORATORY PROGRAMS

Impingement

Impingement samples are collected within one week of the start of each pumping period and weekly thereafter as long as pumping continues. Each week, three samples are collected over a 24-hr period. Prior to the start of each revolving screen sample, 2 of the 24 screens are selected at random and run for 15 min to clean them of accumulated debris. The two screens are then sampled for a 30-min period by placing a tight-fitting dip net with 1/4-in mesh at the lower end of the screenwash trough and filtering all the organisms washed off the screens. While the sample is being collected, hydrology and water quality parameters are recorded from the siltation basin behind the screen structure. Surface and bottom readings of water temperature (°C), conductivity (millimhos/cm) and dissolved oxygen (ppm) and a surface reading of pH are recorded as are the number and size of RMPF pumps operating at the

time of sample collection. The Colorado River flow (cfs) is also noted on the field data sheets.

After the two screens have been sampled for 30 min, the collecting net is checked for fish, shrimp and crabs. Those found are placed in a plastic sample jar, preserved with 10% buffered formalin and taken to the laboratory for identification and enumeration. In the laboratory, each sample is rinsed, sorted by species and the total weight by species and individual lengths (standard length for fish, total for shrimp) or widths (carapace width for crabs) are recorded. If over 50 individuals of the same species occur in a sample, a subsample of 50 is measured. The remainder are counted and the weight of the total is recorded.

Entrainment

Entrainment sampling commences within one week of the start of each cooling reservoir filling period and is conducted at least every other week as long as pumping continues. A set of samples is collected every 6 hrs over a 24-hr period. During the months of March-May and August-December, sampling is done weekly when the salinity at the -8.5 ft level in the Colorado River exceeds 3 ppt. Salinity probes have been mounted on a piling in the river near the RMPF at that depth and are connected to a continuous chart recorder to provide a record of salinity fluctuations. The recorder is checked daily and, if the 3 ppt level is exceeded, the appropriate personnel are notified to initiate sampling. During the initial months of pumping in 1983, instrumentation and procedural problems resulted in the total loss of

continuous salinity data. However, salinity data was collected in conjuction with biological sampling and is discussed later in this report.

Colorado River

Prior to the start of collection of each set of biological samples, surface and bottom readings of conductivity (which was later converted to salinity), water temperature and dissolved oxygen were taken at mid-channel of the Colorado River near the northern end of the RMPF screen structure. Additional conductivity readings were made at 5-ft intervals between the surface and bottom. The primary instrument used to measure these parameters was a Hydrolab Model 8002 with 8100 series probe assembly. A Yellow Springs Instrument Co. Model 51A temperature and dissolved oxygen meter and an American Optical Co. hand-held refractometer were used as a backup to the primary system. Surface pH was measured with a portable Altex Model 531153 pH meter and water transparency was determined using a 200-mm diameter Secchi disc.

A 0.5-m diameter, 3:1 (length:mouth diameter) plankton net with 0.5-mm square mesh was used to collect plankton samples at mid-channel of the Colorado River. Samples were collected at the surface, mid-depth (10 ft) and near the bottom. The plankton net was attached to a sled to keep the net about 4 inches above the bottom during towing for the bottom sample. A General Oceanics Model 2030 digital flowmeter mounted in the center of the net mouth was used to calculate the volume of water filtered during each tow. The flowmeter reading was recorded prior to and at the conclusion of each plankton

tow. Each mid-channel sample was collected by lowering the net to the appropriate depth with the boat in a stationary position. All tows were made in the direction of river flow, i.e. north to south. Each tow started approximately 50 yds upstream of the RMPF and continued to a point approximately 50 yds downstream of the RMPF. Bottom tows were made at a slower forward speed than either the mid-depth or surface tows to insure that the net sled remained on the bottom. A wire-angle indicator and graduated towline were used to verify the depth from which the mid-depth sample was collected. This was maintained at about 10 ft as the depth of the channel is approximately 20 ft. The surface sample was taken by towing the net with the upper edge of the net mouth a few inches below the water's surface. At the end of each tow, the boat was held stationary in the river while the net was quickly brought to the surface. This was done in an effort to minimize contamination of the sample due to the net being towed upward through the water column above the level being sampled. At the end of each tow the net was rinsed from the outside to wash the sample contents into the cod end bucket. The sample was then placed in a plastic jar, labeled and preserved with 5% formalin. Rose Bengal was added to each sample several days before sample workup to facilitate visual separation of the organisms from trash and detritus.

A 0.5-m diameter, 3:1 (length:mouth diameter) plankton net with 0.5-mm square mesh equipped with a General Oceanics model 2030 digital flowmeter and a cable depressor was used to collect oblique-tow plankton samples near the west shoreline of the Colorado River. Before each sample was collected, the flowmeter reading was recorded. After lowering the net to the bottom at the

north end of the RMPF screen structure, the net was towed downstream while the towline and attached plankton net was slowly reeled in. When the net reached the surface, the boat was stopped, the net raised and the flowmeter reading recorded. After rinsing the net down from the outside, the sample was placed in a plastic jar, labeled and preserved with 5% buffered formalin. Rose Bengal was added to each sample as described above.

A 20-ft (headrope length) otter trawl, with 1 1/4-in stretched mesh in the upper end and 3/8-in stretched mesh in the cod end, was towed on the bottom parallel to shore at mid-channel of the Colorado River to determine the species composition and abundance of the nekton (fish and macroinvertebrates). Tows were of 5 min duration and were made in the direction of water flow. Each trawl tow began approximately 50 yds upstream of the RMPF. Each sample was emptied into a large tub and inspected for larger specimens of fish and invertebrates. These were identified, weighed, measured and returned to the river. The remainder of the sample was preserved in 10% formalin and taken to the laboratory for analysis.

Shallow shoreline populations of fish and invertebrates in the vicinity of the RMPF were sampled by use of a two-man bag seine. A 20-ft long x 6-ft high x 6-ft deep seine, with 1/2-in stretched mesh in the body and 1/4-in ace webbing in the bag, was pulled for a distance of approximately 75 ft along the west shore line downstream of the RMPF. The seine collections were made by pulling the seine in the upstream direction (south to north) as the current helps in holding the bag of the seine open. Specimens taken by seining were handled as described above for trawl samples.

Siltation Basin

The method originally chosen to sample organisms from the siltation basin was to pump water to the top of the RMPF pump structure deck where it would be filtered through an ichthyoplankton net. During the first two collecting trips, on 14-15 July and 27-28 July 1983, repeated attempts were made to collect samples by this method. However, the pump could not overcome the head involved. Therefore, no siltation basin samples were collected on those dates. On the third trip, surface plankton samples were collected by hand-towing a 0.5-m (mouth diameter) ichthyoplankton net, having 0.5-mm square mesh, parallel to the front wall of the pump structure. Hand-towing the net at a deeper level in the water was not attempted because of the danger of the net being pulled into the mouth of one of the operating pumps. Towing the net by boat in the siltation basin was not possible because of the small size of the basin and the presence of several submerged obstructions.

RESULTS AND DISCUSSION

HYDROLOGY AND WATER QUALITY

Water temperature, pH, turbidity (Secchi disc) and dissolved oxygen at the Colorado River station are given in Table 1. Tables 2 & 3 show the conductivity measurements and the derived salinity values. Water temperature, salinity, dissolved oxygen and pH in the RMPF siltation basin are given in Table 4. Water temperature, conductivity, salinity, dissolved oxygen and pH at the RMPF revolving screens are given in Table 5.

On 14-15 July a wedge of salt water was present in the Colorado River extending up to about 10 to 15 ft below the surface. The wedge was 2.3 to 3.0 C warmer than the overlying fresh water and was low in dissolved oxygen (maximum of 0.9 ppm).

On 27-28 July no salt wedge was present (0.9 ppt at bottom) and fresh oxygenated water extended to the bottom. A salt wedge was re-established on 9-10 August and 15-16 September extending up to 10 to 15 ft from the surface and even up to 5 ft on 9 August. The bottom oxygen was again very low on these two days (0.1 to 0.5 ppm).

In the RMPF siltation basin the water quality of the surface water was similar to that of the surface water in the river on the same dates.

At the revolving screens the water quality was similar to that of the river at comparable depths on the same dates.

The most ubiquitous species, as well as the most abundant, was the zoea larval stage of the xanthid mud crab, Rhithropanopeus harrisii. The second most abundant forms were the zoeal and postlarval stages of the ghost shrimp, Callianassa spp. The postlarval stage of the brown shrimp, Penaeus aztecus, and the white shrimp, P. setiferus, and the megalops and juvenile stages of the blue crab, Callinectes sapidus, were collected only sporadically and never in very high densities. It is possible that some of the crab megalops represented the non-commercial pygmy blue crab, C. similis, which is impossible to differentiate from C. sapidus at this stage of development.

A list of the common and scientific names of the egg, larval and juvenile stages of the fish taxa collected from both the Colorado River and the siltation basin is found in Table 13.

Tables 14-17 show the changes in abundance which were observed, both temporally and spatially, in the Colorado River ichthyoplankton during the study period. The most notable trends seen in this limited amount of data are: (a) the relatively small numbers of ichthyoplankters from the surface and oblique tows compared to the large numbers from the mid-depth and bottom tows and (b) the greater numbers of larval and juvenile fish in samples collected at night, regardless of depth. The bay anchovy was the most abundant species, due primarily to its peak in abundance on 27-28 July. One possible explanation for the anchovy's apparent high level of abundance is due to the low salinity observed from surface to bottom on those dates (see Table 3). The bay anchovy is an estuarine species preferring salinities in excess of 10 ppt, and the fact they were caught in such large numbers during a period of

high freshwater flow and salinities less than 1 ppt indicates they were under stress. This made them more susceptible to capture by a plankton net than they would be under normal conditions, when they are probably just as abundant, especially in the salt wedge (mid-depth to the bottom). The only other taxa collected regularly were two species of gobies and one category called Gobiidae larvae. The darter goby, Gobionellus boleosoma, and the naked goby, Gobiosoma bosci, are both estuarine, mid-depth to bottom dwelling species which are common over mud substrates in all Texas estuaries. The larvae of the two genera are indistinguishable below about 5 mm, thus resulting in the unidentified Gobiidae larvae category.

Because ichthyoplankton were taken in such small numbers in the samples collected in the siltation basin, they are included with the invertebrates on the tables showing temporal changes in abundance of organisms at this location (Tables 18 and 19). Penaeus setiferus (white shrimp) postlarvae peaked in abundance during the night on both collecting dates, but were otherwise found only in low densities. Macrobrachium ohione, one of the river shrimps, and Rhithropanopeus harrisii, a xanthid mud crab, were the most abundant species in the basin. M. ohione were much more abundant in the basin than they were in the Colorado River on the same dates (see Tables 11 and 12). This is easily explained by the fact that river shrimp zoeae and juveniles, the life stages collected in these samples, prefer shoreline areas with protective vegetation cover to open river channel habitat. The front wall of the RMPF pump structure, along which the plankton net was towed, afforded a semblance of shoreline habitat by accumulating floating pieces of wood, dead grasses and other types of vegetative material. Further evidence for the shoreline nature

River flow during the sampling periods is shown in Table 6 and the daily volume of water pumped into the cooling reservoir during July - September, 1983 is shown in Table 7.

MACROZOOPLANKTON AND ICHTHYOPLANKTON

Samples collected by 0.5-m plankton net in the Colorado River yielded 49 taxa of invertebrates and 10 taxa of vertebrates, (Table 8). The dominant invertebrate forms were cladocerans, or water fleas, which are all freshwater organisms; copepods, both freshwater and estuarine-marine in origin; and Malacostraca, consisting of estuarine mysid shrimp, freshwater and estuarine amphipods, estuarine-marine penaeids (commercial shrimp), freshwater and estuarine carideans (grass and river shrimp) and various species of crabs. The fish were represented by as many as 10 taxa, but they were rarely a major component of any single sample. On some occasions, however, the bay anchovy did occur in large numbers.

Tables 9-12 show the temporal and spatial variations in density of invertebrates collected from the Colorado River on each of the four sampling trips. The largest total numbers of organisms were collected in mid-depth, bottom and oblique tows and also in night collections. Higher densities appear to be closely related to the presence of a salt wedge at the -10 ft level and deeper, as occurred on 9-10 August and 15-16 September (See Table 3). A salt wedge also occurred on 14-15 July, but no bottom samples were collected on that trip because the bottom plankton net was lost during the first tow of the day.

of the siltation basin sampling location is the occurrence of Gambusia affinis, a shallow shoreline species of fish known as the mosquitofish, on both the 9-10 August and 15-16 September collecting dates. The megalops and juvenile life stages of the blue crab, Callinectes sapidus, were the only other taxa occurring in fairly high densities, and this was only on 9-10 August when they also peaked in abundance in river samples. Notable by its absence from the siltation basin were Callianassa spp. zoeae, which were very abundant in the river. They are, however, primarily a mid-depth and bottom dwelling group and the sampling technique used was not adequate for detecting their presence.

MACROINVERTEBRATES AND FISH

Trawl and seine samples yielded eight macroinvertebrate species, five shrimp, two crabs and a crayfish (Table 20 and Tables 21-28). The grass shrimp, Palaemonetes paludosus, the river shrimp, Macrobrachium ohione, and the crayfish, Procambarus blandingi acutus, are freshwater animals whereas the three penaeid shrimp and the two crabs are estuarine and marine. The blue crab, Callinectes sapidus, however, is tolerant of fresh water and is known to migrate far upstream in rivers.

The river shrimp was the most common invertebrate (818) closely followed by the white shrimp, Peneaus setiferus (760). The majority of the river shrimp were caught in trawls on 27-28 July while the majority of the white shrimp were caught in seines on 15-16 September.

Twenty-nine species of fish were collected in trawl and seine samples. Of these, four species are freshwater and 25 are estuarine or marine. The greatest number of species of fish (16) as well as the greatest number of individuals (3697) were recorded from the trawls taken on 27-28 July. However, because the majority (97.7%) of the fish caught that day were bay anchovies, Anchoa mitchilli, the diversity for that day is low. Except for the large number of anchovies on this one day, the catches in the trawls and seines were similar in number of species and total number of individuals taken.

Impingement samples yielded 6 macroinvertebrate taxa, 2 of which were found only in the impingement samples (Tables 29-33). Palaemonid shrimp dominated the species list (4 of 6 taxa), but the majority of individuals were blue crabs. With few exceptions the individuals were small, less than 30 mm in length (or width in the case of crabs).

Three species of fish were collected in the impingement samples, each represented by one individual. The green sunfish, Lepomis cyanellus, was the only freshwater fish and the only fish species caught by impingement that was not caught by trawl or seine.

TABLE 1

TEMPORAL VARIATIONS IN TEMPERATURE, TURBIDITY, pH AND DISSOLVED OXYGEN AT MID-CHANNEL OF THE COLORADO RIVER (JULY-SEPTEMBER, 1983)

Sampling Dates	Time (CST)	Temperature (°C) Surface	Temperature (°C) Bottom	pH Surface	Secchi disk Turbidity (inches)	Dissolved O_2 (ppm) Surface	Dissolved O_2 (ppm) Bottom	Bottom Depth (ft)
14 July	1100	27.2	29.5	7.4	16.5	6.1	0.6	21
14 July	1720	26.6	29.6	7.4	13.0	6.5	0.4	22
14 July	2300	26.6	29.3	8.0	12.5	6.4	0.4	21
15 July	0845	26.1	29.0	7.7	11.0	7.2	0.9	21
27 July	1300	32.5	31.3	8.4	14.0	10.5	5.9	19
27 July	1920	32.8	31.5	8.4	17.0	10.9	7.2	19
28 July	0120	31.8	31.5	8.4	18.5	9.6	5.7	17
28 July	0720	31.6	31.4	8.4	19.0	9.4	6.4	16
9 August	1155	30.9	29.8	8.0	25.5	7.6	0.1	18
9 August	1800	29.9	29.8	8.0	24.5	7.9	0.1	19
9 August	2330	29.8	29.9	7.9	25.5	7.1	0.1	20
10 August	0600	29.4	29.9	7.9	26.0	6.1	0.1	17
15 September	1200	29.6	29.4	8.0	16.5	8.1	0.1	18
15 September	1745	30.5	29.3	8.2	16.5	10.2	0.5	17
15 September	2330	29.8	29.2	8.2	20.0	9.6	0.5	19
16 September	0600	29.2	29.1	8.2	19.5	7.3	0.5	18

TABLE 2

TEMPORAL AND SPATIAL VARIATIONS IN CONDUCTIVITY (MILLIMHOS/CM)

AT MID-CHANNEL OF THE COLORADO RIVER (JULY-SEPTEMBER, 1983)

Sampling Dates	Time (CST)	DEPTH (ft.) S	5	10	15	20	B (Depth)
14 July	1100	2.6	2.9	9.8	23.2	28.7	28.6 (21')
14 July	1720	2.4	2.5	6.2	20.0	22.0	26.0 (22')
14 July	2300	1.9	2.0	5.7	16.5	24.9	25.5 (21')
15 July	0845	0.8	1.0	1.2	12.0	20.3	22.5 (21')
27 July	1300	0.5	0.6	0.6	1.0	-	1.4 (19')
27 July	1920	0.5	0.5	0.6	0.6	-	0.9 (19')
28 July	0120	0.6	0.6	0.6	0.6	-	1.9 (17')
28 July	0720	0.6	0.6	0.6	1.5	-	1.7 (16')
9 August	1155	4.9	8.1	32.3	36.9	-	37.7 (18')
9 August	1800	4.6	11.7	32.0	36.9	-	37.5 (19')
9 August	2330	4.9	15.6	33.2	36.4	36.8	36.8 (20')
10 August	0600	4.1	6.3	25.5	35.8	-	36.5 (17')
15 September	1200	1.4	5.2	17.5	26.0	-	27.9 (18')
15 September	1745	1.5	4.8	16.0	25.6	-	26.6 (17')
15 September	2330	2.9	3.3	7.6	25.4	-	26.2 (19')
16 September	0600	2.0	3.5	11.5	24.1	-	25.5 (18')

TABLE 3

TEMPORAL AND SPATIAL VARIATIONS IN SALINITY (PPT)

AT MID-CHANNEL OF THE COLORADO RIVER (JULY-SEPTEMBER, 1983)

Sampling Dates	Time (CST)	DEPTH (ft.) S	5	10	15	20	B (Depth)
14 July	1100	1.4	1.5	5.5	14.1	17.7	17.6 (21')
14 July	1720	1.3	1.3	3.4	12.0	13.3	15.9 (22')
14 July	2300	1.0	1.0	3.1	9.7	15.1	15.5 (21')
15 July	0845	0.4	0.5	0.6	6.8	12.1	13.6 (21')
27 July	1300	0.3	0.3	0.3	0.5	-	0.7 (19')
27 July	1920	0.3	0.3	0.3	0.3	-	0.4 (19')
28 July	0120	0.3	0.3	0.3	0.3	-	0.9 (17')
28 July	0720	0.3	0.3	0.3	0.7	-	0.8 (16')
9 August	1155	2.6	4.5	20.1	23.3	-	23.8 (18')
9 August	1800	2.5	6.7	19.9	23.3	-	23.7 (19')
9 August	2330	2.6	9.1	20.7	23.0	23.2	23.2 (20')
10 August	0600	2.1	3.4	15.5	22.6	-	23.0 (17')
15 September	1200	0.7	2.8	10.3	15.9	-	17.1 (18')
15 September	1745	0.7	2.6	9.4	15.6	-	16.3 (17')
15 September	2330	1.5	1.7	4.1	15.5	-	16.0 (19')
16 September	0600	1.0	1.8	6.5	14.6	-	15.6 (18')

TABLE 4

TEMPORAL VARIATIONS IN SURFACE WATER QUALITY PARAMETERS
IN THE RMPF SILTATION BASIN (AUGUST-SEPTEMBER, 1983)

Sampling Dates	Time (CST)	Temperature (°C)	Salinity (PPT)	Dissolved Oxygen (PPM)	pH
9 August	1100	31.5	2.8	7.4	7.9
9 August	1640	30.0	2.7	7.8	8.1
9 August	2230	29.6	3.2	7.2	8.0
10 August	0450	29.4	2.4	6.3	7.8
15 September	1100	29.4	1.2	7.5	7.9
15 September	1705	30.3	1.0	9.2	8.0
15 September	2250	30.1	1.6	8.1	8.1
16 September	0545	29.4	1.4	7.8	7.8

TABLE 5

TEMPORAL VARIATIONS IN TEMPERATURE, CONDUCTIVITY, SALINITY, DISSOLVED OXYGEN AND pH AT THE STP REVOLVING SCREENS (JULY - SEPTEMBER, 1983)

Sampling Dates	Time (CST)	Temperature (°C)		Conductivity (millimhos/cm)		Salinity (ppt)		Dissolved Oxygen (ppm)		pH	Bottom Depth
		Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	(ft.)
13 July	1329	27.5	27.5	4.6	6.0	2.5	3.3	6.5	5.2	7.4	4
13 July	2100	27.2	27.4	5.0	5.9	2.7	3.3	6.1	6.8	7.5	3
14 July	0511	26.6	26.8	3.5	3.9	1.7	2.1	6.1	6.1	7.4	3
21 July	1315	29.6	29.4	0.4	0.4	0.2	0.2	6.2	5.4	7.9	4
21 July	2110	29.4	29.8	0.4	0.4	0.2	0.2	6.6	6.1	7.9	7
22 July	0505	29.5	29.8	0.4	0.4	0.2	0.2	6.6	6.2	8.0	8
27 July	1400	32.9	32.1	0.6	0.6	0.3	0.3	8.9	8.7	7.8	8
28 July	2230	31.9	32.5	0.6	0.6	0.3	0.3	11.0	10.8	8.6	7
28 July	0626	31.6	32.0	0.6	0.7	0.3	0.4	9.2	8.9	8.1	9
9 August	1300	30.7	30.3	5.0	13.8	2.7	8.0	8.0	6.3	7.9	9
9 August	2100	29.7	30.2	6.2	12.2	3.4	7.0	7.5	7.1	8.0	6
10 August	0500	29.4	29.6	4.4	5.8	2.3	3.2	7.0	5.8	7.9	5
15 September	1414	30.1	29.4	1.6	4.0	0.8	2.3	8.1	6.7	8.2	7
15 September	2205	30.2	30.2	2.4	6.0	1.2	3.3	8.4	7.0	8.2	7
16 September	0615	29.3	29.8	2.3	5.2	1.1	2.8	7.6	6.3	8.0	9

TABLE 6

AVERAGE* COLORADO RIVER FLOW (CFS) ON DATES OF SAMPLE COLLECTION, JULY-SEPTEMBER, 1983

DATE	RIVER FLOW
13 July	492
14 July	1023
15 July	3149
21 July	2139
22 July	1676
27 July	713
28 July	825
9 August	637
10 August	2076
15 September	913
16 September	736

*Derived by taking arithmetic mean of 3 daily flow values recorded at the beginning of each shift

TABLE 7

RESERVOIR MAKEUP PUMPING FACILITY (RMPF)
DAILY PUMPAGE, IN CUBIC METERS, JULY-SEPTEMBER, 1983

DATE	JULY	AUGUST	SEPTEMBER
1	85,617.24	94,388.08	0
2	0	85,617.24	0
3	0	64,030.99	0
4	0	293,005.59	0
5	0	200,283.40	0
6	0	278,758.67	0
7	0	160,540.03	0
8	0	146,120.41	36,696.63
9	0	311,409.41	176,871.57
10	0	873,071.30	327,185.88
11	88,676.32	1,674,340.57	464,314.07
12	84,988.15	1,761,499.68	667,841.57
13	100,591.93	1,761,499.68	733,969.51
14	319,846.55	1,761,499.68	733,969.51
15	396,607.26	1,761,499.68	733,969.51
16	691,376.75	1,466,409.47	554,569.27
17	1,027,505.50	530,590.03	354,705.26
18	1,027,505.50	0	305,784.65
19	975,229.77	316,528.44	131,552.78
20	1,027,505.50	580,509.77	9,744.65
21	1,027,505.50	357,764.34	0
22	1,070,332.62	79,018.01	0
23	1,174,304.34	0	0
24	897,309.58	0	0
25	477,130.14	0	0
26	365,412.04	0	0
27	271,110.97	0	0
28	475,674.61	0	0
29	434,512.71	0	0
30	191,056.82	0	0
31	21,401.23	0	0
Totals	12,231,201.03	14,558,384.47	5,231,174.86

TABLE 8

MACROZOOPLANKTON AND FISH TAXA COLLECTED IN THE COLORADO RIVER BY 0.5-M PLANKTON NET, JULY - SEPTEMBER 1983

TAXA	14-15 JULY				27-28 JULY				9-10 AUGUST				15-16 SEPTEMBER			
	Surface	Mid-Depth	Bottom*	Oblique	Surface	Mid-Depth	Bottom	Oblique	Surface	Mid-Depth	Bottom	Oblique	Surface	Mid-Depth	Bottom	Oblique
CNIDARIA																
Jellyfish medussae		X		X						X	X	X		X	X	X
ANNELIDA (Oligochaeta)																
Dero furcata		X														
ANNELIDA (Polychaeta)																
Nereid reproductive form		X												X		
MOLLUSCA																
Pelecypoda juvenile									X	X	X	X	X	X	X	X
CHAETOGNATHA																
Sagitta sp.		X		X						X				X	X	X
CLADOCERA																
Leydigia acanthacercoides				X												
Moina brachiata		X				X		X								
Moinodaphnia macleayii	X	X														
Simocephalus exspinosus		X											X			
S. serrulatus		X														
S. vetulus	X	X		X												
OSTRACODA																
Unidentified Ostracoda	X					X				X						
COPEPODA																
Copepoda nauplii						X	X	X								
Acartia lilljeborgei													X		X	
A. tonsa		X		?		X			X	X	X	X	X	X	X	X

TABLE 8 (Cont'd)

TAXA	14-15 JULY				27-28 JULY				9-10 AUGUST				15-16 SEPTEMBER			
	Surface	Mid-Depth	Bottom*	Oblique	Surface	Mid-Depth	Bottom	Oblique	Surface	Mid-Depth	Bottom	Oblique	Surface	Mid-Depth	Bottom	Oblique
COPEPODA (Cont'd)																
Diaptomus spp.				X		X										
Cylopoida copepodida					X	X										
Cyclops vernalis							X									
Halicyclops spp.																X
Hemicyclops spp.														X	X	
Macrocyclops albidus		X														
M. ater		X														
M. fuscus				X												
Mesocyclops edax					X	X		X								
Oithona spp.														X	X	X
Harpactacoida copepodida						X	X						X			X
Unidentified Caligoida													X			X
BRANCHIURA																
Argulus spp.		X		X	X	X		X	X	X		X	X	X	X	X
CIRRIPEDIA																
Barnacle nauplii		X		X						X	X	X	X	X	X	X
Barnacle cypris											X					X
MALACOSTRACA																
Mysidopsis spp. juveniles		X				X	X			X				X		
M. almyra						X				X				X	X	
Corophium louisianum		X		X		X	X							X	X	
Hyalella azteca		X		X												
Penaeus aztecus postlarvae														X		
P. setiferus postlarvae		X		X					X	X			X	X	X	X
Macrobrachium spp. zoeae	X	X				X			X	X	X		X	X		X
M. ohione				X		X	X	X	X					X	X	X
Palaemonetes spp. zoeae					X	X	X							X	X	X
P. pugio					X		X									

TABLE 8 (Cont'd)

TAXA	14-15 JULY				27-28 JULY				9-10 AUGUST				15-16 SEPTEMBER			
	Surface	Mid-Depth	Bottom*	Oblique	Surface	Mid-Depth	Bottom	Oblique	Surface	Mid-Depth	Bottom	Oblique	Surface	Mid-Depth	Bottom	Oblique
MALACOSTRACA (Cont'd)																
Callianassa spp. zoeae		X		X	X	X	X	X		X	X	X		X	X	X
Callianassa spp. postlarvae		X								X				X	X	X
C. jamaicense										X	X			X		
Petrolisthes armatus zoeae														X	X	
Callinectes spp. megalopa									X	X		X				
C. sapidus juveniles		X			X	X	X		X	X	X	X		X		X
Rhith. operopeus harrisii zoeae	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
R. harrisii megalopa						X	X						X	X		X
Pinnixa spp. zoeae															X	
PISCES																
Unidentified fish eggs	X	X		X												
Unidentified fish larvae	X	X				X										X
Anchoa mitchilli				X	X	X	X	X	X	X				X	X	X
Syngnathus sp. juvenile					X								X			
Carana hippos				X												
Gobionellus boleosoma								X		X	X			X	X	X
Gobionellus hastatus										X	X				X	
Gobiosoma bosci		X				X		X		X				X		
Gobiosoma robustum						X										
Unidentified Gobiidae		X												X	X	X

*No bottom samples collected on this date due to loss of net on submerged debris

TABLE 9

NUMBER (PER 100 M^3) OF MAC-200 PLANKTON COLLECTED IN THE COLORADO RIVER BY 0.5-M PLANKTON NET ON 14-15 JULY 1983

	SURFACE				MID-DEPTH				BOTTOM*				OBLIQUE			
TAXA / TIME (CST):	1100	1720	2300	0845	1100	1720	2300	0845	1100	1720	2300	0845	1100	1720	2300	0845
Jellyfish medussae					72.2	142.2	36.7	79.9					91.1	176.1	63.3	192.7
Dero furcata						2.1										
Nereid reproductive form							2.3									
Sagitta spp.					9.8	4.2										10.1
Leydigia acanthacercoides														9.8		
Moina brachiata					2.0											
Moinodaphnia macleayii				3.0				2.1								
Simocephalus exspinosus					2.0											
S. serrulatus							6.9									
S. vetulus			6.1			2.1	20.7	6.2							42.2	
Ostracoda (unidentified)				3.0												
Acartia tonsa					19.5	4.2							11.4			
Diaptomus spp.																10.1
Macrocyclops albidus								2.1								
M. ater								2.1								
M. fuscus															21.1	
Argulus spp.					2.0		2.3							19.6		10.1

TABLE 9 (Cont'd)

TAXA	TIME (CST):	SURFACE 1100	SURFACE 1720	SURFACE 2300	SURFACE 0845	MID-DEPTH 1100	MID-DEPTH 1720	MID-DEPTH 2300	MID-DEPTH 0845	BOTTOM* 1100	BOTTOM* 1720	BOTTOM* 2300	BOTTOM* 0845	OBLIQUE 1100	OBLIQUE 1720	OBLIQUE 2300	OBLIQUE 0845
Barnacle nauplii						13.7	50.9								9.8		
Mysidopsis spp. juveniles							2.1		2.1							21.1	
Corophium louisianum								13.8	2.1								
Hyalella azteca							2.1		6.2							21.1	
Penaeus setiferus postlarvae							2.1	2.3	12.3							21.1	
Macrobrachium spp. zoeae				3.0		3.9	2.1										
M. ohione																21.1	
Callianassa spp. zoeae							101.9	200.0	73.7						19.6	42.2	10.1
Callianassa spp. postlarvae						64.4		39.0	2.1								
Callinectes sapidus juveniles								4.6									
Rhithropanopeus harrisii zoeae				3.0		177.5	72.2	259.5	18.4						48.9	105.5	30.4

* No samples taken at the bottom on this date due to loss of net on submerged debris

TABLE 10

NUMBER (PER 100 M^3) OF MACROZOOPLANKTON COLLECTED IN THE COLORADO RIVER BY 0.5-M PLANKTON NET ON 27-28 JULY 1983

	SURFACE				MID-DEPTH				BOTTOM				OBLIQUE			
TAXA / TIME (CST):	1300	1920	0120	0720	1300	1920	0120	0720	1300	1920	0120	0720	1300	1920	0120	0720
Moina brachiata						2.2		3.2							10.3	
Ostracoda (unidentified)							2.0									
Copepoda nauplii					2.8		2.0		16.8		42.7			23.5		
Acartia tonsa							10.1									
Diaptomus spp.						2.2	2.0									
Cyclopoida copepodida		3.0	2.2		2.8		10.1									
Cyclops vernalis											42.7					
Mesocyclops edax		3.0				2.2	2.0	6.4							10.3	
Harpactacoida copepodida							8.1				71.1					
Argulus spp.	9.9	10.0			5.5	2.2	2.0	9.6					20.4			
Mysidopsis spp. juveniles							4.0	3.2		22.8	14.2					
M. almyra						9.0	6.1	3.2								
Corophium louisianum						2.2						11.7				
Macrobrachium spp. zoeae						2.2	10.1	3.2								
M. ohione		26.9	2.2			13.4	10.1					11.7		140.9	102.6	
Palaemonetes spp. zoeae			4.4		2.8		2.0	12.8	16.8	22.8		11.7				
P. pugio		20.9							50.3							

TABLE 10 (Cont'd)

TAXA	TIME (CST):	SURFACE 1300	SURFACE 1920	SURFACE 0120	SURFACE 0720	MID-DEPTH 1300	MID-DEPTH 1920	MID-DEPTH 0120	MID-DEPTH 0720	BOTTOM 1300	BOTTOM 1920	BOTTOM 0120	BOTTOM 0720	OBLIQUE 1300	OBLIQUE 1920	OBLIQUE 0120	OBLIQUE 0720
Callianassa spp. zoeae			47.9	4.4			463.6	66.5	25.5	50.3	1252.9	554.8	23.4		164.3	71.8	
Callinectes sapidus juveniles				6.6				12.1				28.5					
Rhithropanopeus harrisii zoeae		19.9		19.7	140.8	57.9	179.2	98.8	194.7	184.6	205.0	455.2	233.9		93.9	61.5	171.5
R. harrisii megalopa							2.2	2.0		33.6		28.5					

TABLE 11

NUMBER (PER 100 M^3) OF MACROZOOPLANKTON COLLECTED IN THE COLORADO RIVER BY 0.5-M PLANKTON NET ON 9-10 AUGUST 1983

	SURFACE				MID-DEPTH				BOTTOM				OBLIQUE			
TAXA TIME (CST):	1155	1800	2330	0600	1155	1800	2330	0600	1155	1800	2330	0600	1155	1800	2330	0600
Jellyfish medussae							2.5	2.6	10.2	13.8	3.1	3.2	21.3			
Pelecypoda juveniles			11.9		2.8		44.4			13.8	3.1	9.5				11.8
Sagitta spp.								2.6								
Ostracoda (unidentified)							2.5									
Acartia tonsa				2.9				7.7	10.2							5.9
Argulus spp.			3.0					2.6						19.8	11.5	5.9
Barnacle nauplii						2.7	249.3	23.0		20.7					23.0	17.8
Barnacle cypris												3.2				
Mysidopsis spp. juveniles					2.8											
M. almyra							64.2	2.6								
Penaeus setiferus postlarvae			17.9				54.3	2.6								
Macrobrachium spp. zoeae			3.0					12.8	10.2							
M. ohione	2.8															
Callianassa spp. zoeae					85.6	16.3	175.2	120.2	30.6		12.4	262.5			34.5	53.3
Callianassa spp. postlarvae					13.8	2.7										
C. jamaicense							7.4				3.1					
Callinectes spp. megalopa			17.9	2.9			19.7								23.0	
C. sapidus juveniles			3.0				14.8				6.2				11.5	
Rhithropanopeus harrisii zoeae	14.2	21.0	92.4	847.8	1960.2	1153.6	2458.1	4831.2	71.5	130.9	9.3	183.4	2680.9	119.1	942.5	3493.2

TABLE 12

NUMBER (PER 100 M^3) OF MACROZOOPLANKTON COLLECTED IN THE COLORADO RIVER BY 0.5-M PLANKTON NET ON 15-16 SEPTEMBER 1983

	SURFACE				MID - DEPTH				BOTTOM				OBLIQUE			
TAXA TIME (CST):	1200	1745	2330	0600	1200	1745	2330	0600	1200	1745	2330	0600	1200	1745	2330	0600
Jellyfish medussae						15.2			12.1	32.8	5.5	3.9		23.9		
Nereid reproductive form							1.9									
Pelecypoda juveniles					8.8	15.2	1.9	4.7	1.5	8.2	16.5	3.9	8.9	47.9	5.3	
Sagitta spp.					8.8	15.2	13.2	2.3	18.1	13.7	11.0	7.8		95.7		13.7
Simocephalus exspinosus				2.6												
Acartia lilljeborgei							1.9		1.5							
A. tonsa					17.7	12.7	7.5		12.1			3.9	8.9			
Halicyclops spp.															15.9	
Hemicyclops spp.									16.5	8.2						
Oithona spp.						2.5						15.5				
Harpactacoida copepodida		2.9	10.9												15.9	
Caligoida (unidentified)								4.7							5.3	
Argulus spp.			10.9				3.8	7.0	1.5						5.3	
Barnacle nauplii						22.8	3.8	2.3		5.5	5.5				5.3	
Barnacle cypris													8.9			
Mysidopsis spp. juveniles						2.5										
M. almyra							15.1			8.2	22.0	3.9				

TABLE 12 (Cont'd)

TAXA	SURFACE				MID - DEPTH				BOTTOM				OBLIQUE			
TIME (CST):	1200	1745	2330	0600	1200	1745	2330	0600	1200	1745	2330	0600	1200	1745	2330	0600
Corophium louisianum							1.9					3.9				
Penaeus aztecus postlarvae							1.9									
P. setiferus postlarvae			8.2				35.7			8.2	11.0				10.6	
Macrobrachium spp. zoeae			5.4				5.6								5.3	
M. ohione							11.3				5.5				15.9	
Palaemonetes spp. zoeae					2.2		3.8		6.0	5.5		7.8	8.9		5.3	
Callianassa spp. zoeae					22.1	99.0	26.3	2.3	61.9	84.6	38.5	46.6		167.5	10.6	
Callianassa spp. postlarvae					2.2	2.5	5.6		3.0		5.5	7.8		23.9	10.6	
C. jamaicense							1.9									
Petrolisthes armatus zoeae					6.6	2.5		2.3	7.6	5.5						
Callinectes sapidus juveniles							7.5									
Rhithropanopeus harrisii zoeae	20.1	20.3	32.6	358.0	10311.5	9091.4	10953.6	2994.7	3077.5	1623.9	291.2	889.3	4701.7	17248.8	2343.3	604.4
R. harrisii megalopa			2.7	7.7			7.5								15.9	
Pinnixa spp. zoeae										2.7						

TABLE 13

LIST OF FISH TAXA COLLECTED IN 0.5-M PLANKTON NET SAMPLES FROM THE COLORADO RIVER (C.R.) AND THE SILTATION BASIN (S.B.), JULY - SEPTEMBER, 1983

COMMON NAME	SCIENTIFIC NAME	LOCATION OF COLLECTION
Bay anchovy	*Anchoa mitchilli*	C.R., S.B.
Mosquitofish	*Gambusia affinis*	S.B.
Pipefish (juvenile)	*Syngnathus* sp.	C.R.
Crevalle jack	*Caranx hippos*	C.R.
Gobies (larvae)	Fam. Gobiidae	C.R.
Darter goby	*Gobionellus boleosoma*	C.R.
Sharptail goby	*G. hastatus*	C.R.
Naked goby	*Gobiosoma bosci*	C.R.
Code goby	*G. robustum*	C.R.
Unidentified fish eggs	---	C.R.
Unidentified larvae	---	C.R.

TABLE 14

NUMBER (PER 100 M^3) OF ICHTHYOPLANKTON COLLECTED IN THE COLORADO RIVER BY 0.5-M PLANKTON NET ON 14-15 JULY 1983

TAXA	SURFACE				MID-DEPTH				BOTTOM*				OBLIQUE			
TIME (CST):	1100	1720	2300	0845	1100	1720	2300	0845	1100	1720	2300	0845	1100	1720	2300	0845
Anchoa mitchilli															21.1	
Caranx hippos															21.1	
Gobiidae (unidentified)								2.1								
Gobiosoma bosci					3.9	2.1										
Fish eggs		5.7		3.0				8.2								10.1
Unidentified larvae		2.9					9.2	4.1								

*No bottom samples collected on this date due to loss of net on submerged debris

TABLE 15

NUMBER (PER 100 M^3) OF ICHTHYOPLANKTON COLLECTED IN THE COLORADO RIVER BY 0.5-M PLANKTON NET ON 27-28 JULY 1983

TAXA	SURFACE				MID-DEPTH				BOTTOM				OBLIQUE			
TIME (CST):	1300	1920	0120	0720	1300	1920	0120	0720	1300	1920	0120	0720	1300	1920	0120	0720
Anchoa mitchilli		167.5	238.8		5.5	201.6	373.0			3.0	597.4	269.0		188.0	492.3	
Syngnathus sp.				3.0												
Gobionellus boleosoma														23.5		
Gobiosoma bosci						4.5	4.0								10.3	
G. robustum							2.0									
Unidentified larvae					2.8											

TABLE 16

NUMBER (PER 100 M^3) OF ICHTHYOPLANKTON COLLECTED IN THE COLORADO RIVER BY 0.5-M PLANKTON NET ON 9-10 AUGUST 1983

TAXA		SURFACE				MID-DEPTH				BOTTOM				OBLIQUE			
	TIME (CST):	1155	1800	2330	0600	1155	1800	2330	0600	1155	1800	2330	0600	1155	1800	2330	0600
Anchoa mitchilli				6.0				2.5									
Gobionellus boleosoma								9.9				3.1					
G. hastatus								7.4				15.5					
Gobiosoma bosci								4.9									

TABLE 17

NUMBER (PER 100 M^3) OF ICHTHYOPLANKTON COLLECTED IN THE COLORADO RIVER BY 0.5-M PLANKTON NET ON 15-16 SEPTEMBER 1983

TAXA		SURFACE				MID-DEPTH				BOTTOM				OBLIQUE			
	TIME (CST):	1200	1745	2330	0600	1200	1745	2330	0600	1200	1745	2330	0600	1200	1745	2330	0600
Anchoa mitchilli								7.5			2.7					5.3	
Syngnathus sp.					2.6												
Gobiidae (unidentified)						6.6		16.9	4.7	1.5						5.3	
Gobionellus boleosoma								33.9				33.0				42.5	
G. hastatus											8.2						
Gobiosoma bosci							2.5	5.6									
Unidentified larvae																5.3	

TABLE 18

NUMBER (PER 100 M^3) OF MACROZOOPLANKTON AND ICHTHYOPLANKTON COLLECTED IN THE SILTATION BASIN BY 0.5-M PLANKTON NET ON 9-10 AUGUST 1983

TAXA	TIME (CST)			
	1100	1640	2230	0450
Neanthes succinea			10.3	
Pelecypoda juveniles			10.3	
Argulus spp.		12.4		
Penaeus setiferus postlarvae		12.4		209.8
Macrobrachium ohione	323.1	149.1	20.5	116.6
Rhithropanopeus harrisii zoeae	48.5	12.4	30.8	93.2
Callinectes spp. megalopa	40.4		51.3	23.3
C. sapidus juveniles	16.2			46.6
Anchoa mitchilli			51.3	
Gambusia affinis				23.3

TABLE 19

NUMBER (PER 100 M^3) OF MACROZOOPLANKTON AND ICHTHYOPLANKTON COLLECTED IN THE SILTATION BASIN BY 0.5-M PLANKTON NET ON 15-16 SEPTEMBER 1983

TAXA	TIME (CST)			
	1100*	1705	2250	0545
Polychaeta larvae				14.1
Pelecypoda juveniles				28.3
Halicyclops spp.				42.4
Oithona spp.				14.1
Penaeus setiferus postlarvae		15.5	283.2	14.1
Macrobrachium ohione			14.9	14.1
Palaemonetes paludosus			14.9	
Rhithropanopeus harrisii zoeae		309.1	685.5	466.8
Callinectes sapidus juveniles				14.1
Gambusia affinis			14.9	

*No organisms in sample

TABLE 20

MACROINVERTEBRATE AND FISH TAXA COLLECTED IN THE COLORADO RIVER BY TRAWL, SEINE AND REVOLVING SCREENS, JULY - SEPTEMBER 1983

TAXA	TRAWL	SEINE	REVOLVING SCREENS
Penaeus aztecus		X	
Penaeus setiferus	X	X	X
Trachypeneus constrictus		X	
Palaemonidae sp.	X		
Palaemonetes kadiakensis			X
Palaemonetes paludosus	X	X	X
Macrobrachium ohione	X	X	X
Callinectes sapidus	X	X	X
Rhithropanopeus harrisii	X		
Procambarus blandingi acutus		X	
Lepisosteus oculatus	X	X	
Brevoortia patronus	X	X	
Dorosoma cepedianum	X		
Anchoa mitchilli	X	X	
Ictalurus furcatus	X		
Arius felis	X		
Bagre marinus	X		
Gambusia affinis		X	
Poecilia latipinna		X	
Menidia beryllina		X	X
Lepomis cyanellus			X

TABLE 20 (cont'd)

TAXA	TRAWL	SEINE	REVOLVING SCREENS
Caranx hippos		X	X
Eucinostomus argenteus		X	
Eucinostomus lefroyi		X	
Archosargus probatocephalus		X	
Lagodon rhomboides	X		
Bairdiella chrysoura	X		
Cynoscion arenarius	X	X	
Leiostomus xanthurus	X	X	
Micropogonias undulatus	X		
Mugil cephalus		X	
Dormitator maculatus		X	
Evorthodus lyricus		X	
Gobiosoma bosci	X		
Gobionellus boleosoma	X	X	
Gobionellus shufeldti		X	
Gobioides broussonetti	X		
Citharichthys spilopterus	X	X	
Paralichthys lethostigma	X	X	
Achirus lineatus	X		

TABLE 21

TOTAL NUMBER, TOTAL WEIGHT (g) AND MEAN LENGTH (mm) OF MACROINVERTEBRATES AND FISH COLLECTED IN THE COLORADO RIVER BY TRAWL ON 14 - 15 JULY 1983

TIME (CST):	1100			1720[a]			2300[a]			0845[b]		
TAXA	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.
Anchoa mitchilli	4	2.2	33.2									
Arius felis	26	1376.0	141.7									
Cynoscion arenarius	5	9.9	43.4									
Micropogonias undulatus	26	130.2	58.1									

[a]No trawls completed because of snags

[b]Trawl completed, no organisms caught

TABLE 22

TOTAL NUMBER, TOTAL WEIGHT (g) AND MEAN LENGTH (mm) OF MACROINVERTEBRATES AND FISH COLLECTED IN THE COLORADO RIVER BY TRAWL ON 27 - 28 JULY 1983

TIME (CST):	1300			1920			0120			0720		
TAXA	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.
Penaeus setiferus	14	23.9	58.1	6	7.5	49.8	3	1.3	34.7	25	33.3	52.4
Palaemonetes paludosus							1	0.1	-	1	0.1	-
Macrobrachium ohione	478	163.0	-	53	69.0	-	20	18.3	-	196	168.2	-
Callinectes sapidus	47	95.4	13.1	98	43.4	11.8	93	107.7	12.1	26	60.8	13.8
Rhithropanopeus harrisii										1	0.2	-
Lepisosteus oculatus	1	850.5	505.0	1	1105.6	530.0						
Brevoortia patronus	2	12.4	67.0							1	4.3	57.0
Dorosoma cepedianum							1	7.1	75.0	1	2.8	56.0
Anchoa mitchilli	245	77.9	29.0	1561	196.6	21.1	1000	115.3	20.9	806	192.6	26.4
Ictalurus furcatus	8	1261.6	207.5	2	81.4	9.6	1	47.3	146.0			
Arius felis	1	141.7	195.0							2	142.2	157.5
Bagre marinus				2	16.5	76.0	1	10.5	84.0	1	5.2	68.0
Bairdiella chrysoura	1	113.4	155.0									
Cynoscion arenarius	9	38.2	56.6				5	13.8	46.8	4	24.3	58.7
Micropogonias undulatus	2	175.3	129.0	2	143.3	125.0				2	151.8	129.0
Gobiosoma bosci	2	0.4	20.5									
Gobionellus boleosoma	2	0.9	30.0	3	0.7	23.0	4	1.2	25.7	1	0.2	24.0

TABLE 22 (cont'd)

TIME (CST):	1300			1920			0120			0720		
TAXA	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.
Gobioides broussonetti				1	0.1	25.0						
Citharichthys spilopterus	7	5.0	34.4	1	0.1	13.0	1	1.9	51.0	6	5.4	38.5
Paralichthys lethostigma				2	183.1	165.0				2	236.0	903.9
Achirus lineatus				1	0.3	21.0	1	0.1	13.0	1	0.1	18.0

TABLE 23

TOTAL NUMBER, TOTAL WEIGHT (g) AND MEAN LENGTH (mm) OF MACROINVERTEBRATES AND FISH COLLECTED IN THE COLORADO RIVER BY TRAWL ON 9 - 10 AUGUST 1983

TIME (CST):	1155[a]			1800			2300			0600		
TAXA	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.
Ictalurus furcatus				1	93.4	178.0	2	247.3	197.0			
Arius felis				1	165.4	214.0				1	65.5	152.0
Bagre marinus				1	14.2	96.0				1	7.9	77.0

[a]No organisms caught

TABLE 24

TOTAL NUMBER, TOTAL WEIGHT (g) AND MEAN LENGTH (mm) OF MACROINVERTEBRATES AND FISH COLLECTED IN THE COLORADO RIVER BY TRAWL ON 15 - 16 SEPTEMBER 1983

TIME (CST):	1200			1745			2330			0600		
TAXA	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.
Penaeus setiferus				1	5.3	95.0	50	34.4	43.9	16	18.2	47.3
Trachypeneus constrictus							1	0.1	23.0			
Anchoa mitchilli							1	0.1	19.0			
Ictalurus furcatus										1	111.7	192.0
Arius felis	1	35.9	125.0	3	266.6	170.3	1	260.0	248.0	4	318.7	157.0
Bagre marinus				1	22.4	108.0	2	45.4	109.5			
Lagodon rhomboides	2	35.7	82.5									
Cynoscion arenarius				1	0.1	13.0	5	52.1	79.0			
Leiostomus xanthurus	11	169.5	80.0	1	10.8	73.0	1	18.6	90.0	5	79.1	82.6
Micropogonias undulatus	3	79.8	103.0				2	184.6	143.5	4	88.7	102.2

TABLE 25

TOTAL NUMBER, TOTAL WEIGHT (g) AND MEAN LENGTH (mm) OF MACROINVERTEBRATES AND FISH COLLECTED IN THE COLORADO RIVER BY SEINE ON 14 - 15 JULY 1983

TIME (CST):	1100			1720			2300			0845		
TAXA	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.
Penaeus aztecus							1	4.3	-			
Penaeus setiferus	7	5.3	44.1	19	11.7	38.6	24	17.5	39.1	8	8.0	47.0
Macrobrachium ohione							4	3.8	-			
Callinectes sapidus	2	0.8	16.5	2	119.2	69.5	10	1.4	11.3	1	0.7	18.0
Procambarus blandingi acutus							1	2.8	-			
Lepisosteus oculatus	2	1757.7	475.0	2	992.2	423.5						
Brevoortia patronus	2	1.5	33.5	2	1.6	35.0	12	27.7	44.2			
Anchoa mitchilli							2	0.3	24.5			
Poecilia latipinna				1	1.4	32.0						
Menidia beryllina				1	1.4	45.0	1	0.4	31.0			
Caranx hippos	10	7.1	27.2							2	1.6	28.5
Eucinostomus lefroyi	1	0.2	18.0	1	0.2	18.0						
Cynoscion arenarius	1	0.6	32.0				3	3.2	37.3	2	1.3	30.5
Mugil cephalus	36	79.0	39.5	1	0.7	30.0	4	22.2	55.0	7	206.5	78.1
Dormitator maculatus	19	15.2	30.3				1	2.3	44.0			
Gobionellus boleosoma				2	0.8	27.5	5	1.8	25.8			
Gobionellus shufeldti							1	1.4	42.0			
Citharichthys spilopterus				2	1.0	30.0	14	8.1	30.9	1	0.3	27.0
Paralichthys lethostigma				2	1048.9	288.0						

TABLE 26

TOTAL NUMBER, TOTAL WEIGHT (g) AND MEAN LENGTH (mm) OF MACROINVERTEBRATES AND FISH COLLECTED IN THE COLORADO RIVER BY SEINE ON 27 - 28 JULY 1983

TIME (CST):	1300			1920			0120[a]			0720[a]		
TAXA	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.
Palaemonetes paludosus				1	0.3	-						
Macrobrachium ohione				42	27.9	-						
Callinectes sapidus	38	23.4	12.6	44	31.6	13.5						
Brevoortia patronus				7	4.2	28.9						
Anchoa mitchilli	3	2.2	38.0	64	13.8	25.6						
Gambusia affinis				1	0.4	23.0						
Poecilia latipinna				1	0.7	29.0						
Archosargus probatocephalus	1	69.5	115.0									
Evorthodus lyricus	2	2.0	34.0									
Gobionellus boleosoma	10	2.8	24.9	3	1.0	24.3						
Gobionellus shufeldti	1	1.7	44.0									
Citharichthys spilopterus	13	5.8	27.7	22	12.4	31.8						

[a]No collection due to silt clogging net

TABLE 27

TOTAL NUMBER, TOTAL WEIGHT (g) AND MEAN LENGTH (mm) OF MACROINVERTEBRATES AND FISH COLLECTED IN THE COLORADO RIVER BY SEINE ON 9 - 10 AUGUST 1983

TIME (CST):	1155			1800[a]			2300[a]			0600[a]		
TAXA	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.
Penaeus setiferus	27	24.4	43.9									
Macrobrachium ohione	1	1.2	-									
Callinectes sapidus	7	0.7	11.0									
Anchoa mitchilli	4	0.4	20.8									
Cynoscion arenarius	2	0.6	23.0									
Mugil cephalus	1	3.0	47.0									
Gobionellus bolesoma	16	4.7	24.6									
Citharichthys spilopterus	5	4.4	36.6									

[a]No collection due to silt clogging net

TABLE 28

TOTAL NUMBER, TOTAL WEIGHT (g) AND MEAN LENGTH (mm) OF MACROINVERTEBRATES AND FISH COLLECTED IN THE COLORADO RIVER BY SEINE ON 15 - 16 SEPTEMBER 1983

TIME (CST):	1200			1745			2330			0600		
TAXA	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.
Penaeus setiferus	88	65.1	47.6	222	55.7	32.0	221	40.7	27.2	36	37.0	50.6
Palaemonetes paludosus							1	0.1	-			
Macrobrachium ohione				5	2.9	-						
Callinectes sapidus				5	1.8	15.0	1	0.1	13.0			
Brevoortia patronus	6	11.5	43.5									
Menidia beryllina	2	1.7	40.0	2	1.3	37.5	3	1.5	36.7			
Caranx hippos							1	1.9	44.0			
Eucinostomus argenteus				1	2.4	45.0				1	0.4	25.0
Cynoscion arenarius							1	1.5	51.0			
Leiostomus xanthurus				1	27.1	98.0						
Mugil cephalus	10	933.5	107.1	3	26.2	69.0	6	56.5	74.2			
Gobionellus boleosoma				6	2.4	28.2						
Citharichthys spilopterus				8	7.2	34.4	2	4.4	51.5			

TABLE 29

TOTAL NUMBER, TOTAL WEIGHT (g) AND MEAN LENGTH (mm) OF MACROINVERTEBRATES AND FISH IMPINGED ON 2 INTAKE SCREENS IN 30 MINUTES ON 13 - 14 JULY 1983

TIME (CST):	1329			2100			0511		
TAXA	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.
Palaemonetes paludosus							1	0.1	-
Macrobrachium ohione							21	1.7	-
Callinectes sapidus	10	1.4	12.4	3	1.3	19.0	42	3.2	9.2
Caranx hippos	1	0.6	27.0						

TABLE 30

TOTAL NUMBER, TOTAL WEIGHT (g) AND MEAN LENGTH (mm) OF MACROINVERTEBRATES AND FISH IMPINGED ON 2 INTAKE SCREENS IN 30 MINUTES ON 21 - 22 JULY 1983

TIME (CST):	1315			2110			0505		
TAXA	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.
Palaemonetes paludosus	2	0.4	-	2	0.6	-	5	1.2	-
Macrobrachium ohione				1	0.1	-	3	0.4	-
Callinectes sapidus	1	0.1	10.0	3	1.3	17.0	2	0.4	17.0
Menidia beryllina							1	0.6	37.0
Lepomis cyanellus							1	1.2	32.0

TABLE 31

TOTAL NUMBER, TOTAL WEIGHT (g) AND MEAN LENGTH (mm) OF MACROINVERTEBRATES AND FISH IMPINGED ON 2 INTAKE SCREENS IN 30 MINUTES ON 27 - 28 JULY 1983

TIME (CST):	1400			2230			0626		
TAXA	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.
Palaemonetes kadiakensis							1	0.3	-
Palaemonetes paludosus				2	0.6	-	2	0.4	-
Palaemonidae sp.	2	0.3	-						
Macrobrachium ohione				2	0.6	-	1	0.1	-
Callinectes sapidus	3	0.4	13.0	4	16.7	23.5	3	0.8	14.7

TABLE 32

TOTAL NUMBER, TOTAL WEIGHT (g) AND MEAN LENGTH (mm) OF MACROINVERTEBRATES AND FISH IMPINGED ON 2 INTAKE SCREENS IN 30 MINUTES ON 9 - 10 AUGUST 1983

TIME (CST):	1300			2100			0500		
TAXA	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.
Penaeus setiferus							3	2.9	47.0
Palaemonetes kadiakensis	1	0.1	-						
Palaemonetes paludosus				1	0.2	-			
Macrobrachium ohione	1	0.1	-	1	0.1	-	2	0.6	-
Callinectes sapidus	29	18.6	12.5	11	1.2	11.6	4	35.6	55.7

TABLE 33

TOTAL NUMBER, TOTAL WEIGHT (g) AND MEAN LENGTH (mm) OF MACROINVERTEBRATES AND FISH IMPINGED ON 2 INTAKE SCREENS IN 30 MINUTES ON 15 - 16 SEPTEMBER 1983

TIME (CST):	1414			2205			0615		
TAXA	No.	Wt.	L.	No.	Wt.	L.	No.	Wt.	L.
Penaeus setiferus	1	0.1	25.0	2	0.4	28.0	10	3.8	35.7
Macrobrachium ohione							1	0.2	-
Callinectes sapidus				2	0.6	18.0	2	0.3	11.5