# ENVIRONMENTAL CONDITIONS IN WEST COUNTY WATERWAYS

# SANTA ROSA SUBREGIONAL LONG-TERM WASTEWATER PROJECT

Prepared for

City of Santa Rosa and U.S. Army Corps of Engineers

**APRIL 1996** 

Prepared by:

Merritt Smith Consulting Environmental Science and Communication 3675 Mt. Diablo Blvd. #120 Lafayette, CA 94549

For

# HARLAND BARTHOLOMEW & ASSOCIATES, INC.

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# 1.0 PURPOSE

The purpose of this technical memorandum is to present previously un-reported water quality and aquatic life information that was collected in the West County project area in 1990 and compare it to previously reported data. Consultants to the City of Santa Rosa collected water quality and aquatic life information in Americano Creek, Estero Americano, Stemple Creek and Estero de San Antonio, as summarized in Table 1, for the purpose of evaluating the effects of irrigation with reclaimed water. The information was collected from February 1988 through September 1990, but only the data from February 1988 through September 1989 has appeared in previous reports (Technical Memoranda No. 1, E5, E8, E8A). This memorandum assembles in one document the water quality and invertebrate data collected from February 1988 through September 1990 and in May 1994. Fish data are given for November 1989 through September 1990. This report is intended to provide a summary of relevant data describing existing environmental conditions. This technical memorandum is intended to provide the basis for evaluating potential impacts of the proposed components of the West County Alternative. Potential project impacts are assessed in the Water Quality Impact Analysis and Aquatic Biological Resources Impacts AssessmentTechnical Reports (MSC 1996).

Parameters	Americano Creek	Estero Americano	Stemple Creek	Estero de San Antonio
Water Quality	<b>'88, '89, '90, '94</b>	<b>'88, '89, '90, '94</b>	'88, '89, '90, '94	<b>'88, '89, '90, '94</b>
Zooplankton	<b>'</b> 88, <b>'</b> 89, <b>'</b> 90	ʻ88, ʻ89, ʻ90	<b>'</b> 89, <b>'</b> 90	<b>'</b> 89, <b>'</b> 90
Epibenthos	<b>'</b> 88, <b>'</b> 89, <b>'</b> 90	ʻ88, ʻ89, ʻ90	<b>'</b> 89, <b>'</b> 90	<b>'</b> 89, <b>'</b> 90
Benthos	<b>'</b> 88, <b>'</b> 89, <b>'</b> 90	ʻ88, ʻ89, ʻ90	<b>'</b> 89, <b>'</b> 90	<b>'</b> 89, <b>'</b> 90
Fish	<b>'88, '89, '90</b>	'88, '89, '90	<b>'</b> 89, <b>'</b> 90	<b>'89, '90</b>

# Year in Which Each Type of Data were Collected in Each Waterway

Table 1.

# 2.0 FINDINGS

## 2.1 BACKGROUND

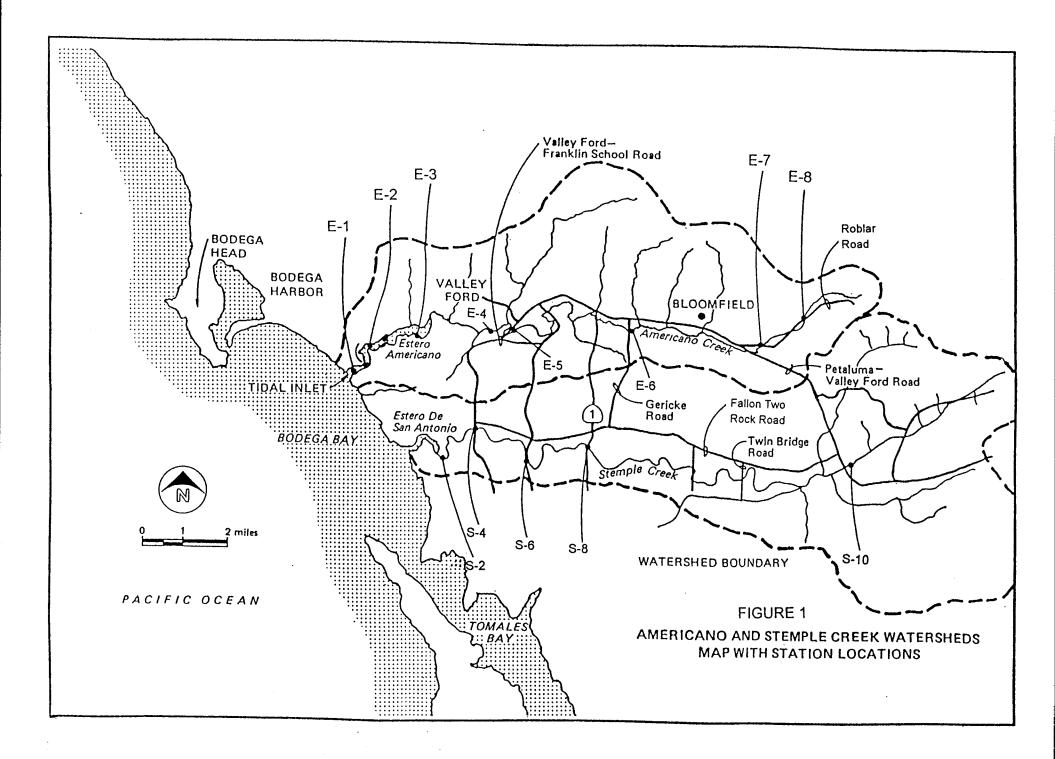
Americano Creek is about 16 kilometers (km) long and drains a 125 square kilometer (km<sup>2</sup>) watershed in which the predominant land use is dairy and dairy pasture. Americano Creek discharges to Estero Americano, a 12 km long tidal embayment extending inland from Bodega Bay. The Estero is relatively narrow (1 meter to 200 meters) and shallow (depth at mean higher high water varies from 0.6 meters to 2.3 meters). Important features of Estero Americano include a sand bar at the mouth that somewhat restricts tidal exchange with the ocean, and a mud flat in the middle reach of the Estero that strongly limits exchange between the upper and lower Estero. Stemple Creek is a larger but otherwise similar watershed located immediately south of the Americano Creek watershed. Estero de San Antonio, the estero associated with Stemple Creek, also has a sand bar at the mouth but has no hydraulic equivalent to the Estero Americano mud flat.

The connection to Bodega Bay controls water quality and water movement in each Estero. Sand can accumulate in the inlet as a result of wind-induced turbulence in Bodega Bay. During spring tide conditions, ebb tide flows are typically sufficient to erode the accumulated sand. If sand accumulates during a neap (low amplitude) tide condition, outflow may be insufficient to erode the accumulated sand, and the inlet is blocked. Sand can continue to accumulate, hydraulically isolating the Esteros from Bodega Bay. The sand bar may remain until rainfall runoff accumulates in the Esteros behind the sand bar, and then overtops and quickly cuts through the sand bar. This process occurs most years in the Esteros, but not every year. Alternatively, local landowners report cutting through the sand bar to alleviate flooding of their land. The accumulation of sediment in the Esteros during the past 100 or so years has reduced the volume of tidal water moving between Bodega Bay and the Esteros, which likely results in more frequent bar closure than occurred prior to sediment accumulation. Bar closure is described in a report by the Marin County Resource Conservation District (MCRCD 1994).

Salinity is an important factor that affects the suitability of aquatic habitat for aquatic life. Salinity in the Esteros is influenced by the amount of freshwater inflow from the creeks, the amount of tidal inflow from Bodega Bay, and evaporation. During and after a large rainfall event, freshwater inflow can flush virtually all seawater from the Esteros. As inflow decreases, seawater has increasing dominance on the Estero. During summers when the bar is open and freshwater inflow is negligible, evaporation leads to salinity levels in excess of seawater (hypersalinity). During summers when the bar is closed, salinity is determined by salinity at the time of bar closure, any continued inflow, and evaporation. Freshwater inflow can float on top of seawater, and if the bar closes during a period of stratification, wind mixing of the two layers is also a factor controlling salinity. Hypersaline conditions were observed only during bar-open conditions. Under bar-closed conditions hyper saline conditions were not observed probably because fresh water was present when the bar closed and was retained in, rather than flushed from the Esteros by tidal action. The system remained stratified and evaporation from the surface (fresh) layer did not lead to hypersalinity.

# 2.2 SUMMARY OF FIELD DATA

Field data were collected at locations identified in Figure 1. The schedule for field collections is shown in Table 2. Within each watershed, station numbers were assigned beginning at the mouth and proceeding upstream. Americano watershed stations (tidally influenced stations) are designated as follows: E-l through E-5 = Estero Americano; E-6 through E-8 = Americano Creek. Stemple watershed stations are designated as follows: S-2, S-4, S-6 = Estero de San Antonio (tidally influenced stations); S-8, S-10 = Stemple Creek.



1.14

# Table 2.

Date	Watershed	Fish	Benthos	Zooplankton	Water Quality
29 Feb. 1988	Americano Stemple				E-1,E-3 - E-8
30 Mar. 1988	Americano Stemple	E-1,E-2,E-4			E-1 - E-8
13-14 Apr. 1988	Americano Stemple	E-1 - E-4	E-1,E-2,E-4,E-6	E-1,E-2,E-4	E-1 - E-6
15-16 May 1988	Americano Stemple				E-1-E-8 S-4,S-10
15-16 June 1988	Americano Stemple	E-1 - E-5		E-1 - E-5	E-1 - E-7 S-4,S-10
21 July 1988	Americano Stemple		E-2 - E-4,E-6		E-1 - E-6 S-4,S-10
29-30-Aug. 1988	Americano Stemple	E-1 - E-5		E-1 - E-5	E-1 - E-5 S-4,S-10
28 Sept. 1988	Americano Stemple				E-1 - E-5 S-4,S-10
25-26 Oct. 1988	Americano Stemple	E-1 - E-5	E-2 - E-4	E-1 - E-5	E-1 - E-5 S-4
22 Nov. 1988	Americano Stemple				E-1 - E-6,E-8 S-4,S-10
20-21 Dec. 1988	Americano Stemple	E-1 - E-5		E-1 - E-5	1-8 4,10
20 Jan. 1989	Americano Stemple		E-2 - E-6		E-1 - E-8 S-4,S-10
17-18 Feb. 1989	Americano Stemple	E-1 - E-5		E-1 - E-5	E-1 - E-8 S-4,S-10
2 Mar. 1989	Americano Stemple				E-1,E-2,E-4 - E-8
6-7 Mar. 1989	Americano Stemple	E-1 - E-5		E-1 - E-5	E-1 - E-8 S-4,S-10
9 Apr. 1989	Americano Stemple	E-1,E-2			E-1,E-3
4-5 May 1989	Americano Stemple	E-1 - E-5	E-2 - E-5,E-2A,E-3A	E-1 - E-5	E-1 - E-8 S-4,S-10
26 May 1989	Americano Stemple				E-1,E-3,E-5

# Sampling Effort in West County, 1988-90 (Stations Sampled)

# Table 2.

# Sampling Effort in West County, 1988-90 (Stations Sampled)

Date	Watershed	Fish	Benthos	Zooplankton	Water Quality
7-8 June 1989	Americano Stemple	E-1 - E-5		E-1 - E-5	E-1 - E-8 S-4,S-10
5-6 July 1989	Americano Stemple	E-1 - E-5 S-2,S- 6		E-1 - E-5	E-1 - E-6 S-2,S-4,S-6,S-10
21 Aug. 1989	Americano Stemple				E-1 - E-3
18-19 Sept. 1989	Americano Stemple	E-1 - E-5 S-2,S- 6	E-2 - E-6,E-2A,E-3A	E-1 - E-5 S-2,S- 6	E-1 - E-6 S-2,S-4,S-6
23 Oct. 1989	Americano Stemple				E-5 - E-8 S-10
28 Nov. 1989	Americano Stemple	E-1 - E-5		E-1 - E-5 S-2,S-4,S-6	E-1 - E-8 S-2,S-4,S-6, S-8,S-10
16 Jan. 1990	Americano Stemple				E-5 - E-8 S-8,S-10
7-8 Feb.	Americano	E-1 - E-5	E-2 - E-5,E-2A,E-3A	E-1 - E-5	E-1 - E-8
1990	Stemple	S-2,S-4,S-6	S-2,S-4,S-6	S-2,S-4,S-6	S-2,S-4,S-6, S-8,S-10
9-10 Mar. 1990	Americano Stemple	E-1 - E-5 S-2,S-4,S-6		E-1 - E-5 S-2,S-4,S-6	E-1 - E-8 S-2,S-4,S-6,S-8,S-10
5-6 Apr. 1990	Americano Stemple	E-1 - E-5 S-2,S-4,S-6		E-1 - E-5 S-2,S-4,S-6	E-1 - E-8 S-2,S-4,S-6,S-8,S-10
24-25 May 1990	Americano Stemple	E-1 - E-5 S-2,S-4,S-6	E-2 - E-5,E-2A,E-3A S-2,S-4,S-6	E-1 - E-5 S-2,S-4,S-6	E-1 - E-8 S-2,S-4,S-6,S-8,S-10
31 May 1990	Americano Stemple				E-5,E-6
25 June 1990	Americano Stemple	E-1 - E-5 S-2,S-4,S-6		E-1 - E-5 S-2,S-4,S-6	E-1 - E-8 S-2,S-4,S-6,S-8,S-10
26-27 July 1990	Americano Stemple	E-1 - E-5 S-2,S-4,S-6		E-1 - E-5 S-2,S-4,S-6	E-1 - E-6 S-2,S-4,S-6,S-8,S-10
10 Sept. 1990	Americano Stemple				E-3,E-5
18-19 Sept. 1990	Americano	E-1 - E-5	E-2 - E-5,E-2A, E-2B,E-3A	E-1 - E-5	E-1 - E-5
	Stemple	S-2,S-4,S-6	S-2,S-4,S-6	S-2,S-4,S-6	S-2,S-4,S-6
15-16 Nov. 1990	Americano Stemple				E-1 - E-5 S-2,S-4,S-6

# 2.3 WATER QUALITY

This section describes the water quality data for Estero Americano, Americano Creek, Estero de San Antonio, and Stemple Creek between October 1989 and November 1990 only, since data from the first two years was presented in earlier reports (TM 1,5,E8). However, the complete water quality data (all three years) for Estero Americano, Americano Creek, Estero de San Antonio, and Stemple Creek are presented in Appendix WQ1 (Estero Americano and Americano Creek) and Appendix WQ2 (Estero de San Antonio and Stemple Creek) and in many of the figures presented below.

### 2.3.1 Methods

Water quality data were collected at five Estero Americano (E-1 through E-5) and three Americano Creek (E-6 through E-8) stations during November 1989, monthly from February - July, and in September and November 1990. Stations E-5 through E-8 were also sampled in October 1989. Temperature, conductivity and/or salinity, dissolved oxygen, and pH were measured in the field at the surface and near the bottom. Surface dip samples were collected for nutrients, metals, chlorophyll *a*, turbidity, total dissolved solids (TDS), and total suspended solids (TSS). Metals were measured only at stations E-1, E-3, E-5, E-6, and E-8. Continuously recording temperature, salinity, and dissolved oxygen meters were installed at stations E-3 and E-5 in September 1989. The mouth of Estero Americano was open during the entire study period in contrast to Estero de San Antonio which was closed during part of this time period.

Water quality samples were collected during November 1989, monthly from February -July; and September and November 1990 at 3 Estero de San Antonio (S-2, S-4, and S-6) stations and two Stemple Creek stations (S-8, and S-10). Methods used and parameters analyzed were the same as for Estero Americano and Americano Creek. Samples were collected when the mouth of Estero de San Antonio was closed (February 1990 and May through November 1990) and when it was open. A continuously recording meter (as above) was installed at station S-4 in September 1989.

## 2.3.2 Results

## 2.3.2-1 Estero Americano and Americano Creek

#### Salinity

Tidal influence in Estero Americano extends through station E-5. Seasonal salinity averages ranged from 35 parts per thousand (ppt) in winter at station E-2 to 0.8 ppt at station E-5 also in winter. Winter and spring salinity values were influenced by freshwater discharge as far downstream as station E-3 (Figure WQ1). In previous years of this study this influence extended as far as station E-1 during spring. Hypersalinity (salinity values in excess of normal seawater, which is 32-35 ppt) was observed during routine sampling at stations E-4 and E-5 during July and September. However, the hypersalinity observed in 1990 was not as pronounced as that found in 1989 (Figure WQ2). Hypersalinity was noted in stations E-3 and E-5 during September with the continuously recording meter

(Figure WQ3). Hypersalinity was not observed at station E-3 during routine sampling because of the strong tidal influence on salinity. Routine monitoring is usually done near the time of high tide (because of the inaccessibility of some stations in Estero Americano during low tide due to the large mudflat in the middle of the Estero), and during periods of hypersalinity, salinity is lowest at this time. This is because salinity at any particular location varies with tide, and at high tide during periods of hypersalinity, high salinity water is pushed to locations upstream of the sampling stations.

#### Dissolved Oxygen

Average daytime dissolved oxygen levels in Estero Americano stations E-1 through E-5 ranged from 5.3 mg/L (summer, station E-4) to 8.9 (winter, station E-1). Dissolved oxygen was much more variable in the stream stations than the estuary stations, ranging from 0.7 mg/L (summer, station E-7) to 19.5 (summer, station E-6) (Figure WQ4). This pattern is similar to that found in previous years. The high dissolved oxygen concentrations found on occasion are likely due to supersaturation since they generally occur in stream stations in summer when there is no flow and very high chlorophyll a concentrations. The difference in variability of dissolved oxygen between Americano Creek and Estero Americano is shown in Figure WQ5 which compares station E-3 (Estero Americano) to station E-6 (Americano Creek). The September 1990 data from the continuously recording meters indicate large diel (day-night) fluctuations in dissolved oxygen at both stations E-3 and E-5; however, these were not as large as fluctuations observed at the Americano Creek stations. Minimum dissolved oxygen concentrations from the continuously recording meter were 2.4 mg/L at station E-3 and 3.5 mg/L at station E-5. The diel dissolved oxygen minimum at station E-5 during September 1990 was higher than the minimum found in the April 1988 diel study conducted at this station. During the April 1988 diel, the minimum dissolved oxygen was 0.7 mg/L. Maximum dissolved oxygen concentrations from the continuously recording meters at stations E-3 and E-5 were 8.1 mg/L and 13.3 mg/L respectively.

#### Nitrogen

Mean seasonal nitrate ranged from undetectable (summer, station E-7; detection limit = 0.03 mg-N/L) to 6.15 mg-N/L (fall, station E-8). Mean values were usually lowest in summer and highest in fall (Figure WQ6). The high fall concentrations of nitrate at stations E-1, E-2, and E-8 were due to unusually high concentrations in October and November 1989 at station E-8 and in November 1989 at stations E-1 and E-2. These high concentrations were not observed in other years.

Seasonal total ammonia values ranged from undetectable (summer, fall at station E-1, and spring at station E-8; detection limit = 0.05 mg-N/L) to 49 mg-N/L (summer, station E-7) (Figure WQ7). Summer ammonia values at station E-7 were also the highest average values in previous years (Technical Memorandum E8, 1990).

Un-ionized ammonia was determined as described in Technical Memorandum E8 (1990). Mean seasonal un-ionized ammonia concentrations ranged from undetectable (summer, fall at station E-1, and spring at station E-8) to 0.610 mg-N/L at station E-6 in summer

(Figure WQ8). In Estero Americano, un-ionized ammonia was nearly always highest in the upstream stations E-4 and E-5 (Figure WQ9). Un-ionized ammonia concentrations in Americano Creek were highest at stations E-6 and E-7 (Figure WQ10). The concentrations of un-ionized ammonia in Americano Creek stations E-6 and E-7 were often one to two orders of magnitude higher than in Estero Americano. (Note scale differences for Figure WQ9 and WQ10)

The estimated un-ionized ammonia concentrations were evaluated using the methods described in Technical Memorandum E8 (1990) to determine if the EPA acute and chronic freshwater and saltwater guidelines for the protection of aquatic organisms were exceeded.

The un-ionized ammonia levels were greater than the chronic guideline, or both the chronic and acute guidelines at all times it was measured at station E-6. Un-ionized ammonia was greater than the chronic guideline, or both the chronic and acute guidelines in two of eight measurements at station E-7 and 2 of 5 measurements at station E-8. On five of the six occasions when the salinity of the water at station E-5 was less than 10 ppt, the un-ionized ammonia exceeded the EPA freshwater guideline for un-ionized ammonia. On two of the 21 occasions when the salinity at station E-5 was greater than 10 ppt, the EPA chronic saltwater guideline for un-ionized ammonia (0.035 mg/L or 0.029 mg-N/L) was exceeded. On the two occasions when the salinity at station E-4 was less than 10 ppt, the EPA chronic freshwater guidelines for ammonia were exceeded. The EPA chronic saltwater guideline for un-ionized ammonia was exceeded at station E-4 on one occasion. The EPA guidelines for un-ionized ammonia were never exceeded at stations E-1, E-2, or E-3.

#### Metals

In May 1995, EPA guidelines for metals toxicity were defined on a dissolved metal basis as a function of the water effect ratio and hardness. For comparisons with these guidelines, we assume a water effects ratio of 1.0 and a hardness of 100 mg/L as  $CaCO_3$ . A hardness of 100 was used because of lack of hardness information in Americano and Stemple Creeks. Dissolved metals were collected in Estero Americano and Americano Creek during October 1989 through May 1990 at stations E-1, E-3, E-5, E-6, and E-8. Information on total copper is also presented here to provide a basis of comparison with data presented in previous Technical Memoranda.

Dissolved copper ranged from below detection (detection limit =  $0.1 \ \mu g/L$ ) to 27  $\mu g/L$  at station E-8 in October 1989 through May 1990. During this time period in Americano Creek, the EPA Critical Maximum Concentration (CMC =  $17 \ \mu g/L$ ) and Critical Continuous Concentration (CCC =  $11 \ \mu g/L$ ) were exceeded in two of seven samples from station E-6 and in one of eight samples from station E-8. The CCC only was exceeded in one of seven measurements from station E-6. In Estero Americano, the CMC and CCC (both =  $2.4 \ \mu g/L$ ) were exceeded in 2 of six measurements at station E-5. No exceedances were observed at other Estero Americano stations during this time period.

Average seasonal total copper from October 1989 through November 1990 ranged from undetectable (detection limit =  $0.1 \ \mu g/L$ ) at station E-1 in winter to  $32 \ \mu g/L$  at station E-6 in fall. The overall average of total copper from station E-6 was 17  $\mu g/L$  during the time period covered by this report (October 1990 through September 1991). This is approximately half the average total copper found at this station from May 1988 through September 1989 (33  $\mu g/L$ ). The cause of the reduction in copper levels is unknown, but may be related to the drought and consequent reduced runoff from the surrounding watershed.

The concentration of dissolved lead was below detection for all measurements except one made in Estero Americano and Americano Creek during October 1989 through November 1990. The one detectable dissolved lead concentration was 0.8  $\mu$ g/L found at station E-5. This concentration does not exceed the EPA freshwater CCC or CMC.

The concentration of dissolved zinc in Americano Creek ranged from 5 to 80  $\mu$ g/L during October 1989 through 1990. There were no exceedances of the EPA freshwater CCC or CMC (assuming a hardness of 100 mg/L as CaCO<sub>3</sub>). The concentration of dissolved zinc in Estero Americano during this time period ranged from below detection (1.0  $\mu$ g/L) to 50  $\mu$ g/L. There were no exceedances of the EPA saltwater CCC or CMC.

Mean seasonal total zinc ranged from undetectable (detection limit = 1  $\mu$ g/L) at station E-1 in summer to 161  $\mu$ g/L at station E-6 in summer. Unlike the May 1988 through September 1989 period described in Technical Memorandum E8, the EPA guidelines for zinc toxicity were never exceeded at stations E-1 through E-5 or E-8 (zinc was not measured an E-7). Zinc levels exceeded the chronic or both the chronic and acute freshwater guidelines (110  $\mu$ g/L and 120  $\mu$ g/L, respectively, assuming hardness = 100 mg/L as CaCO<sub>3</sub>) at station E-6 two times out of seven measurements. The overall average total zinc at station E-6 was 78  $\mu$ g/L, similar to the previous average (May 1988 through September 1989) of 74  $\mu$ g/L, but the high average was due to just one exceptionally high measurement (300  $\mu$ g/L). This indicates a reduction from 1988-89 to 1989-90 in total zinc levels similar to that found with copper.

#### Chlorophyll a

Mean seasonal chlorophyll *a* ranged from 0.0009 mg/L at station E-8 in winter to 7.29 mg/L at station E-6 in summer (Figure WQ11). As was found in previous years, chlorophyll *a* concentrations are generally highest in the Creek stations E-6 and E-7 and lowest in the Estero stations E-1 through E-3.

## 2.3.2-2 Estero de San Antonio and Stemple Creek

## Salinity

Tidal influence in Estero de San Antonio extends through station S-6. The mouth of the Estero de San Antonio was closed briefly in February and during May through September 1990 and the subsequent salinity in the system was brackish. Surface salinities ranged from 19.2 ppt to 30.4 ppt before the closure (i.e., on 28 November 1989) and 0.5 ppt to 18.7

.ppt afterward (Figure WQ12). Due to the closure of the mouth, the estuary exhibited strong vertical stratification during February through April 1990. By May, stratified conditions had mostly disappeared. The vertical differences in salinity, which were between 20 - 28 ppt in April, were usually less than 2 ppt from May through November. The exception to this was in June at station S-6, when surface salinity was 8.4 ppt and bottom salinity was 13 ppt. The disruption of the large salinity differences present in spring indicates a large energy input into the system, presumably from wind mixing, as well as tidal mixing during bar-open conditions.

#### Dissolved Oxygen

Average daytime surface dissolved oxygen levels in Estero de San Antonio and Stemple Creek ranged from 2.6 mg/L (fall, station S-6) to 17.2 mg/L (winter, station S-2) (Figure WQ13). The high winter dissolved oxygen at station S-2 is based on one sample when an annotation in the field notes read "water incredibly green". It is not likely representative of winter dissolved oxygen at this station. Reduced dissolved oxygen levels often occurred in the bottom layer during the period of stratification. During this time (February, and May through September 1990) dissolved oxygen in the bottom layer ranged from 0.3 mg/L to 7.4 mg/L, while dissolved oxygen at the surface ranged from 6.6 mg/L to 17.2 mg/L. The surface and bottom dissolved oxygen concentrations are shown for station S-4 in Figure WQ14. Station S-6 continued to have low dissolved oxygen near the bottom through November 1990.

#### Nitrogen

Mean seasonal nitrate concentrations in Estero de San Antonio and Stemple Creek ranged from undetectable (stations S-4, S-6, and S-8 in summer; detection limit = 0.03 mg-N/L) to 2.15 mg-N/L at station S-8 in winter. Nitrate concentrations were usually highest in winter and early spring and usually higher in the Creek stations (stations S-8 and S-10) than in the Estero stations (Figure WQ15).

Average seasonal total ammonia ranged from 0.065 mg-N/L (summer, station S-6) to 6.05 mg-N/L (winter, station S-10). Both ammonia and nitrate were usually lowest in summer and highest in winter.

The concentration of un-ionized ammonia in the Stemple Creek stations exceeded either the chronic or both the chronic and acute freshwater EPA ammonia guidelines on one of seven occasions at station S-8 and on seven out of eight occasions at station S-10. At these stations average un-ionized ammonia ranged from below detection to 0.18 mg-N/L (station S-10, March 1990) (Figure WQ16). The concentration of un-ionized ammonia in Estero de San Antonio, when salinities were less than 10 ppt, exceeded the chronic freshwater EPA ammonia guidelines in one of one measurement at station S-2, two of three measurements at station S-4, and one of three measurements at station S-6. The concentration of un-ionized ammonia in Estero de San Antonio, when salinities were greater than 10 ppt, exceeded the chronic saltwater EPA ammonia guideline in two of seven measurements at station S-6. One of these measurements at station S-6 also exceeded the acute saltwater EPA ammonia guideline. The EPA saltwater guidelines for ammonia were never exceeded in seven measurements at station S-4 and nine measurements at station S-6.

#### Metals

Dissolved copper concentrations in Estero de San Antonio and Stemple Creek during October 1989 through November 1990 ranged from 2  $\mu$ g/L to 26  $\mu$ g/L (the latter value found at station S-10 in November 1989). The EPA freshwater CMC and CCC were exceeded in one of ten measurements from Stemple stations S-8 and S-10. The saltwater CMC and CCC were exceeded on two of four measurements at station S-6. However, these exceedances occurred at times when salinity was only 0.5 ppt. If the freshwater guidelines are applied, no exceedances occurred at station S-6. In Estero de San Antonio, the saltwater copper CMC and CCC were exceeded on one of one measurement in station S-2 and in two of three measurements at station S-4.

Mean seasonal total copper ranged from undetectable (fall, stations S-4 and S-6; detection limit = 0.1  $\mu$ g/L) to 17  $\mu$ g/l (fall, station S-10). In the Stemple Creek stations, copper exceeded the EPA chronic guideline for copper toxicity (assuming a hardness of 100 mg/L as CaCO<sub>3</sub>) in 2 of 14 measurements. In Estero de San Antonio copper exceeded the chronic and acute guideline (both = 2.9  $\mu$ g/L) in 6 of 16 measurements.

Dissolved lead concentrations in Stemple Creek stations S-8 and S-10 during October 1989 through 1990 ranged from below detection (detection limit =  $0.1 \ \mu g/L$ ) to 5.2  $\mu g/L$ . The EPA CCC of 2.5  $\mu g/L$  (assuming a hardness of 100 mg/L as CaCO<sub>3</sub>) was exceeded in one of seven measurements in Stemple Creek during this time period. Dissolved lead concentrations in Estero de San Antonio during this time period were all below detection (detection limit =  $0.1 \ \mu g/L$ ). This detection limit is below the saltwater CCC for dissolved lead (8.1  $\mu g/L$ ).

Dissolved zinc concentrations in Stemple Creek stations S-8 and S-10 during October 1989 through 1990 ranged from 13 to 80  $\mu$ g/L. There were no exceedances of the EPA freshwater CCC and CMC. Dissolved zinc concentrations in Estero de San Antonio during this time period ranged from below detection (detection limit = 1.0  $\mu$ g/L) to 21  $\mu$ g/L. There were no exceedances of the EPA saltwater CCC and CMC.

Mean seasonal total zinc for October 1989 through November 1990 ranged from undetectable (fall, station S-4; detection limit =  $1.0 \ \mu g/L$ ) to 55  $\mu g/L$  (fall, station S-10). The EPA guidelines for zinc toxicity (assuming a hardness of 100 mg/L as CaCO<sub>3</sub>) were never exceeded during this segment of the study.

#### Chlorophyll a

Mean seasonal chlorophyll *a* during October 1989 through September 1990 ranged from 0.002 mg/L at station S-2 in fall to 0.49 in station S-10 in summer. The highest chlorophyll *a* concentrations were generally found at station S-10 (Figure WQ17). The exception to this was in February 1990 when the chlorophyll *a* concentration at station S-10 was lower than the other stations.

# **2.4** INVERTEBRATES

Invertebrate sampling in Esteros Americano and de San Antonio included plankton (small, free-swimming animals with limited powers of directed movement, such as copepods), nekton/epibenthos (larger, stronger-swimming invertebrates, such as shrimps and crabs), and benthos (animals which live in the sediments, such as worms and clams).

#### 2.4.1 Zooplankton and Fish Larvae

#### 2.4.1-1 Methods

Zooplankton and other aquatic life were collected with metered nets of two mesh sizes: 505  $\mu$ m and 130  $\mu$ m. The larger mesh net is designed to collect larger zooplankton, the young life stages of nekton and epibenthos, and fish larvae. The smaller net catches mostly small zooplankton and the young life stages of larger zooplankton. The adult forms of the numerically dominant species of copepods are retained by the larger mesh net, although their immature stages are probably not quantitatively collected. The following summary is based primarily on the data from the larger net, which are available for the whole 3-year study period.

#### 2.4.1-2 Results

A description of the zooplankton and the larval fish that were collected in the zooplankton nets is given below for each Estero.

#### Estero Americano

#### Zooplankton

The invertebrate zooplankton data from the 505-mesh nets are given in Appendix P1. During the study period (1988 - 1990) the bar at the Estero mouth was maintained open continuously, and the zooplankton fauna consisted of a rather diverse assemblage of estuarine and coastal species. Figure P1 shows that the five Estero Americano stations had 10 - 20 species each, with greater diversity (up to 30 species) near the mouth. There was no clear seasonal pattern in the number of zooplankton species which occurred at the five stations.

Figure P2 shows that the 505-mesh net tows in Estero Americano usually contained around 25 individuals per m<sup>3</sup>. Counts of smaller zooplankton, available for the first two years of the study, are typically much higher than this. Counts of up to 300,000 individuals per cubic meter (i.e., 300 per liter) have been observed at station E-5 in fall (see Technical Memorandum No. E8). The 505-mesh net counts had peaks of several hundred individuals per cubic meter in May 1989 at the upstream station, E-5, primarily due to the abundance

of *Neomysis mercedis*; and at the near-mouth station, E-1, in April 1990 due to larvae (zoeae) of xanthid crabs. *Acartia clausi*, the most common copepod, and often the most common zooplankter, typically comprised at least a third of the total catch at all stations except E-5.

#### Fish Larvae

The larval fish collected in the 505- $\mu$ m net tows are summarized in Appendix P3. There were typically only one to five kinds of larval fish present (Figure P3), and these generally were the same species whose adults frequent the Estero (see fish section). Larval fish seldom exceeded ten per cubic meter, except for brief pulses of up to 67 per cubic meter (Figure P4), due to immature gobies.

Estero de San Antonio

#### Zooplankton

Estero de San Antonio was studied from mid-1989 through September 1990. During this period the bar at the Estero de San Antonio mouth was allowed to open and close due to natural forces. The diversity (number of zooplankton species) was much less than in Estero Americano. Estero de San Antonio typically had 5 to 10 species (Figure P5). Total zooplankton numbers were often lower as well, except for April 1990 when a bloom of *Eurytemora affinis* occurred at all 3 stations (Figure P6). *E. affinis* was typically the dominant copepod species in Estero de San Antonio. This species is remarkably euryhaline (tolerates wide range of salinities), and so is well adapted to the salinity extremes of that environment, which ranges from fresh to hypersaline.

The composition of the macrozooplankton faunas of the two Esteros are compared in Figure P7, which shows that copepods comprised from 30 to 45 percent of the total in Estero Americano, whereas in Estero de San Antonio, copepods accounted for 85 to 90 percent of the zooplankton numbers. Epibenthic and benthic invertebrates and fish are also more diverse in Estero Americano (see below). The greater diversity in Estero Americano is very likely due to its mouth being maintained open continuously, thus assuring a continuous supply of recruitment from marine populations. However, the fauna at the stations sampled in Estero de San Antonio was not necessarily more diverse during brief bar-open conditions than when its bar was closed. This is shown in Figure P8. Closer to the mouth, the number of invertebrate species would reflect coastal populations during bar-open conditions. Total zooplankton abundance may have been higher during bar open conditions (Figure P9--note log scale), but these data are driven by the *Eurytemora* bloom which took place during a brief bar-open episode in April 1990, but which did not depend upon an influx of recruitment from the sea.

#### Fish Larvae

Estero de San Antonio had fewer kinds of fish larvae (Figure P10), typically only one or two on a given day. The abundance of fish larvae was also much lower in Estero de San Antonio (Figure P11). These plots (and also the invertebrate plots P5 and P6) show which days the bar was open or closed. There is no obvious relationship between diversity or abundance of fish or invertebrates and whether the bar was open.

#### 2.4.1-3 Comparison With Other Data

The biology of the Esteros was summarized in DFG (1977). However, that review did not provide information about zooplankton. No other studies of Estero biology have been identified.

#### 2.4.2 Nekton/Epibenthic Invertebrates

#### 2.4.2-1 Methods

Shrimps, crabs, and other free-swimming macroinvertebrates were collected in bottom trawls and gillnets used in fish sampling (see fish methods).

#### 2.4.2-2 Results

#### Estero Americano

Catches of nektonic and epibenthic invertebrates in fish trawls and gill nets are listed in Appendix E1. These data are only semi-quantitative. Small invertebrates such as *Neomysis* are retained only when they become entangled in macrophytes or other debris in the trawl cod-end, or when they are so abundant as to clog the cod-end. Only large invertebrates such as *Cancer* crabs are caught in gill nets.

Forty-five invertebrate species were collected during the three years, twelve of which were collected for the first time during the second year and ten more of which were not seen until the third year. It is typical that the number of species collected increases as the number of collections increases. Several of the Estero Americano epibenthic invertebrates are primarily associated with macrophytes. As was the case with zooplankton, the number of epibenthic invertebrate species collected was greatest near the mouth of the Estero and decreased upstream (Figure E1). Appendix E2 summarizes the invertebrate distributions in the Estero by the number of occurrences of each species at each station. Mysids, shrimps, and crabs, often species of economic importance, comprised the most numerous invertebrate groups represented.

Four mysid species were found, but of these only *Neomysis mercedis* occurred throughout the Estero. It was often found in great abundance. The other three species were found only at stations E-1 and/or E-2, the most seaward stations, and only in low numbers.

Nine caridian shrimp species were collected, three of which (*Crangon franciscorum*, *C. nigricauda*, and *Heptacarpus pictus*) were widely distributed in the estuary. *Crangon franciscorum* is the common shrimp species in San Francisco Bay.

Twelve species of crabs were found, six of which were *Cancer* species. Of these, only *C*. *magister*, the Dungeness crab, occurred at all Estero stations. Larger Dungeness crabs were often caught in gillnets.

*Hemigrapsis oregonensis*, the yellow shore crab, was abundant throughout the Estero, and was an important forage organism.

A single individual of *Carcinus maenas*, the green shore crab, was caught in a gillnet at station E-2 on 8 June 1989. This is a common European species which has been introduced along the Atlantic coast of North America, but up until that time rarely occurred on the Pacific coast. This specimen was examined by Dr. James T. Carleton, who commented that *Carcinus* had been reported from this coast only one other time during this century (a single specimen from Willapa Bay, Washington, in 1961). The estero specimen proved to be a harbinger, as the species has since become common in both San Francisco Bay and in Bodega Bay.

Two amphipod species, *Ampithoe lacertosa* and *Anisogammarus confervicolus* were widely distributed within the estuary wherever macrophytes were collected.

The number of invertebrate species collected in otter trawls was greatest in fall and winter, and fewest in summer; this was true both near the mouth and in the upper part of the Estero (Figure E1). Few epibenthic invertebrates were caught in the upper Estero (stations E-4 and E-5) during high freshwater runoff during March and April, 1989. No such catch decrease in the number of invertebrate species occurred at Estero stations nearer to the mouth nor did such a decrease occur in 1990, which had less rain. However, many of the epibenthic invertebrates collected in the upper estero during the runoff event in March 1990 were in poor condition, as is discussed in the fish section below.

Table 3 lists numerically dominant epibenthic invertebrate species found at each station in the two Esteros.

# Table 3.

Station	Total Species Collected	Mean individ./m <sup>2</sup>	Dominant	Dominant Species	
E-1	35	9.2	Crangon nigricauda	Black-tail shrimp	33.9
			Heptacarpus pictus	Broken-back shrimp	14.5
			Pugettia producta	Kelp crab	8.0
			Heptacarpus brevirostris	Broken-back shrimp	6.0
			Hemigrapsis oregonensi	Yellow shore crab	4.2
			Cancer magister	Dungeness crab	3.6
E-2	30	7.5	Neomysis mercedis	Opossum shrimp	93.8
			Lacuna sp.	Chink snail	3.3
			Heptacarpus pictus	Broken-back shrimp	1.0
E-3	14	3.9	Neomysis mercedis	– Opossum shrimp	64.2
			Hemigrapsis oregonensis	Yellow shore crab	21.8
			Crangon nigricauda	Black-tail shrimp	6.5
			Crangon franciscorum	San Francisco Bay shrimp	5.3
E-4	18	3.9	Neomysis mercedis	Opossum shrimp	98.9
			Hemigrapsis oregonensis	Yellow shore crab	0.8
			Crangon franciscorum	San Francisco Bay shrimp	0.1
E C	14	2.0			0.0.0
E-5	14	2.8	Neomysis mercedis	Opossum shrimp	92.3
			Hemigrapsis oregonensis Crangon franciscoru	Yellow shore crab San Francisco Bay shrimp	6.1 0.8

## Estero Americano Nektonic/Epibenthic Invertebrate Summary

#### Estero de San Antonio

Catches of nektonic and epibenthic invertebrates in fish trawls and gill nets are listed in Appendix E3. Sampling effort in Estero de San Antonio was less than in Estero Americano, but the invertebrates collected from Estero de San Antonio are species also common in Estero Americano. These include *Neomysis mercedis, Crangon franciscorum, Corophium spinicorne*, and *Anisogammarus confervicolus* (Table 4). One specimen of *Cancer jordani*, a small *Cancer* crab, was collected at station S-2 near the mouth in September 1989. This species was collected in Estero Americano on several occasions, always near the Estero mouth.

#### Table 4.

Station	Total Species Collected	Mean individuals/m <sup>2</sup>	Dominant S	Species	% of Total
S-2	8	3.3	Neomysis mercedis	Opossum shrimp	61.1
			Corophium spinicorne	Scud	33.3
			Anisogammarus confervicolus	Scud	5.2
S-4	6	2.3	Corophium spinicorne	Scud	70.9
			Neomysis mercedis	Opossum shrimp	22.4
			Anisogammarus confervicolus	Scud	6.6
S-6	8	2.1	Corophium spinicorn	Scud	88.8
			Anisogammarus confervicolus	Scud	8.4
			Cenocorixa blaisdelli	Water boatman	2.4

Estero de San Antonio Nektonic/Epibenthic Invertebrate Summary

Appendices E3 and E4 show that far fewer epibenthic species were found in Estero de San Antonio than in Estero Americano; this is due in some part to the fewer number of sampling dates, but also reflects that no samples were collected in eelgrass beds close to the Estero mouth, as was the case with Estero Americano.

There may have been more of an impact of runoff in 1990 on the number of epibenthic invertebrate species than in Estero Americano (Figure E2), but so few species were found before the rain that it is difficult to be certain.

Both Esteros were dominated by estuarine species, but unlike Estero Americano, Estero de San Antonio had few coastal species represented at the stations sampled.

### 2.4.2-3 Comparison with Earlier Data

DFG (1977) included a list of invertebrates from various habitats in the two esteros. Included are 12 species of mysids, shrimps, and crabs. All of these species were also found in the 1988-1990 study. The DFG list attributed most of the invertebrate species to Estero de San Antonio, with only a few indicated as also occurring in Estero Americano. It is likely that most or all of these species occurred in both esteros, and that the longer list reflects the greater study effort expended in Estero de San Antonio in the 1970's (see reports cited in DFG, 1977). No quantitative data on invertebrates was presented in the 1977 review.

#### 2.4.3 Benthic Invertebrates

### 2.4.3-1 Methods

Sediment samples were collected with a 15.2 x 15.2 cm ("petite") PONAR grab and screened in the field through a 0.5 mm screen. Benthic invertebrates were preserved in formalin to which rose Bengal stain had been added. Samples were transferred to 70 percent ethanol after 48 hours. Benthic samples were collected approximately quarterly. Data were collected nine times during the three-year study period (1988, 1989, 1990) in Estero Americano/Americano Creek stations. In Estero de San Antonio benthic invertebrate samples were collected three times during 1990.

Beginning in May, 1989, two intertidal mudflat stations were added to the sampling schedule in Estero Americano. The first (station 2A) is located in the shallow embayment on the south side of the Estero approximately midway between stations E-1 and E-2. The second (station 3A) is located a few meters north of station E-3. A third intertidal station (2B, located on the opposite side of the channel from 2A) was sampled only in September 1990.

## 2.4.3-2 Results

#### Estero Americano

#### Qualitative Aspects

Over 110 invertebrate taxa have been identified to date from Estero Americano benthic samples (Appendix B1). Of these, 46 are polychaete species, 27 are crustaceans, and 19 are molluscs. The remaining taxa represent other groups, and these were usually not identified to species.

The abundance and composition of benthic invertebrate animals is highly dependent on the substrate type. The benthic environment at Estero Americano station E-1 is composed of coarse sand and gravel, reflecting the relatively high energy of currents near the mouth. This station was sampled only on the first and the last survey. It contained only a few nemerteans and a population of *Hesionura* sp., a polychaete characteristic of coarse sand habitats. Since the sediments at stations E-2 to E-5 are silts and sandy silts, it was decided not to include station E-1 in subsequent surveys. The number of benthic species was highest at station E-2, and diminished farther upstream (Figure B1). Station E-2 had 17 - 40 species, often over twice as many as any of the stations further upstream. The proximity to the sea (the source of invertebrate larvae as well as relatively constant salinity) and the presence of eelgrass at station E-2 undoubtedly contributed to the greater diversity of benthic invertebrates found there. Station E-3 had 6 -19 benthic invertebrate species, while station E-4 had 5 - 8 species. Only 3-5 species were collected at station E-5.

The benthic invertebrate fauna was dominated by a few small species (Table 5). The polychaete *Streblospio benedicti* and the amphipod *Corophium spinicorne* were the numerically dominant benthic species at most stations and seasons. Other species which occasionally occurred in sizable numbers were the polychaetes *Pseudopolydora kempi*, *Capitella capitata* complex, another capitellid, designated species A; the amphipods *Grandidierella japonica* and *Ampelisca abdita* [=A. *milleri*]; and *Cumella vulgaris*, a cumacean. Most of the other species occurred in low numbers. Molluscs in these samples were represented only by tiny juveniles of various bivalves whose adults, although well represented in Estero Americano mudflats, are not effectively sampled with the PONAR grab. These include the heart cockle, *Clinocardium nuttalii*, the Baltic macoma, *Macoma balthica*, the bent-nosed clam, *Macoma nasuta*, the littleneck clam, *Protothaca staminea*, and the Japanese littleneck, *Tapes japonica*. The bivalves in intertidal mudflats in Estero Americano were quantitatively surveyed in July 1990, and these data were reported in a separate report (Technical Memorandum No. E8A).

PONAR samples at the intertidal mudflat stations 2A, 2B, and 3A yielded qualitatively similar benthic faunas to nearby channel sites.

The number of polychaete species found at stations E-2 and E-3 decreased dramatically between January 1989 and the next sampling, in May 1989 (Appendix B1). This may be a reflection of the high freshwater runoff following heavy rains in March 1989 (the most significant runoff event during the study period). No such decrease in benthic crustacean species occurred, but the Estero Americano amphipods are known to be euryhaline species. The benthic invertebrate data base is too scanty to draw definitive conclusions, however.

# Table 5.

Station	Total Species Collected	Mean individuals/m <sup>2</sup>	Dominant Species		% of Total
E-2	71	37.2K	Ampelisca abdita	Scud	46.4
			Streblospio benedicti	Polychaete worm	13.4
			Corophium spinicorne	Scud	19.4
E-3	33	35.1K	Corophium spinicorne	Scud	60.4
			Pseudopolydora kempi	Polychaete worm	10.2
			Streblospio benedicti	Polychaete worm	9.0
E-4	18	26.14K	Streblospio benedicti	Polychaete worm	78.5
			Corophium spinicorne	Scud	10.3
E-5	12	29.1	Streblospio benedicti	Polychaete worm	66.4
			Oligochaeta	Aquatic earthworms	27.1
			Corophium spinicorne	Scud	6.0

#### Estero Americano Benthic Invertebrate Summary

#### **Quantitative Aspects**

The abundance of benthic invertebrates in Estero Americano ranged from 1,000 (station E-5 in September, 1989) to over 122,000 (station E-3 in May 1989) individuals per square meter of bottom. Station E-2, which had the maximum number of benthic invertebrate species, sometimes had the highest numbers of individuals as well, although the maximum abundance often occurred at station E-3, which averaged 35,000 individuals<sup>2</sup>/nver all

seasons (Figure B2). Average abundance at stations E-4 and E-5 was only slightly less than that at station E-3. Between-date variability in benthic invertebrate abundance at each station was large, so that the between-station differences are probably not statistically significant.

The decrease in the number of polychaete species between January and May 1989 was accompanied by a decrease in polychaete abundance, from over 28,000 to less than 775 individuals/m<sup>2</sup> (average for stations E-2 - E-5). Crustacean numbers increased at those stations over the same interval, from ca. 25,000 to over 36,000 individuals/m<sup>2</sup>. This was due to increased abundance of *Corophium spinicorne*, a species that is tolerant of very low salinity.

#### Americano Creek

Americano Creek was sampled for benthic invertebrates at station E-6 (Gericke Road crossing). The creek here is freshwater and intermittent. Mean monthly flows in winter and spring are often several tens of cfs, but by late spring or summer the creek is reduced to a series of standing pools which were used as cattle wallows (cattle have since been fenced out of the creek at this site). Later the site is dry. Technical Memorandum E6 provided a summary of monthly estimated streamflows at this station for the years 1958 through 1985.

In April 1988 benthic invertebrates at station E-6 consisted of oligochaetes (over  $90,000/m^2$ ) and *Chironomus* larvae (ca.  $2000/m^2$ ), as well as a few tiny *Corophium spinicorne*. A conspicuous population of free-swimming entomostracans--consisting primarily of *Daphnia magna*, but also including other cladocerans and copepods--attested to the fact that flow rates were low. Very few animals were found in July 1988, and the site was dry on the next survey date (26 October 1988). No benthic animals were found in the sample collected at station E-6 on 20 January 1989. Another sample was collected on 18 September, by which time the site was nearly dry. A few oligochaetes were found, along with semi-aquatic species (muscoid maggots) associated with manure.

#### Estero de San Antonio and Stemple Creek

Benthic invertebrate data is available for three dates in 1990 at each of three stations S-2, S-4, and Ss-6 (Appendix B2). Only about twenty species were found, although the dominant species were often the same species that were most abundant in Estero Americano. Total numerical abundances were similar in the two Esteros (Table 6, Figure B3). There was no apparent effect of runoff on benthic invertebrates in Estero de San Antonio, but the data is scanty (Figure B4). The shorter list of benthic species in Estero de San Antonio relative to Estero Americano also reflects that Estero de San Antonio was not sampled as close to the mouth, where coastal species mostly occurred in Estero Americano.

# Table 6.

Station	Total Species Collected	Mean individuals/m²	Dominant	Species	% of Total
S-2	17	31.4K	Corophium spinicorne	Scud	35.6
			Oligochaeta	Aquatic earthworms	25.6
			Streblospio benedicti	Polychaete worm	19.3
			Capitella capitata	Polychaete worm	8.3
S-4	13	44.0K	Oligochaeta	Aquatic earthworms	40.5
			Corophium spinicorne	Scud	34.9
			Streblospio benedicti	Polychaete worm	13.8
S-6	9	1.8K	Ostracoda	Seed shrimps	66.4
			Corophium spinicorne	Scud	13.8
			Oligochaeta	Aquatic earthworms	10.3

#### Estero de San Antonio Benthic Invertebrate Summary

#### 2.4.3-3 Comparison with Earlier Data

The list of invertebrates in the 1977 review of the esteros (DFG, 1977) is much shorter than lists based on the 1988-1990 collections. Species found in the 1970's were still present in the later collections. The earlier list is shorter because only a few of the polychaetes were identified to species, and because sampling effort was probably not focused on the areas near the estero mouths where the most diverse assemblages occur. As was the case with swimming invertebrates, the 1977 list attributed most of the species to Estero de San Antonio, with only a few indicated as also occurring in Estero Americano. This is almost certainly a reflection of the sampling effort being mostly focused on Estero de San Antonio in the earlier report.

## 2.5 Fish

#### 2.5.1 Methods

Fish were collected in the esteros by otter trawl (8 ft. wide opening, <sup>1</sup>/<sub>4</sub> in. mesh bag) and gillnet (variable mesh, <sup>3</sup>/<sub>4</sub>-5 in., stretched). The trawl was slowly dragged once at each

station, parallel to the channel, usually for 4 minutes in Estero Americano (except station E-5, 2 min.), and 2 minutes at Estero de San Antonio stations (a longer interval would cause the bag to become clogged with mud). The otter trawl is effective at capturing bottom-dwelling, slow-moving fishes, as well as epibenthic invertebrates such as crabs, shrimp, and mysids. The gillnets were used to capture more active, faster-moving, benthic and mid-water fishes which would avoid the trawls. Crabs were also routinely captured in the gillnets. Gillnets were set overnight at each station, parallel to the main channel and direction of tidal current. Fish were sampled on 21 occasions from 1988 through 1990 in Estero de San Antonio (Table 2).

#### 2.5.2 Results

Detailed results of the fish sampling conducted through October 1989 were presented in Technical Memoranda No. E5 and E8. Results from November 1989 through September 1990 are presented here, except in the cases of species lists, and bar-open vs. bar-closed comparisons in Estero de San Antonio, where data from all years (1988 - 1990) are combined.

#### 2.5.2-1 Estero Americano

A total of 46 fish species representing 22 families were collected during the entire sampling period in Estero Americano (Table 7). Many of the species listed in Table 7 are typically marine species that may wander into the mouths of estuaries at high tide to feed (e.g., cabezon, ling cod, buffalo sculpin, opaleye), and were mainly captured at the marinelike lower stations E-1, E-2, or E-3 (sampling effort and catch results are summarized in Appendices F1-F6; complete data for every trawl and gillnet set are provided in Appendices F7 and F8). Others species found in Estero Americano are either typically estuarine dwellers throughout their lives (e.g., shiner surfperch, tidewater goby, longjaw mudsucker), species that are common in both marine and estuarine areas (e.g., leopard shark, starry flounder, English sole), or species that either spawn in estuaries (topsmelt, jacksmelt, Pacific herring) or whose larvae or juveniles move into estuaries to spend the early part of their lives (plainfin midshipman). Only two anadromous fishes (striped bass and steelhead trout) are listed in Table 7. The striped bass are occasional visitors feeding in the Estero, but unlikely to spawn there, because the whole system is much too small for their reproductive strategy. The two steelhead adults captured in the Estero were probably strays from other watersheds (one was definitely a hatchery-reared fish--see Technical Memorandum No. E8), as there is essentially no salmonid spawning habitat remaining in the Estero Americano watershed (Aquatic Habitat Survey Results Technical Memorandum, MSC 1996). Both steelhead trout and coho salmon are thought to have had spawning runs in the Americano watershed historically (DFG 1977, CSCC 1987, Buell 1988).

# Table 7.

Family	Scientific Name	Common Name
Atherinidae	Atherinops affinis	Topsmelt
	Atherinopsis californiensis	Jacksmelt
Batrachoididae	Porichthys notatus	Plainfin midshipman
Bothidae	Citharichthys sordidus	Pacific sanddab
	Citharichthys stigmaeus	Speckled sanddab
Carcharhinidae	Triakis semifasciata	Leopard shark
Clinidaey	Gobbonsia montereyensis	Crevice kelpfish
Clupeidae	Clupea harengus	Pacific herring
Cottidae	Leptocottus armatus	Staghorn sculpin
	Oligocottus maculosus	Tidepool sculpin
	Cottus asper	Prickly sculpin
	Enophrys biso	Buffalo sculpin
	Scorpaenichthys marmoratus	Cabezon
	Unidentified sculpin	
Embiotocidae	Phanerodon furcatus	White Surfperch
	Damalichythys vacca	Pile surfperch
	Brachyistius frenatus	Kelp surfperch
	Amphistichus argenteus	Barred surfperch
	Cymatogaster aggregata	Shiner surfperch
	Micrometrus minimus	Dwarf surfperch
	Embiotoca jacksoni	Black surfperch
Engraulididae	Engraulis mordax	Northern anchovy
Gadidae	Microgadus proximus	Pacific tomcod
Gasterosteidae	Aulorhynchus flavidus	Tubesnout
	Gasterosteus aculeatus	Threespine stickleback
Gobiidae	Clevelandia ios	Arrow goby
	Eucyclogobius newberryi	Tidewater goby
	Gillichthys mirabilis	Longjaw mudsucker
	Ilypnus gilberti	Cheekspot goby
	Goby larvae	
Hexagrammidae	Hexagrammos decagrammus	Kelp greenling

## Fish Species Caught in Estero Americano, 1988 - 1990

## Table 7.

Fish Snecies	Caught in	Estero Americano,	1988 - 1990
TISH Species	Caugin in	LSIELO AITIELICATIO,	1700 - 1770

Family	Scientific Name	Common Name
	Ophiodon elongatus	Lingcod
	Unidentified greenling	
Kyphosidae	Girella nigricans	Opaleye
Osmeridae	Hypomesus pretiosus	Surf smelt
	Spirinchus thaleichthys	Longfin smelt
	Unidentified smelt	
Percichthyidae	Morone saxatilis	Striped bass
Pholididae	Apodichthys flavidus	Penpoint gunnel
Pleuronectidae	Hypsopsetta guttulata	Diamond turbot
	Parophrys vetulus	English sole
	Platichthys stellatus	Starry flounder
	Psettichthys melanostictus	Sand sole
	Unidentified larval flatfish	
Salmonidae	Onchorhynchus mykiss	Steelhead trout
Scorpaenidae	Sebastes jordani	Shortbelly rockfish
	Sebastes sp.	Juvenile rockfish A
	Sebastes sp.	Juvenile rockfish B
	Sebastes sp.	"Black" juvenile rockfish
	Unidentified juvenile rockfish	
Squalidae	Squalus acanthias	Spiny dogfish
Syngnathidae	Syngnathus leptorhynchus	Bay pipefish

Seasonal variations in trawl and gillnet catches are shown in Figures F1 and F2, and parallel the results obtained in 1988-1989 (Technical Memorandum No. E8): fish numbers were low in the winter months, increasing in spring and summer. The high values shown in trawl catches for July and September 1990 samples are mainly due to an influx of fingerling plainfin midshipman (Appendices F3 and F4), which was also observed in the late summer samples in 1989. After plainfin midshipman, the species most commonly caught in trawls (Appendix F3) were staghorn sculpin, arrow goby, shiner surfperch, topsmelt, northern anchovy, and threespine stickleback, all of which are common estuarine species in this region. Gillnet catches (Appendix F5) were dominated by topsmelt (54 percent of total), followed by jacksmelt, shiner surfperch, staghorn sculpin, Pacific herring, and surfsmelt.

#### 2.5.2-2 Estero de San Antonio

In Estero de San Antonio, thirteen fish species were captured by trawl and gillnet (Table 8). Twelve of the thirteen species were also captured in Estero Americano--Bay goby was the only species caught only in Estero de San Antonio. The sampling effort is shown in Appendices F9 and F10, for trawls and gillnets, respectively. Total catch by each method is presented in Appendices F11- F14, and is displayed in Figures F3 and F4. Complete data for each trawl and gillnet set are provided in Appendices F15 and F16. The selectiveness of the two sampling methods for different fish species can be readily seen by comparing Appendix F11 (otter trawls) with Appendix F13 (gillnets). The results show that threespine stickleback and tidewater goby were relatively abundant at stations S-2 and S-4 and very abundant at S-6, but were not vulnerable to capture by gillnet (adults of both of these species are quite small, less than about 2 inches total length, and pass through the smallest mesh on the gillnets). Staghorn sculpin were common throughout the estuary and were vulnerable to capture by both methods; their sluggishness and demersal lifestyle makes them vulnerable to trawls, and their prominent barbed spines are easily entangled by gillnets. On the other hand, Pacific herring, topsmelt, and striped bass are all good swimmers that usually avoid trawls, but are readily captured in gillnets. Most of the Pacific herring were spawning adults captured at S-2 in March (Appendices F13-F14, Figure F4). The high value shown for March in Figure F4 is mainly due to these herring, which spawn in late winter in estuaries and shallow coastal areas.

Tidewater goby, a federally endangered species, was abundant in Estero de San Antonio, particularly at the uppermost station, S-6. Minimizing incidental mortality to this species was a major part of the reason for reducing the trawl interval from 4 to 2 minutes in this Estero--at times, hundreds were captured in a single trawl, forcing the team to hurriedly sort and release them to avoid injury or suffocation. The trawls at station S-6 invariably collected massive quantities of manure along with the gobies. The large numbers of tidewater gobies in the presence of the manure is in contrast to reports that the species is sensitive to "nutrient enrichment from agricultural and sewage effluents" and requires "clean, coarse sand" for breeding (Swift et al. 1989).

# Table 8.

Family	Scientific Name	Common Name
Atherinidae	Atherinops affinis	Topsmelt
Clupeidae	Clupea harengus	Pacific Herring
Cottidae	Leptocottus armatus	Staghorn sculpin
	Cottus asper	Prickly sculpin
Gasterosteidae	Gasterosteus aculeatus	Threespine stickleback
Gobiidae	Lepidogobius lepidus	Bay goby
	Clevelandia ios	Arrow goby
	Ilypnus gilberti	Cheekspot goby
	Eucyclogobius newberryi	Tidewater goby
Percichthyidae	Morone saxatilis	Striped bass
Pleuronectidae	Parophyrys vetulus	English sole
	Platichthys stellatus	Starry flounder
Syngnathidae	Sygnathus leptorhynchus	Bay pipefish

Fish Species Caught In de Esstero de San Antonio 1989-90

#### 2.5.2-3 Comparison of Esteros

The list of fish species captured in Estero de San Antonio (Table 8) is much shorter than the list for Estero Americano (Table 7), so a few explanatory remarks may be in order. First, all of the species captured in Estero de San Antonio are generally regarded as typically estuarine species, although some may be equally abundant in nearshore coastal waters (e.g., English sole), or may spend much of their adult life at sea (striped bass). All of these same species except Bay goby were also collected in Estero Americano, as were many of the invertebrates (discussed in previous sections, above), which suggests that the two estuaries are basically similar, at least in the functional, ecosystem sense. The longer species list for Estero Americano is probably a result of a combination of three factors:

- the "species-area relationship";
- types of habitat sampled; and
- sampling effort/frequency.

The "species-area relationship" (Macarthur 1972) is an well-known concept in ecology which says that, as the size of an area increases (e.g., one island compared to another), so does the number of species living within that area. A corollary to this concept is that as the size of the area *sampled* increases, so does the number of species collected. Estero

Americano is considerably larger than Estero de San Antonio (approximately 300 acres open water and 400 acres wetlands vs. 90 acres open water and 200 acres wetlands, respectively--DFG, 1977). Thus, on that basis alone, Estero Americano would be expected to harbor more aquatic species than Estero de San Antonio.

The types of habitat sampled in the two esteros differed significantly--the primarily marine portion of Estero Americano represented by stations E-1, E-2, and to some extent, E-3, had no equivalent in the sampling program conducted in Estero de San Antonio. The marine area near the mouth of Estero de San Antonio is very small relative to the equivalent portion of Estero Americano, and is also very shallow, with swift tidal currents, making boating impossible most of the time, and ruling out use of either trawls or gillnets. Approximately two thirds of the fish species listed in Table 7 for Estero Americano are regarded as marine species, and most of those were captured at stations E-1 and E-2 (Appendices F7- F8, and Technical Memorandum No. E8).

Finally, the sampling effort was greater in Estero Americano than in Estero de San Antonio, in terms of time (21 occasions over 2½ years vs. 9 occasions over 15 months), number of stations sampled (5 in Americano vs. 3 in de San Antonio), and duration of trawls (4 minutes in Americano vs. 2 in de San Antonio, on average, which means twice as much area sampled), all of which lead to the expectation that more species would be found in Estero Americano than in Estero de San Antonio.

The sampling on 7-8 February 1990 was conducted immediately after a rainstorm, and both esteros were experiencing a large influx of freshwater combined with runoff containing manure. The observable effects on the biota in the two esteros were quite different. Estero Americano was open at its mouth, and being unstratified, fresh water totally displaced salt water at upper stations. Trawl samples at stations E-4 and E-5 had a foul odor and contained many recently killed mysids, Dungeness crabs, and shore crabs (*Hemigrapsus*), and the few live specimens were moribund. Very few fish were collected. In contrast, the mouth of Estero de San Antonio was closed at this time, and stratification persisted within the estero. The water level at S-2 was approximately 8 to 10 feet higher than normal. No fish were caught in gillnets (sampling mainly the freshwater layer), but a few gobies, sticklebacks, and sculpins were collected in trawls (Appendices F12, F15). This suggests that the lower, saline layer provided a refuge from the lethal effects of freshwater on this date.

Although Estero de San Antonio was sampled over only a 15-month period, the trends in seasonal catch variation appear similar to those in Estero Americano; greater catches in spring and summer, lower numbers in fall and winter (Figures F3 and F4).

Possible reasons for the disparity in the density of tidewater goby in the two esteros are discussed in some detail in Technical Memoranda No. E5 and E8. The likely reason for the low abundance of tidewater goby in Estero Americano relative to Estero de San Antonio is poor water quality conditions (mainly lack of summer freshwater input and resulting spates of hypersalinity in the upper Estero) and/or habitat conditions in Estero Americano (C. Swift, Los Angeles Natural History Museumpers. comm. to Michael Fawcett, MSC).

#### 2.5.2-4 Bar-open vs. Bar-closed Conditions

Figures F5 and F6 show trawl data plotted so as to distinguish total catches and number of species caught during bar-open and bar-closed periods in Estero de San Antonio, and include the July and September 1990 catches (reported in Technical Memorandum No. E8). No obvious trends related to bar condition are apparent. However, the bar-closed condition during summer and fall 1990 may have prevented an influx of juvenile plainfin midshipman during that period, when large numbers were moving into Estero Americano (Appendices F4, F5, F7). These midshipman fingerlings probably provide a large boost of food to the Esteros' foodweb during their summer invasions.

# **3.0 CONCLUSIONS**

The two esteros show many biological similarities, but they differ physically. Each consists of a downstream estuary-like section with eelgrass beds, and a narrow upper section with riverine properties. The downstream section in Estero Americano is much larger, and provides far more habitat for marine species when the bar is open. In contrast, the downstream section in Estero de San Antonio is very small, and most of the estero (including all of the part sampled regularly in 1989-1990) is narrow and riverine.

Both esteros were allowed to open and close "naturally" in the 1970's, and data gathered then indicate few differences in the biology of the systems between that time and the 1988-1990 period. During the later period, Estero Americano was artificially kept open, and biological sampling made near the mouth showed greater faunal diversity in the marine-influenced sections. Keeping the bar open also increases the likelihood of the occurrence of hypersaline conditions in the upper part of the tidal system. Estero de San Antonio was not kept open during this period. The stations sampled there did not differ much biologically between bar-open and bar-closed dates, but areas near the mouth (where tidal exchange would occur) were not sampled.

The current management of the Gulf of the Farallones National Marine Sanctuary is not to issue any permits to keep the bar open artificially. Therefore, the bar is likely to be closed during some times in the future. The data at hand provide an indication of the distribution of biota in Estero Americano when the bar is closed. Observations made in 1989-1990 in Estero de San Antonio would suggest that the upper riverine parts of Estero Americano will be less saline but probably not be much different biologically, since the dominant species in the upper parts are euryhaline. When the Estero Americano bar is closed, biota in the lower Estero Americano during bar-closed conditions will probably be related both to lowered salinity and lack of recruitment from coastal populations. Both of these factors can be expected to reduce, at least temporarily, the diversity of the biota there.

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## **5.0 APPENDICES**

## WATER QUALITY FIGURES

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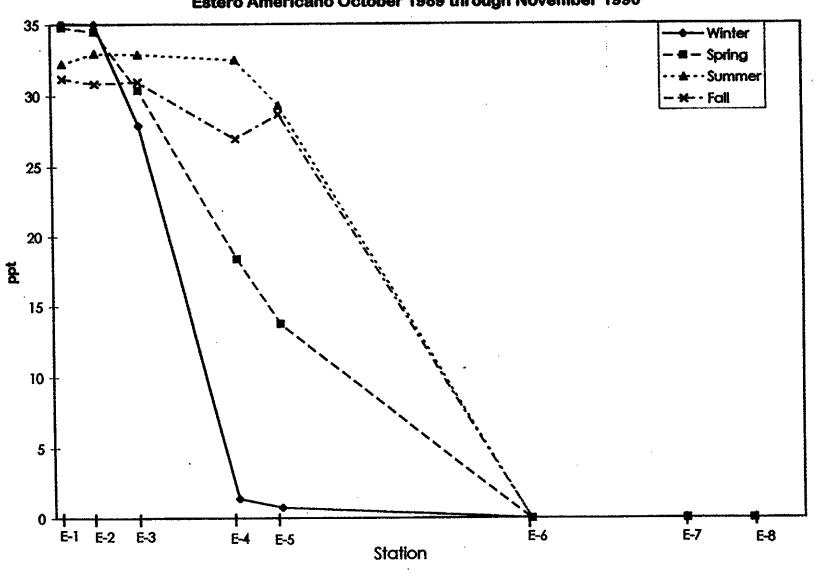
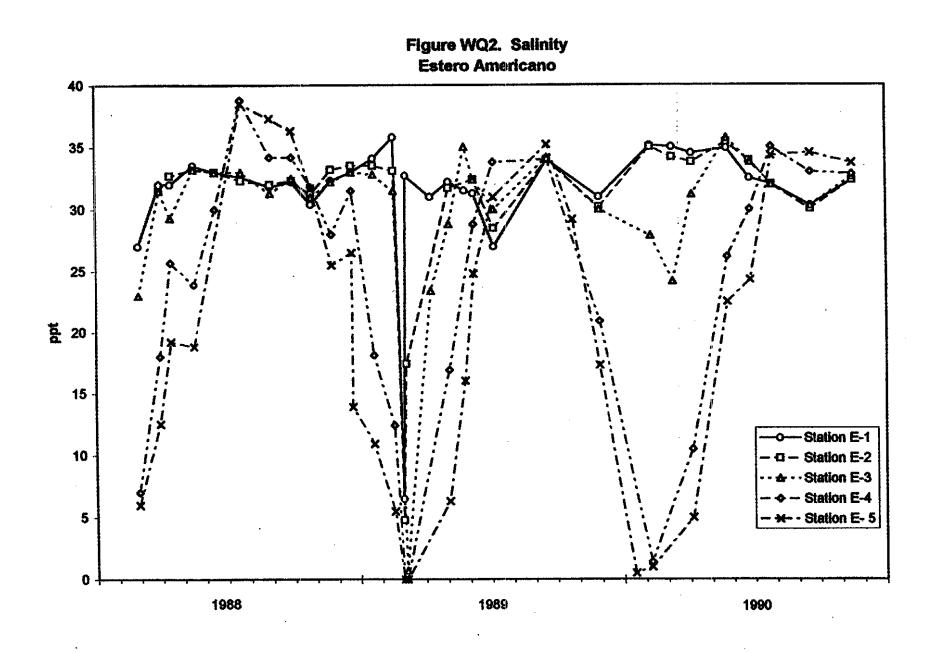


Figure WQ1. Seasonal Average Salinity Estero Americano October 1989 through November 1990 n California a california de la california

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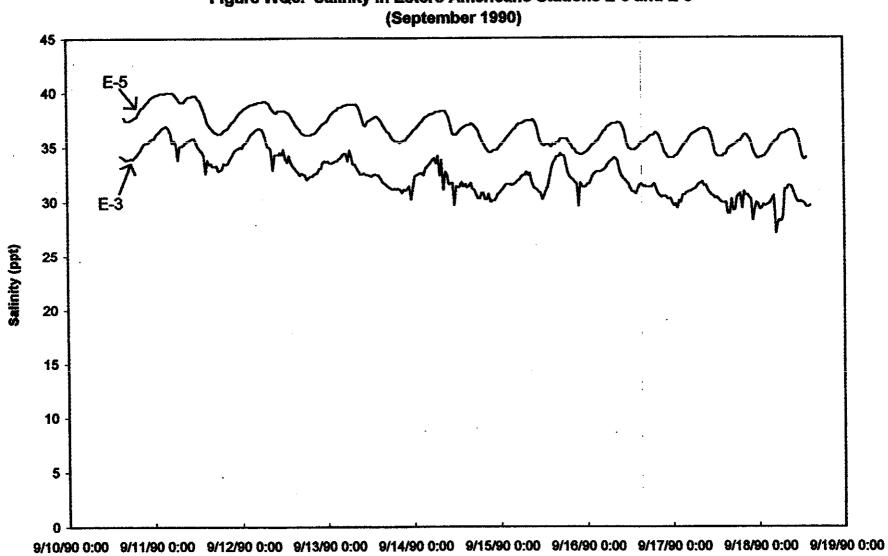
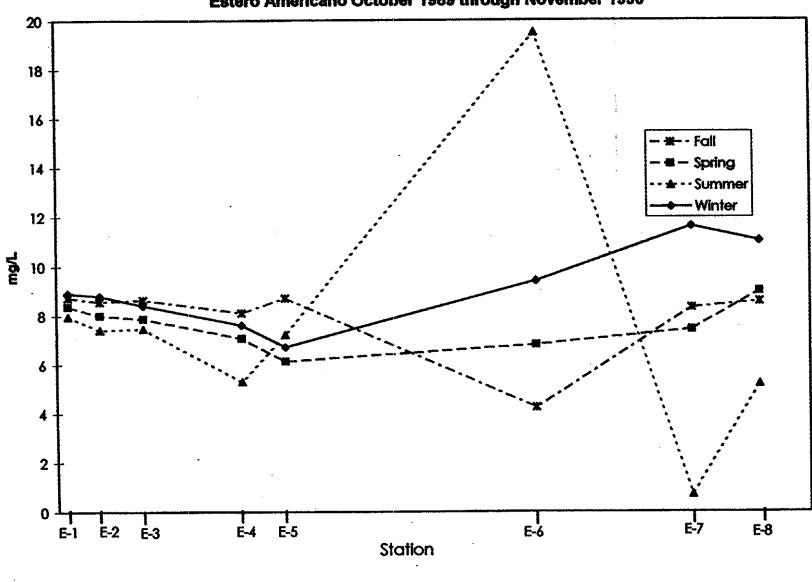


Figure WQ3. Salinity in Estero Americano Stations E-3 and E-5

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#### Figure WQ4. Seasonal Average Dissolved Oxygen Estero Americano October 1989 through November 1990

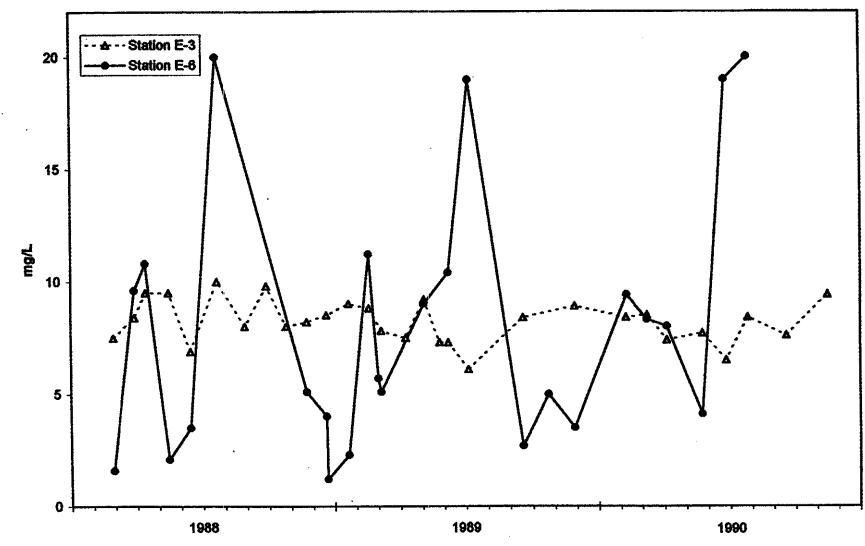
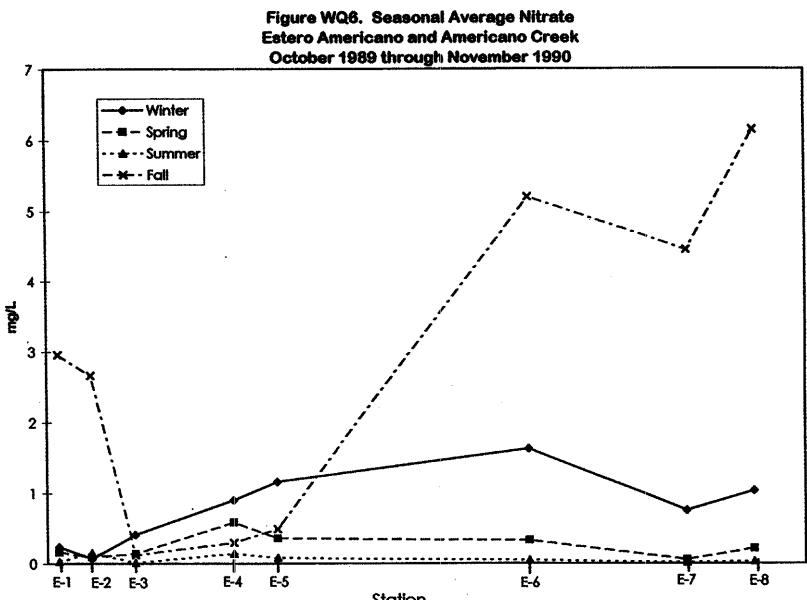


Figure WQ5. Dissolved Oxygen Estero Americano (Station E-3) versus Americano Creek (Station E-6)

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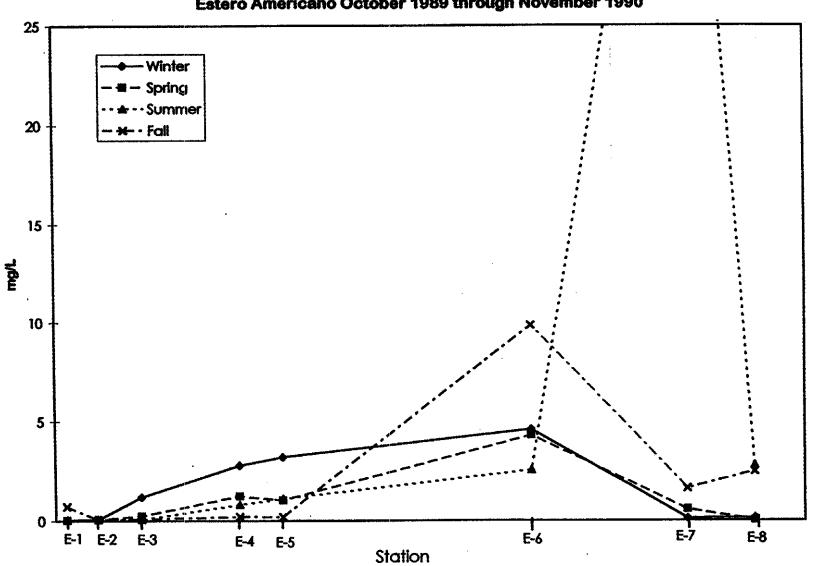


Figure WQ7. Seasonal Average Ammonia Estero Americano October 1989 through November 1990

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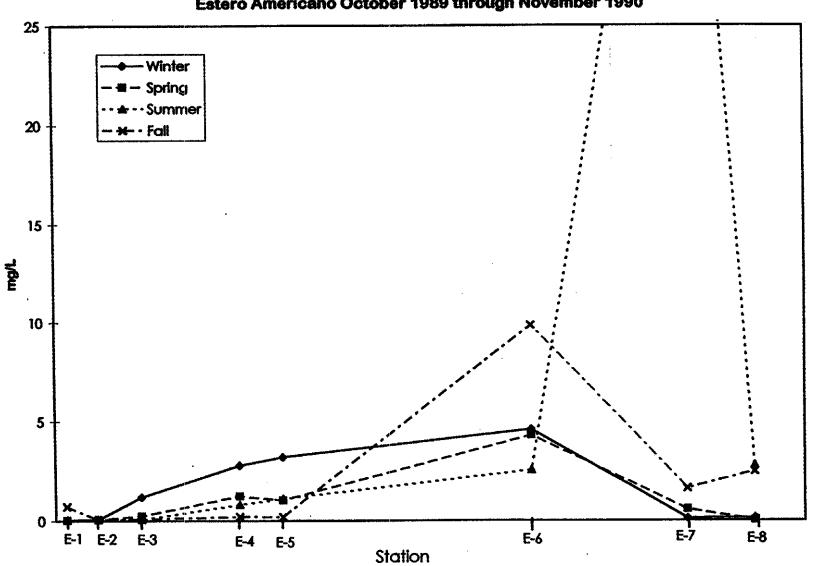
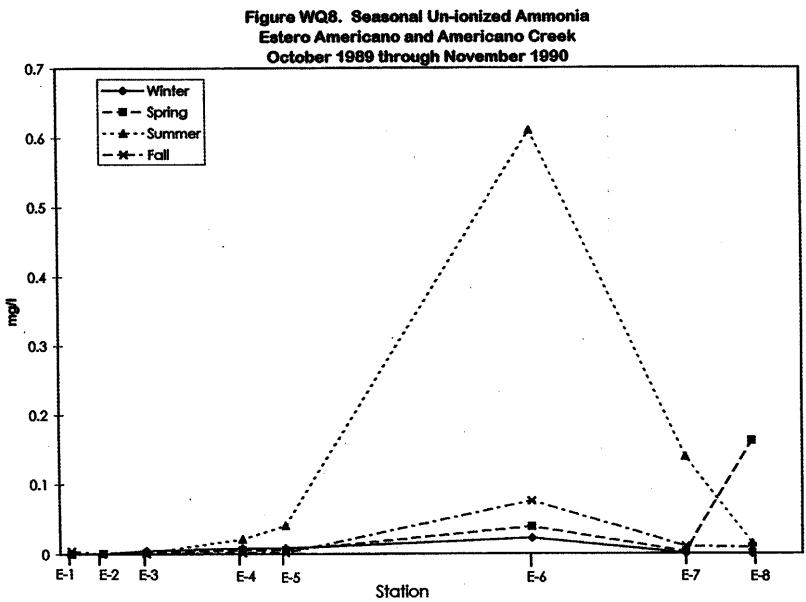
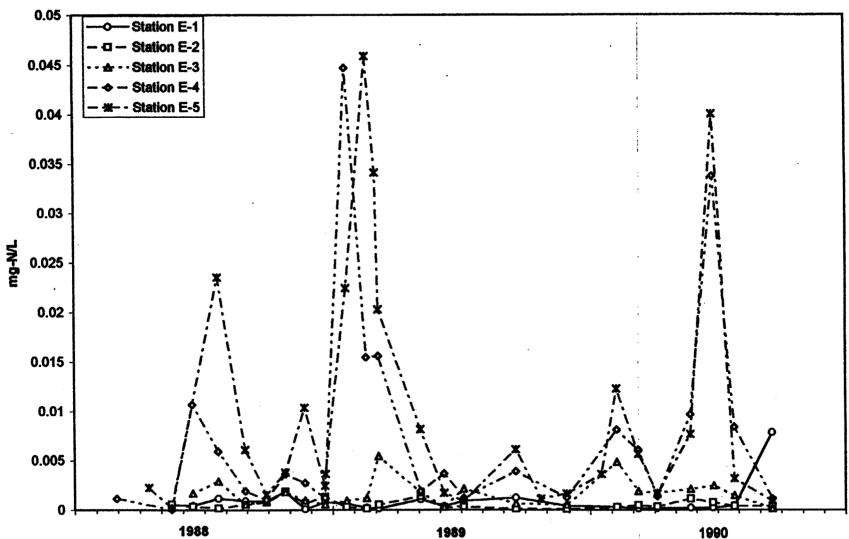


Figure WQ7. Seasonal Average Ammonia Estero Americano October 1989 through November 1990

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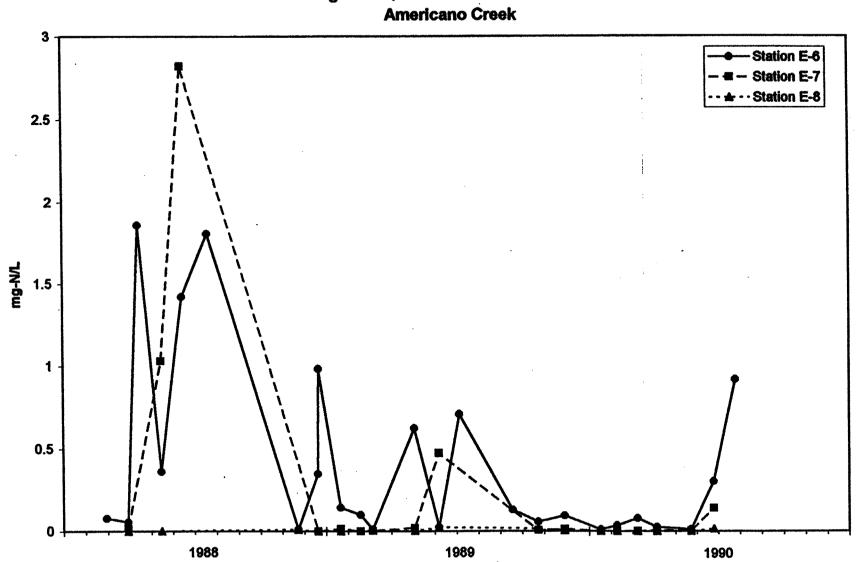


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#### Figure WQ9. Un-ionized Ammonia Estero Americano

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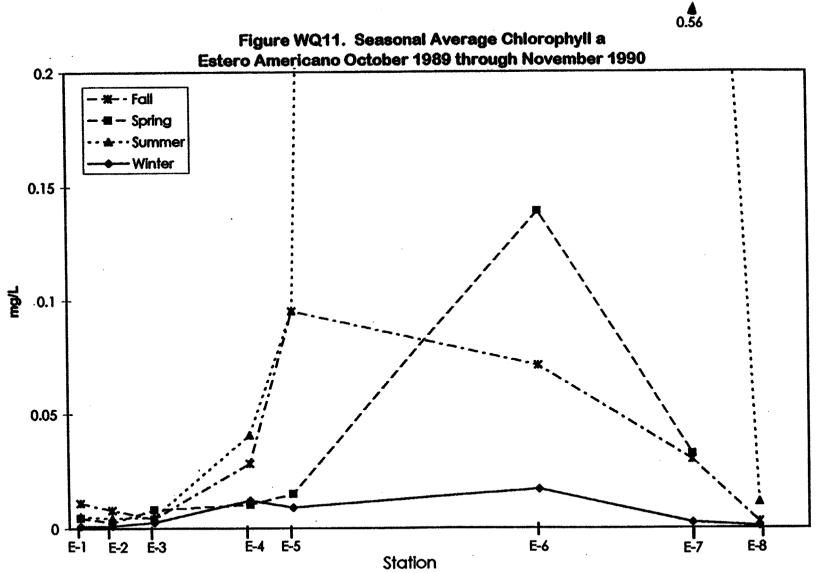
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# Figure WQ10. Un-ionized Ammonia Americano Creek

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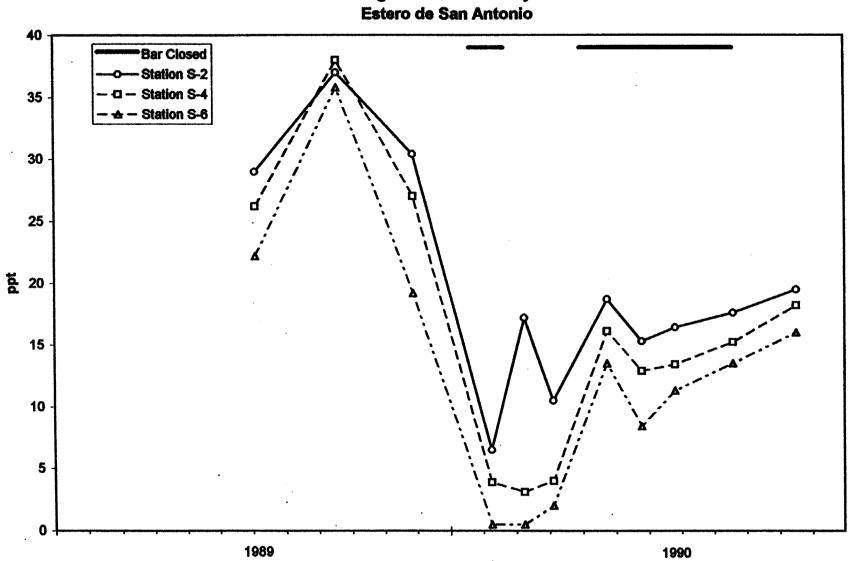
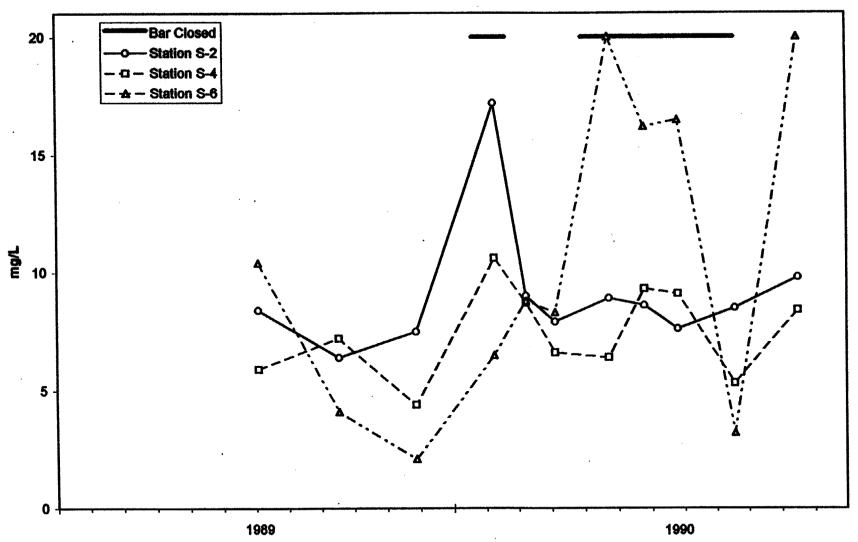


Figure WQ12. Salinity

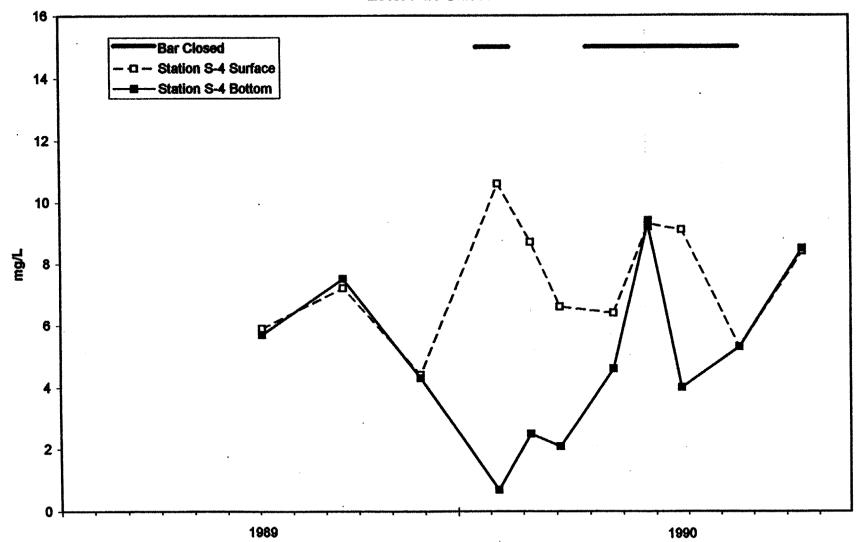
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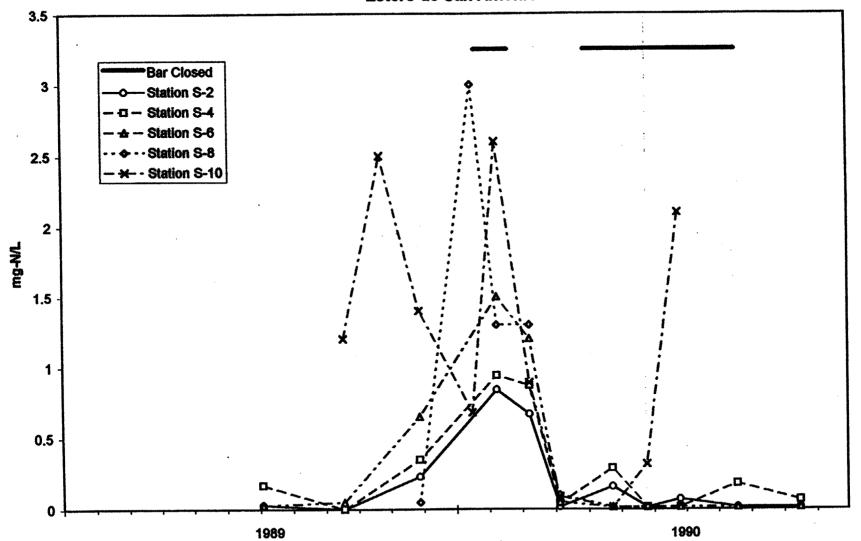


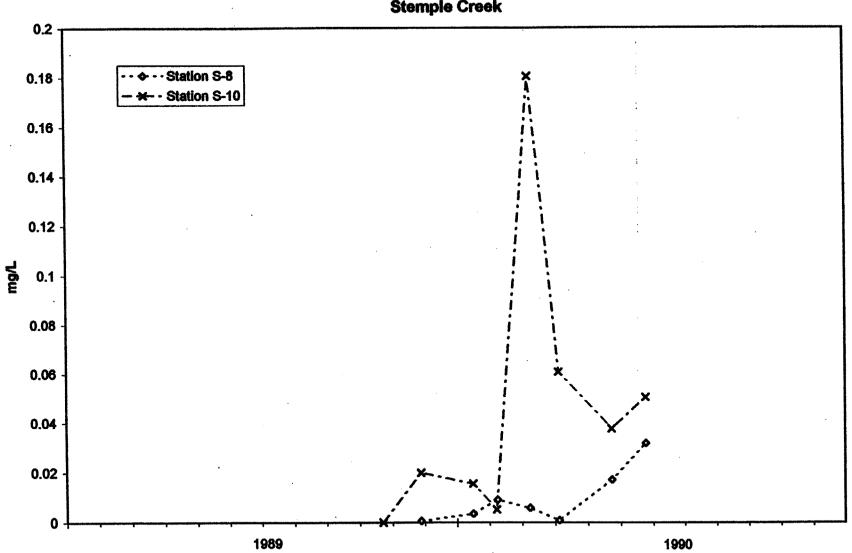


#### Figure WQ14. Dissolved Oxygen Estero de San Antonio





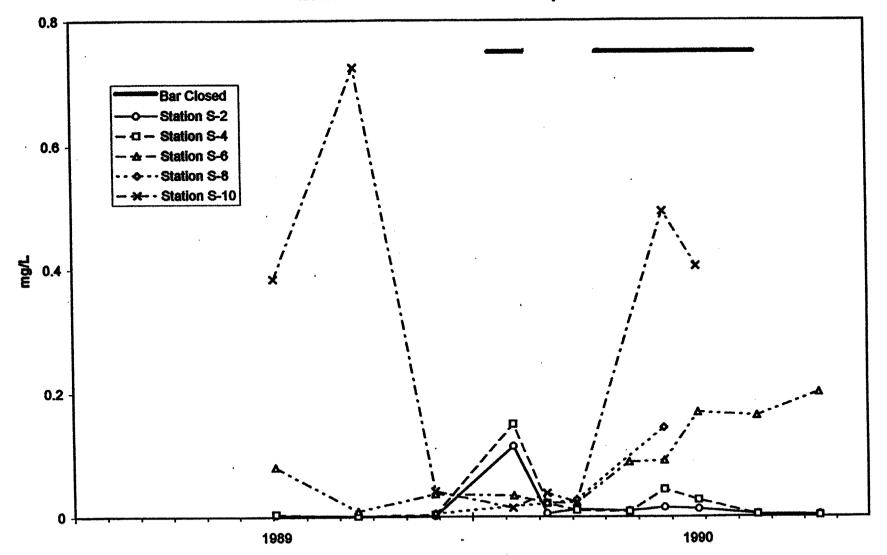




#### Figure WQ16. Un-ionized Ammonia Stemple Creek



Figure WQ17. Chlorophyll *a* Estero de San Antonio and Stemple Creek



## **ZOOPLANKTON AND FISH LARVAE FIGURES**

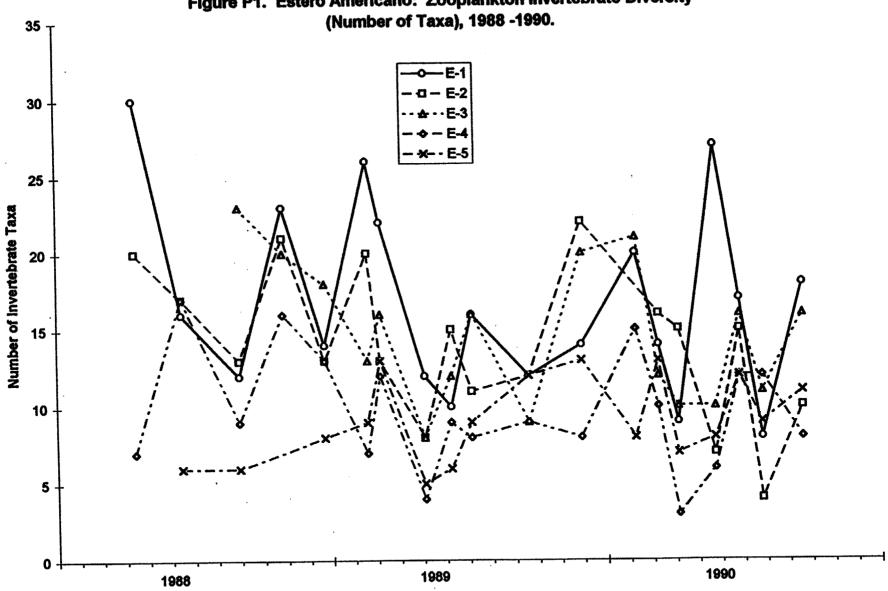


Figure P1. Estero Americano: Zooplankton Invertebrate Diversity

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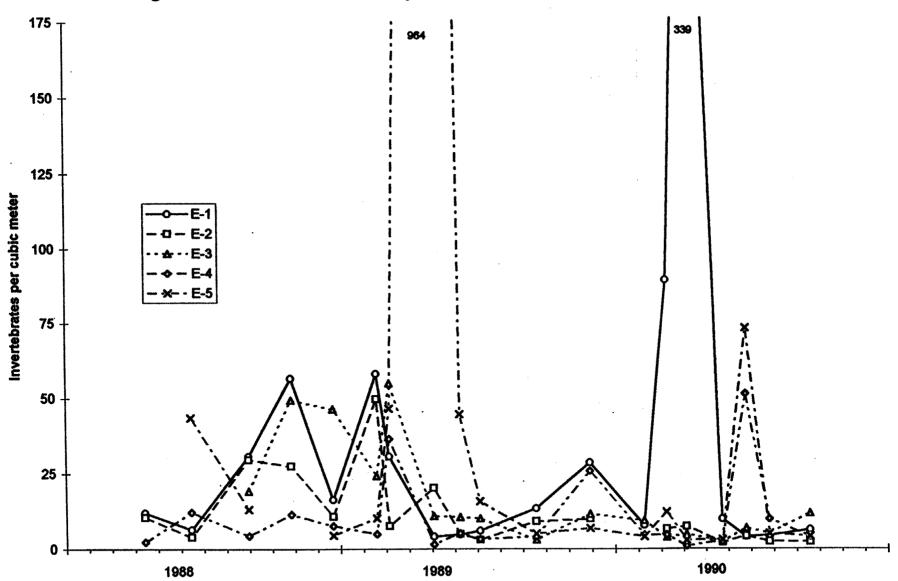


Figure P2. Estero Americano: Zooplankton Invertebrate Abundance, 1988 -1990.

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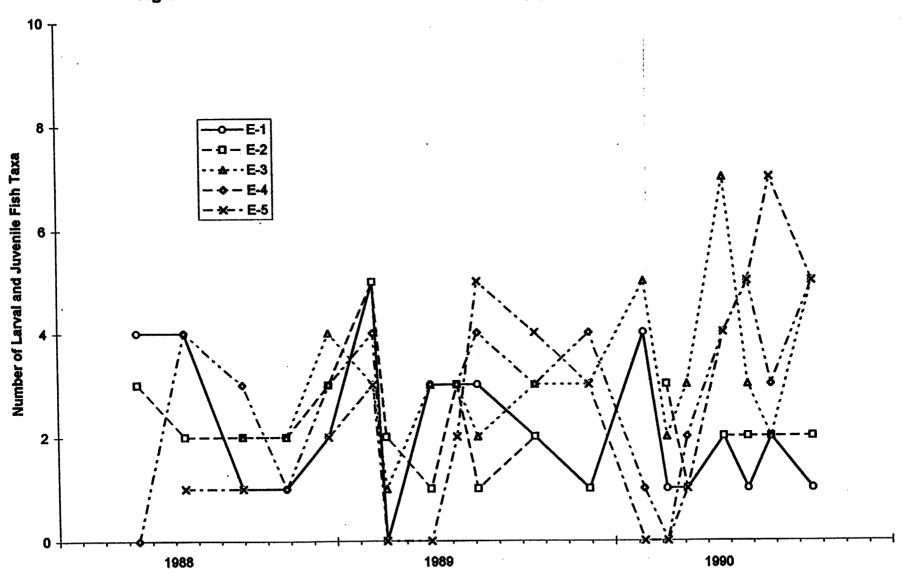


Figure P3. Estero Americano: Larval Fish Diversity (Number of Taxa), 1988 -1990.

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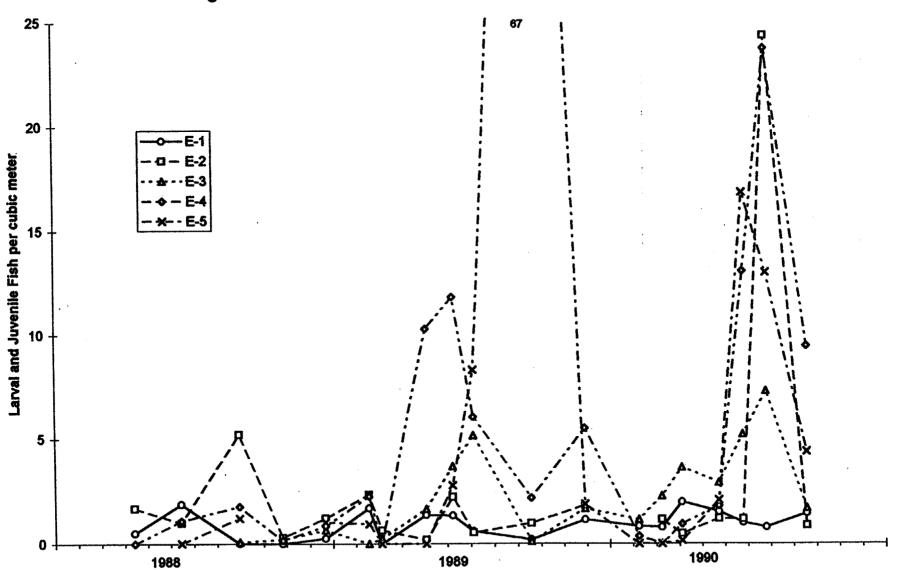
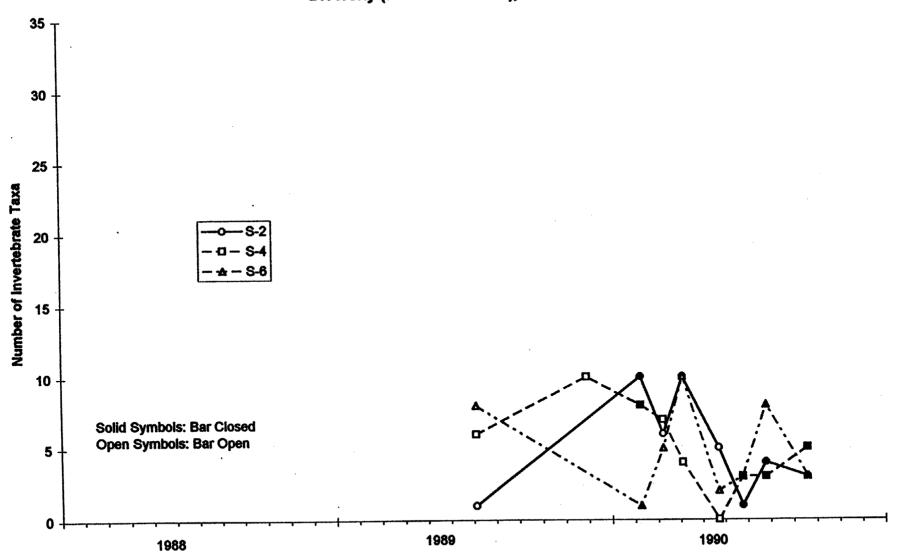


Figure P4. Estero Americano: Larval Fish Abundance, 1988 -1990.

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### Figure P5. Estero de San Antonio: Zooplankton Invertebrate Diversity (Number of Taxa), 1988 -1990.

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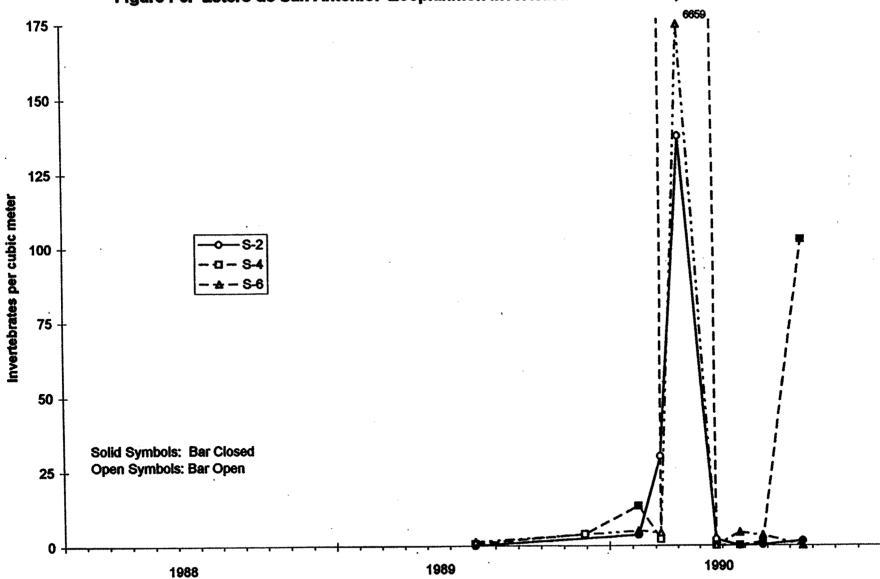


Figure P6. Estero de San Antonio: Zooplankton Invertebrate Abundance, 1989 -1990

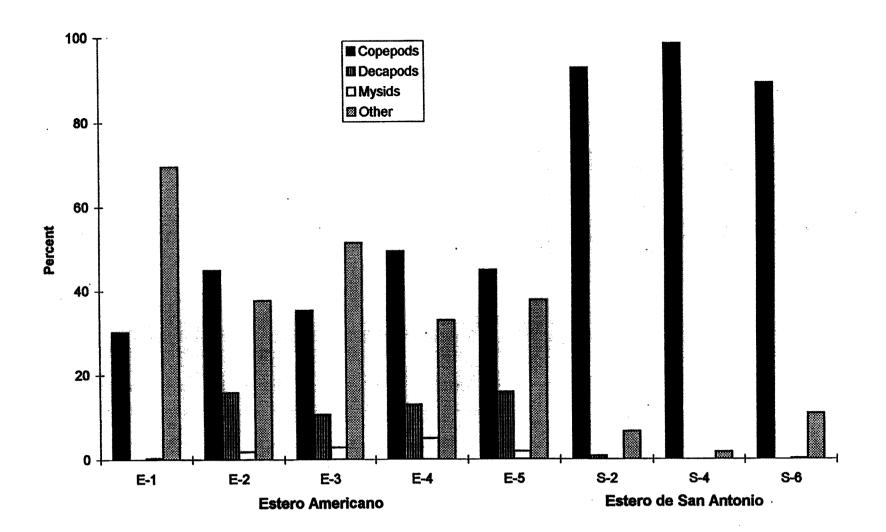
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Figure P7. Composition of Estero Zooplankton.

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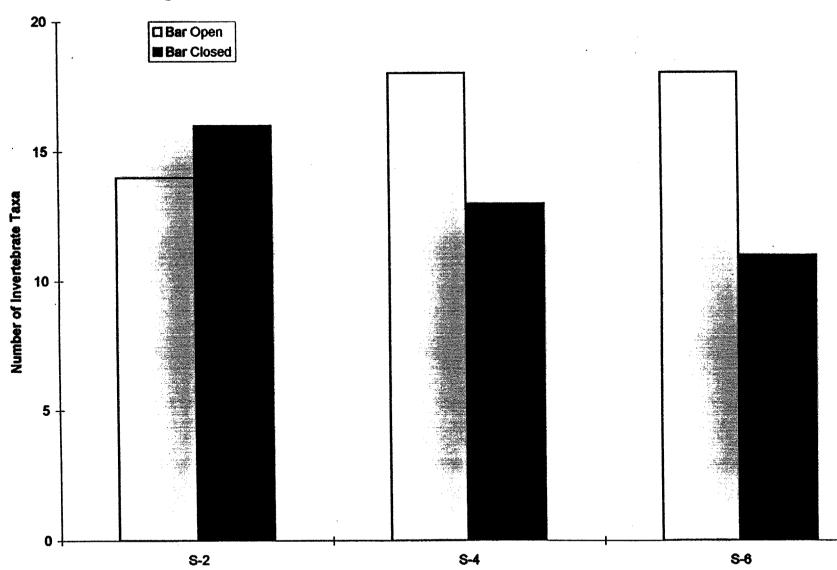


Figure P8. Estero de San Antonio: Bar Closure versus Zooplankton Diversity.

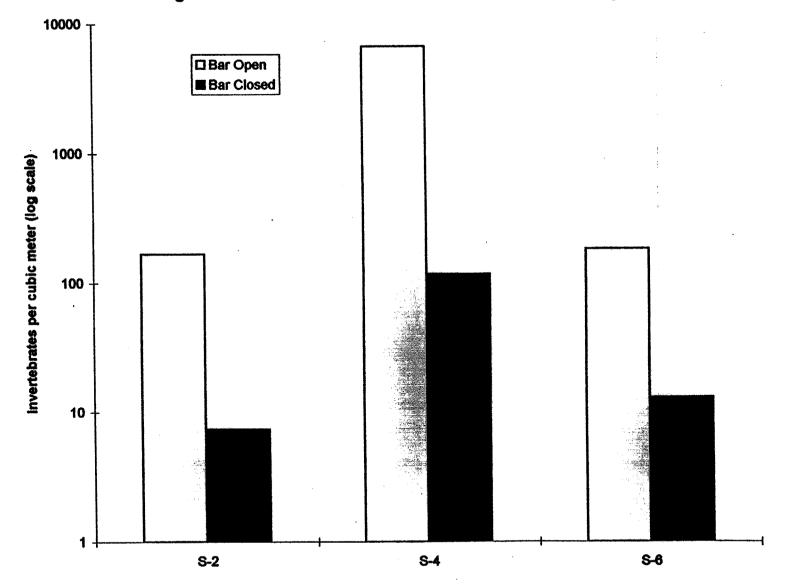


Figure P9. Estero de San Antonio: Bar Closure versus Zooplankton Abundance.

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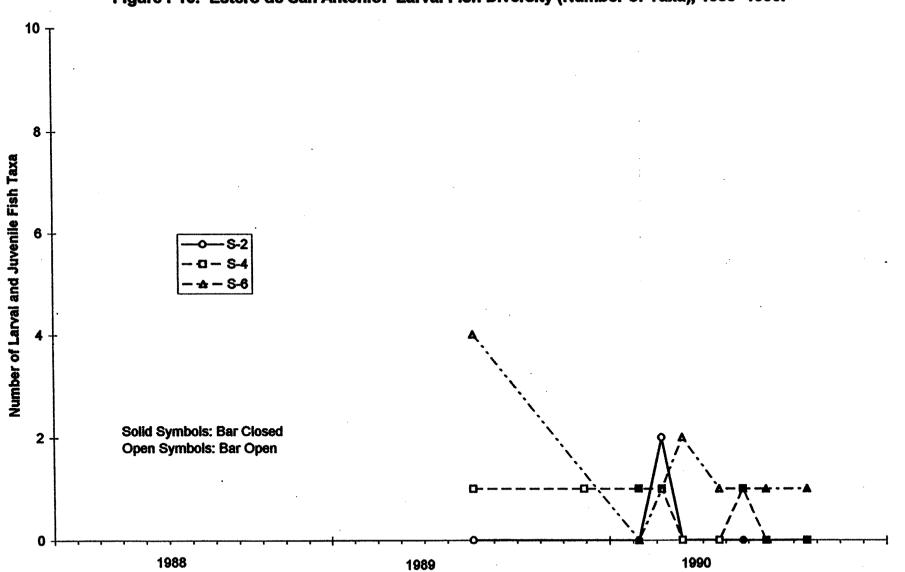
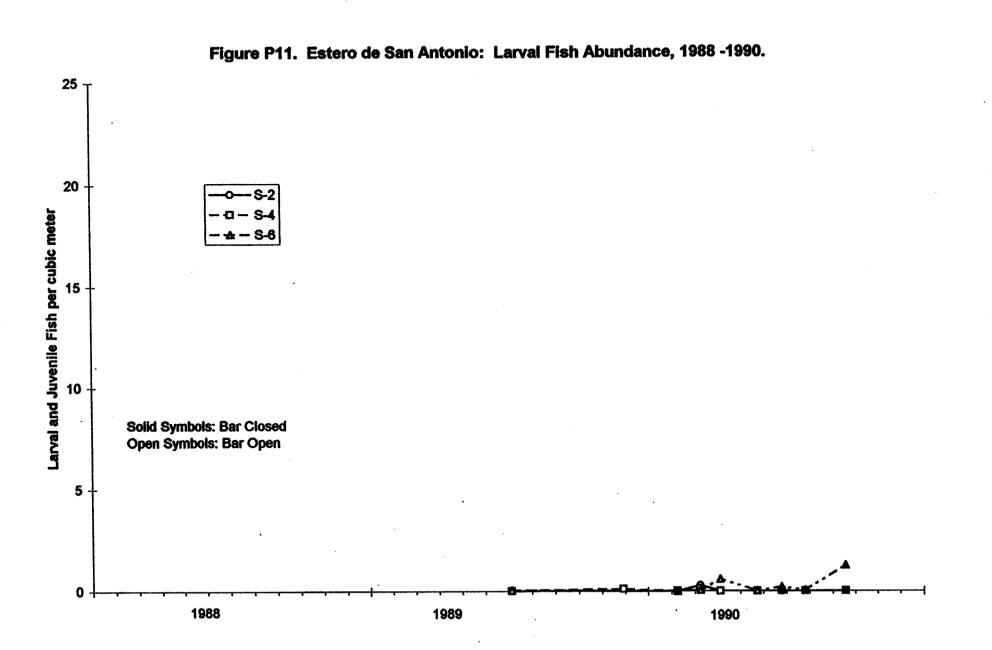


Figure P10. Estero de San Antonio: Larval Fish Diversity (Number of Taxa), 1988 -1990.

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## NEKTON/EPIBENTHIC INVERTEBRATE FIGURES

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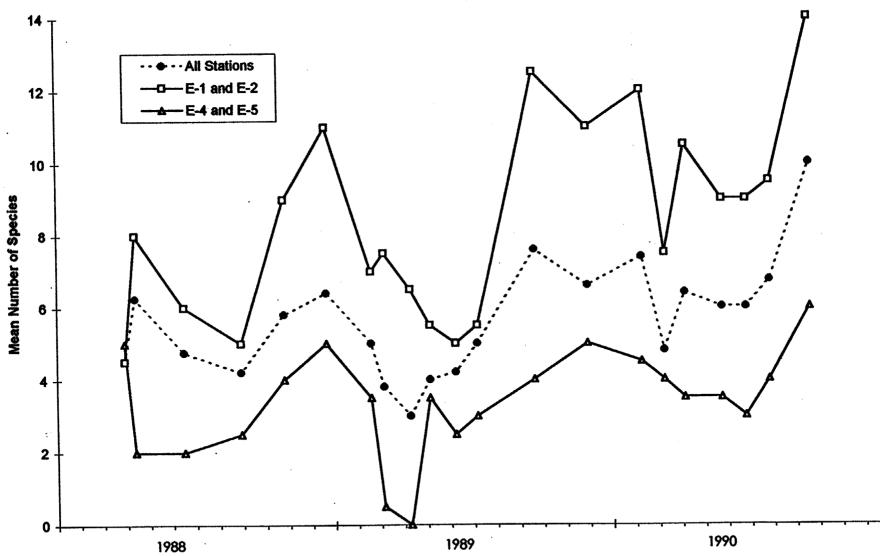
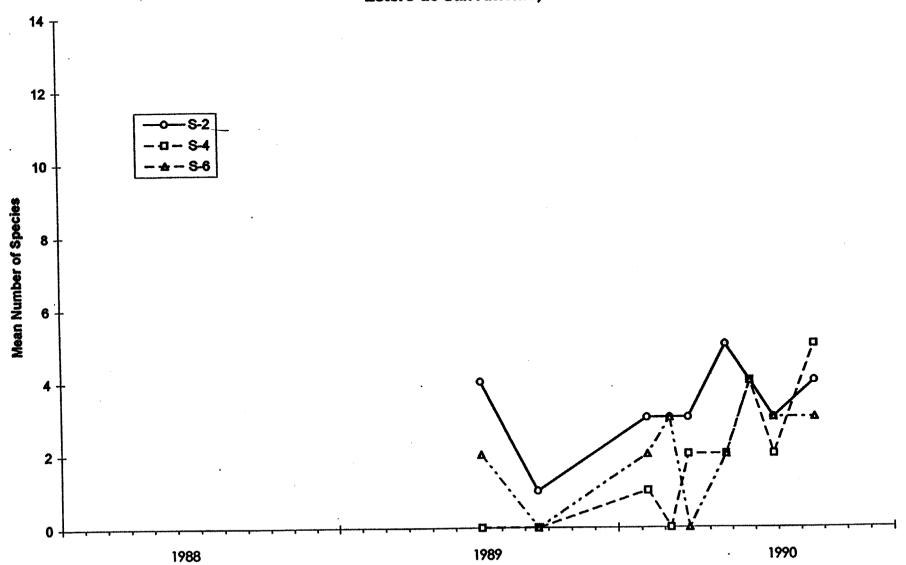


Figure E1. Mean Number of Species of Epibenthic Invertebrates Collected in Otter Trawls in Estero Americano, 1988-1990.

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## **BENTHIC INVERTEBRATE FIGURES**

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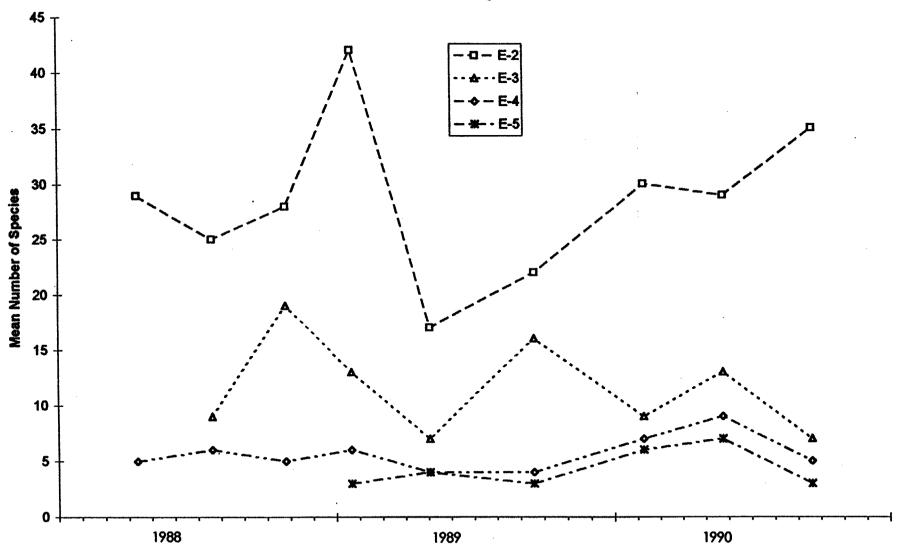
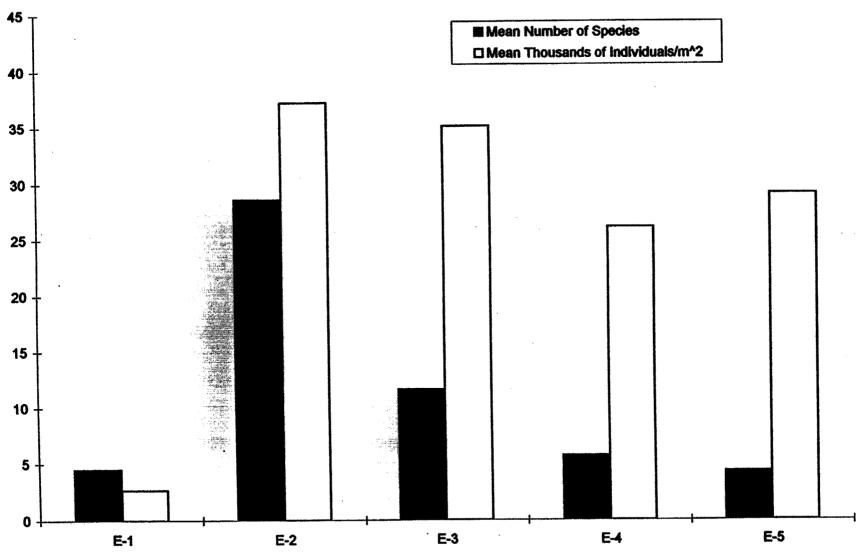


Figure B1. Estero Americano Benthic Invertebrates: Mean Number of Species.



## Figure B2. Estero Americano Benthic Invertebrates: Mean Number of Species and Mean Number per Square Meter.

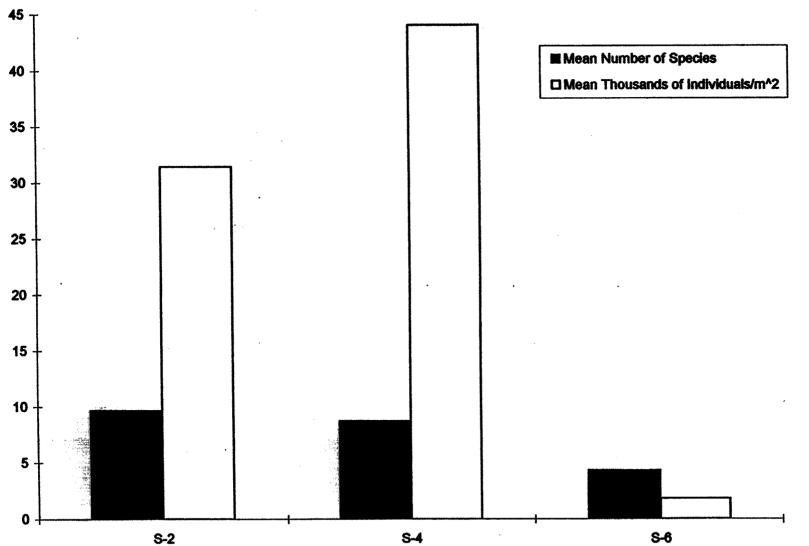


Figure B3. Estero de San Antonio Benthic Invertebrates: Mean Number of Species and Mean Number per Square Meter.

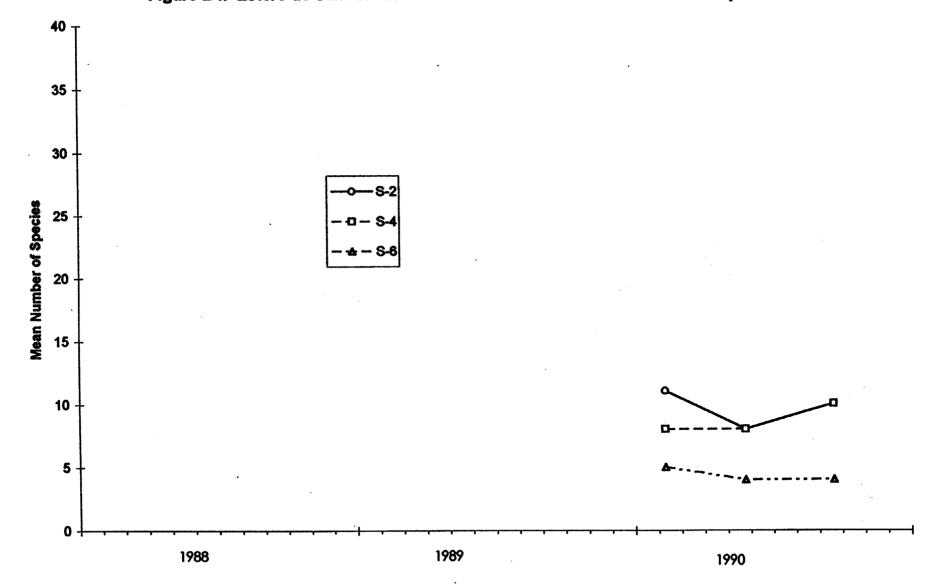


Figure B4. Estero de San Antonio Benthic Invertebrates: Mean Number of Species.

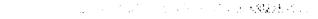
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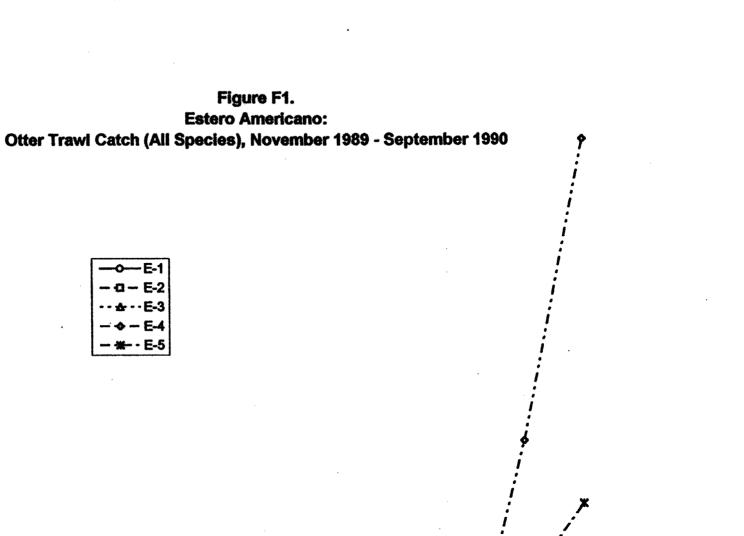
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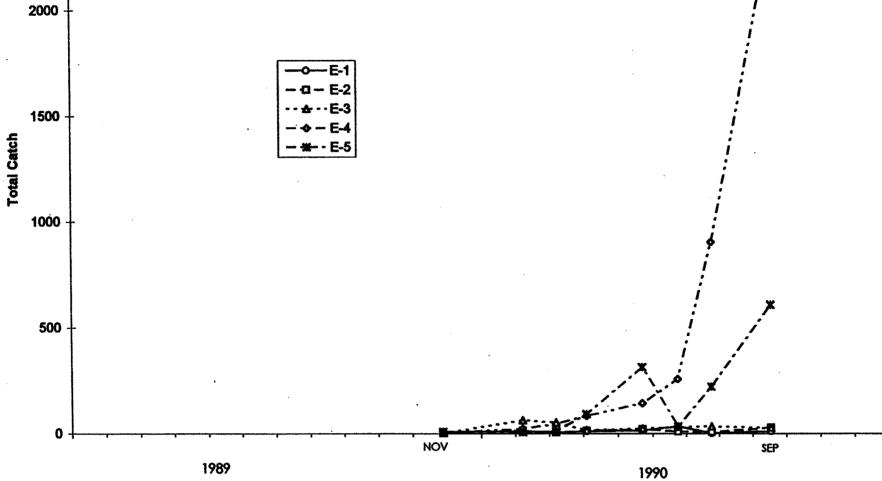
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## **FISH FIGURES**

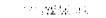
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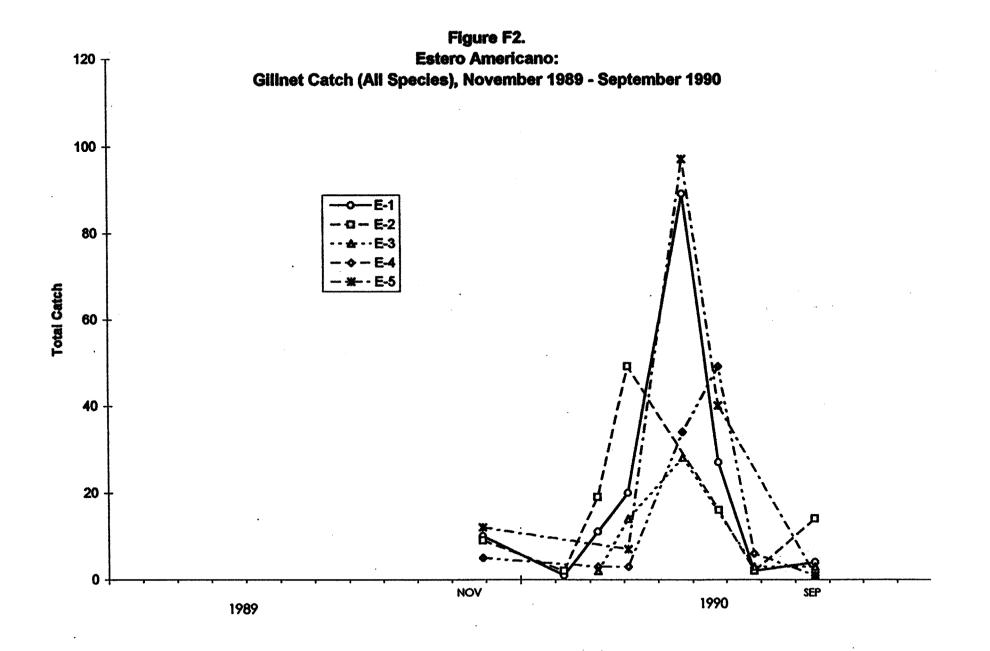


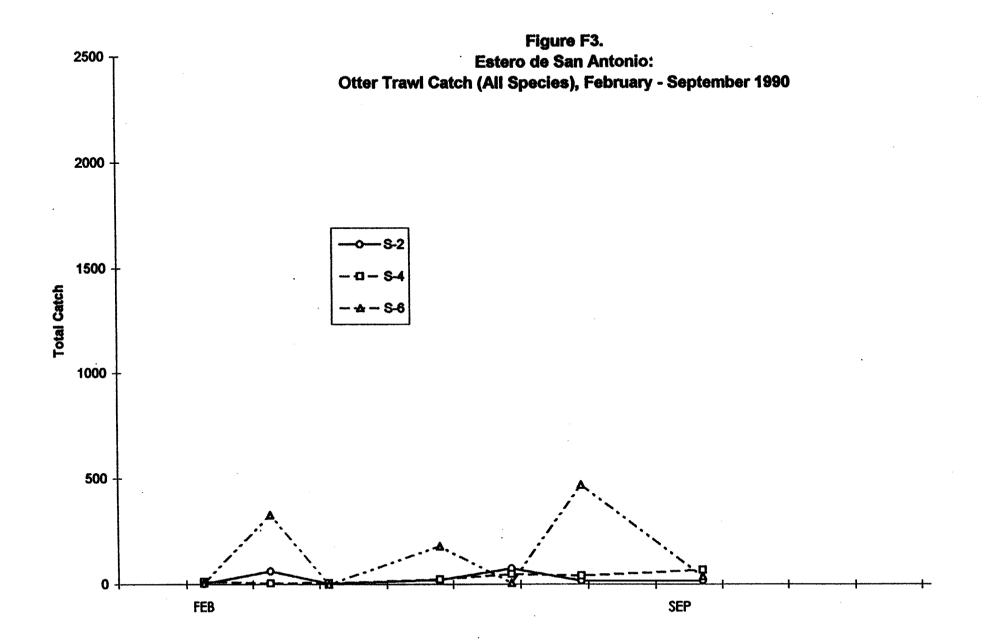


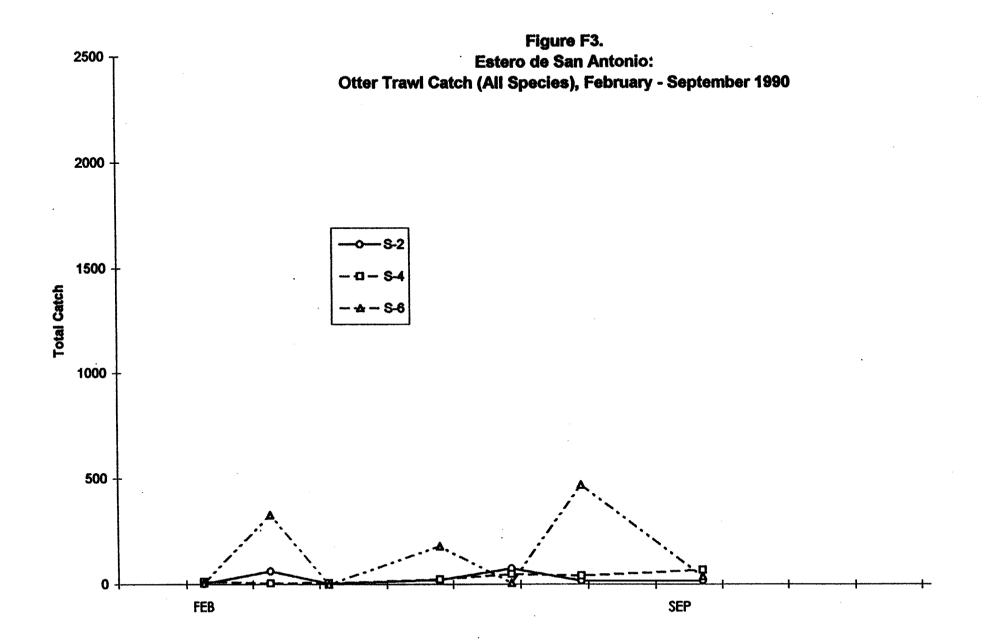
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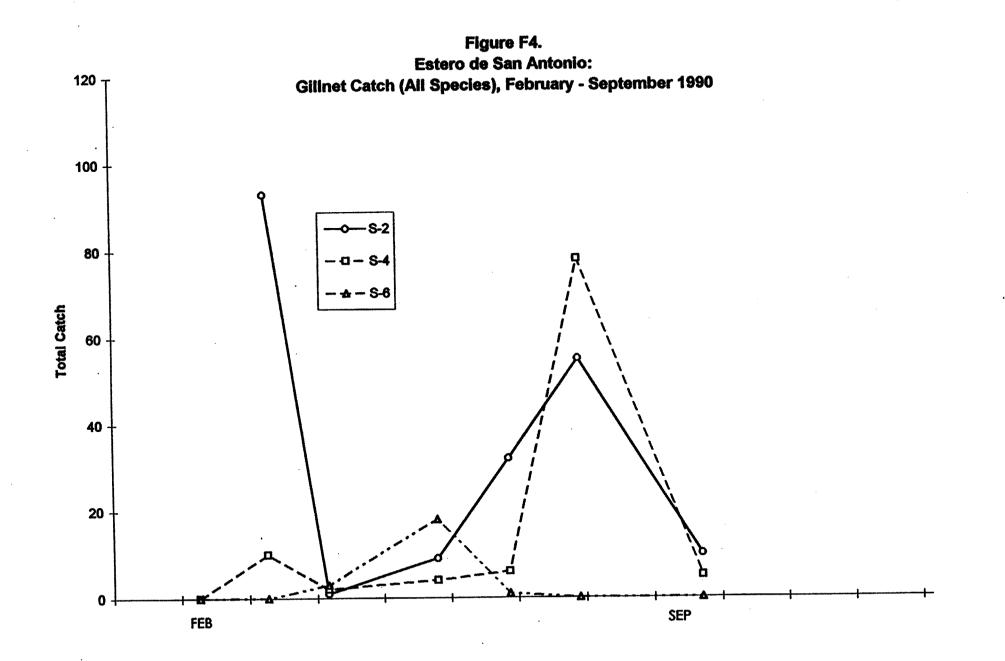




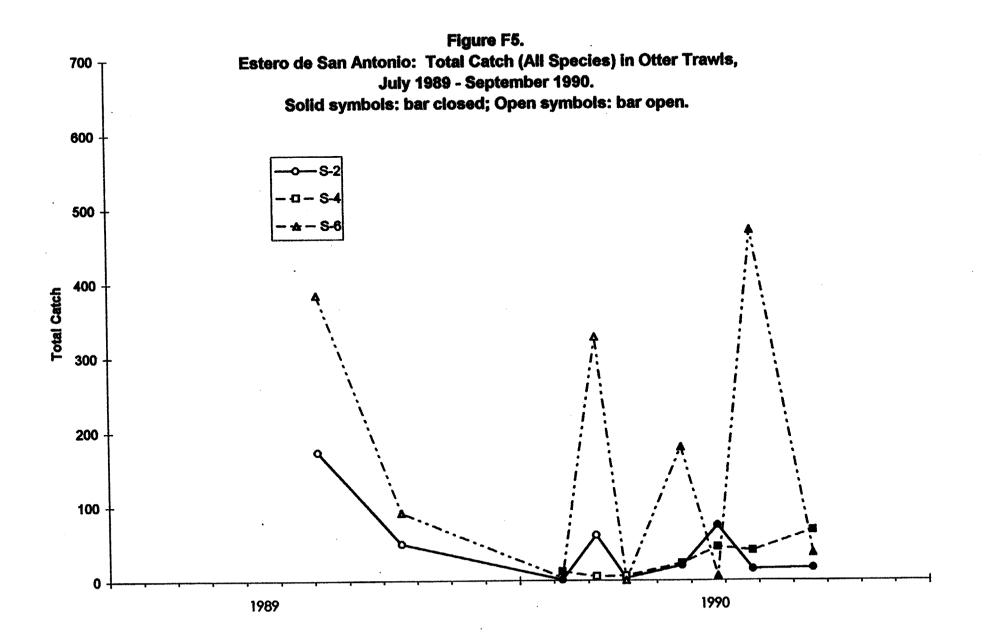




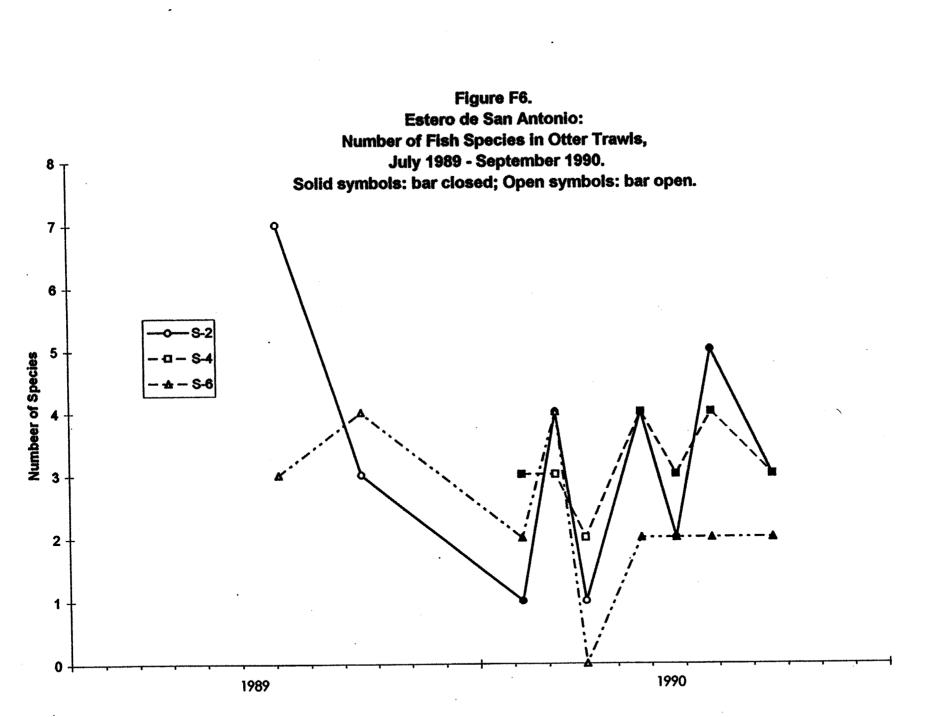








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C. MARINE STREET

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# WATER QUALITY APPENDIX

the managements of

weeks added added to be a set of the

· 1996年1月1日,1月1日日,1月1日日期,1月1日

#### Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 1. Surface Water Quality

\* indicates value below MDL, number to left is one half MDL.

			ND	Non Detect	able										
Station	Date	Temp.	Salinity	Conduct.	DO	pН	Turbid.	Secchi	Chia	F Coli	TDS	<b>TSS</b>	TOC	NO3	NH3
		<b>°C</b>	ppt		ppm		FTU	cm	mg/L	MPN/100ml				mg-N/L	mg-N/L
E-1	29-Feb-88	12	27		9.0			30.5		>16				0.05 *	0.05 *
E-1	30-Mar-88	10.5	32		8.5			70	0.0623		NR			0.05 *	ND
E-1	14-Apr-88	12	32		9.5			137	0.2432					ND	ND
E-1	16-May-88	15.2	33.5		11.2	7.55	3.7	137	0.047124	<2	NR			0.015 *	0.06
E-1	15-Jun-88	14.5	33	40000	11.5	7.2	3.6	91.5	0.17952					0.05 *	0.16
E-1	21-Jul-88	15.8	32.6		11	8.39	1.7	152						0.015 *	ND
E-1	29-Aug-88	15.1	31.8		8.8	7.81	1.8	170		ND				0.03 *	0.08
E-1	28-Sep-88	15.1	32.2		9.75	8	3.6	195	0.262261					0.15 *	0.05
E-1	25-Oct-88	13.4	30.4		8,4	7.9	2.4	180	0.0485			_		0.31	0.15
E-1	22-Nov-88	12.2	32.3		8.5	7.15	4	125	0.023053	11	i	7		0.18	0.05
E-1	20-Dec-88	10.2	33		8	7.9	4.5	>210	0.052017		:			0.19	0.06
E-1	20-Jen-89	9,5	34.1		8.5	7.8	6.3	100	0.030146	•				0.08	0.09
E-1	17-Feb-89	9	35.8		12.3	7.9	1.3	>195	0.050243	2				0.06	0.025 *
E-1	2-Mar-89	10.8	6.5	8100	9.6	7.3	~ ~	15 170						0.22	0.025 *
E-1	6-Mar-89	10	32.7 31		9.1	7.7	2.8	>170	0.010008					0.22	0.025 *
E-1 E-1	9-Apr-89 4-May-89	15 15	32.2	•	8.6	8	4.3	140	0.02587	ND				0.015 *	0.06
E-1	26-May-89	15	31.5		8.9	8	4.3	140	0.02307	NU				0.013	0.00
E-1	7-Jun-89	13	31.3		9.3	8	2.6	>170	0.037577					0.015 *	0.025 *
E-1	5-Jul-89	19	27		8.2	7.8	3.4	150	0.018663					0.16	0.06
E-1	18-Sep-89	13	34		8.2	7.7	1.7	>210	0.01	6.1		4.8		0.23	0.16
E-1	28-Nov-89	12	31		8	7.4	4	120	0.010668			13		8.7	0.12
E-1	7-Feb-90	8.2	35.1		8.9	7.8	5.2	95	0.010106	130		12		0.24	0.05
E-1	9-Mar-90	8.2	35		8,6	7.8	3.1 .	140	0.0517			29		0.21	0.025 *
E-1	5-Apr-90	11.2	34.5		8	7.8	2.6	>160	0.0041			54		0.05	0.025 *
E-1	24-May-90	9.5	34.9		8.5	7.9	4.4	>135	0.0825	5		55		0.22	0.025 *
E-1	25-Jun-90	12	32.5		8.5	7.8	1.9	>140	0.0698			26		0.04	0.025 *
E-1	26-Jul-90	11.2	32		7.4	8.1	1.6	170	0.0341	<2.0		41		0.015 *	0.025 *
E-1	18-Sep-90	10.3	30.3		8.6	7.5	2.4	>210	0.151			11		0.06	2
E-1	15-Nov-90	11.1	32.3		9.6	7.8		>210	0.172	<2		12		0.096	0.025 *
E-2	30-Mar-88	12	31.5		8.4			65	0.0813		NR			0.05 *	ND
E-2	14-Apr-88	12.5	32.7		10.4			>91	0.1342					ND	ND
E-2	16-May-88	18.5	33.2		9.8	7.2	12	71.1	0.079101	NR	NR			0.015 *	0.16
E-2	15-Jun-88	16	33	42000	10	7.1	4.2	<b>78.7</b>	0.108273					0.1	0.14
E-2	21- <b>Jul-88</b>	17	32.3		9.9	7.04	4.5	109						0.015 *	0.08
E-2	29-Aug-88	15.2	32		8.9	7.72	4.2	135cm						0.03 *	0.06
E-2	28-Sep-88	15.2	32.3		9.8	8.25	4.4	175	0.206783					0.15 *	0.025 *
E-2	25-Oct-88	13.3	31.2		8.4	8	3.6	160	0.045391					0.33	0.12
E-2	22-Nov-88	12	33.2		8.3	· 7.9	5.7	1.05	0.020097			11		0.2	0.06
E-2	20-Dec-88	10	33.5		9	8	2.8	>200	0.031328					0.22	0.11
E-2	20-Jan-89	9.7	33.5		8.2	7.75	5.4	~~~~	0.04315					0.27	0.05
E-2	17-Feb-89 2-Mer-89	8.8 11	33.1 4.8	5500	10.3 9.3	7.8 6.8	1.9 78	>200 15	0.029555 0.197427					0.05	0.025 *
E-2	<b>7-MBI-0</b> 0	11	4.0	0000	9.3	0.0	10	. 19	U.18/42/						

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#### Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 1. Surface Water Quality

		un-ionized								8=80	ute c=chronic	violations			
Station	Dete	NH3	Total P	Diss P	DOC		Cđ	diseCd	Cr	dissCr	Cu	dissCu	Pb	dissPb	total Ni
		mg-N/L	mg-P/L	mg-P/L	mg/L		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E-1	29-Feb-88		0.05	0.08			0.005 *		0.01 *		0.02		0.05 *		
E-1	30-Mar-88		0.19	0.19											
E-1	14-Apr-88		0.2	0.04											
E-1	16-May-88		0.16	0.08			0.005 *		0.01 *		0.01 *		0.004		
E-1	15-Jun-88		2.1	1.8											
E-1	21-Jul-88		0.15	0.06									• • •		
E-1	29-Aug-88		0.3	0.1 *			0.005 *	0.005	0.01 *	0.01 *	0.01 *	0.01 *	0.1 *	0.1	
E-1	28-Sep-88		0.2	0.1 *											
E-1	25-Oct-88		0.1 *	0.1 *							0.01 *	0.01 *	0.005 *	0.005	
E-1	22-Nov-88		0.34	0.1 *			0.005 *	0.005	0.02	0.01 *	0.01	0.01	0.0025 *	0.0025	
É-1	20-Dec-88		0.1 *	0.1 *											
E-1	20-Jan-89		0.1 *	0.1 *											
E-1	17-Feb-89		0.1 *	0.1 *	4.2		0.005 *	0.005	0.01 *	0.01 *	0.001 *	0.001 *	0.0025 *	0.0025	
E-1	2-Mar-89		• •	• • •											
E-1	6-Mar-89		0.4	0.18	2.1		0.005 *	0.005	0.01 *	0.01 *	0.001 *	0.001 *	0.001 *	0.001	
E-1	9-Apr-89				-										
E-1	4-May-89		0.2	0.05	5		0.005 *	0.005	0.01 *	0.01 *	0.003	0.001 *	0.05 *	0.05	
E-1	26-May-89					٠						0.004 t			
E-1	7-Jun-89		0.47	0.02 0.07	0.5 2.2	-	0.01 *	0.01	0.0025 *	0.0025 *	0.001 *	0.001 *	0.0025 *	0.0025	
E-1	5-Jul-89		0.04					0.005				0.001		0.1	
E-1	18-Sep-89	0.000.400	0.07 0.1 *	0.06	1.4 0.5		0.01 *	0.01	0.025 *	0.025 *	0.001 *	0.001 * 0.00025 *	0.001 *	0.001	
E-1	28-Nov-89	0.000438		0.1 *			0.00005 *	0.00005	0.012	0.011	0.00025 *	0.00025 *	0.0005 *	0.0005	
E-1	7-Feb-90	0.000331	0.07	0.09	0.5	-	0.0002	0.0002	0.0062	0.0064		0.00005 *	0.00005 *	0.00005	
E-1	9-Mar-90	0.000165	0.1 0.01 *	0.06	1		0.067	0.062 0.00005	0.0031 0.0009	0.0028	0.0007 0.002	0.00005 *	0.00005 *	0.00005	
E-1	5-Apr-90	0.00021 0.000235	0.01 -		1.4 0.5		0.00005 *	0.0005	0.0004	0.0057	0.0005 *	0.00000 -	0.0005	0.00005	
E-1	24-May-90	0.000235	0.12	0.08 0.05	0.5		0.0006		0.0061		0.00005 *		0.0005 *		
E-1 E-1	25-Jun-90 26-Jul-90	0.000227	0.09	0.05	1.3		0.00005 *		0.005		0.0005		0.00005 *		
		0.00784	0.08	0.05	0.5		0.00005 *		0.005		0.0028		0.00005 *		
E-1	18-Sep-90	0.00/04	0.08	0.07	0.5 3.6	-	0.00031		0.0005 *		0.00005		0.0005 -		
E-1	15-Nov-90		0.06	0.03	3.0		0.0031		0.0005		0.00005		0.0027		
E-2	30-Mar-88		0.13	0.13											
E-2	14-Apr-88		0.06	0.04											
E-2	16-May-88		0.27	0.19											
E-2	15-Jun-88		2.1	2.1											
E-2	21-Jul-88		0.1	0.06											
E-2	29-Aug-88		0.1 *	0.1 *											
E-2	28-Sep-88		0.3	0.1 *											
E-2	25-Oct-88		0.1 *	0.1 *											
E-2	22-Nov-88		0.1 *	0.1 *											
E-2	20-Dec-88		0.1 *	0.1 •											
E-2	20-Jan-89		0.25	0.1 *											
E-2	17-Feb-89		0.1 *	0.1 *											
E-2	2-Mar-89														
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Station	Date	Ag mg/L	diasAg mg/L	Zn mg/l	dissZn mg/L	Se µg/l	Fe µg/l	dissFe µg/l	Mn µg/l	diasMn µg/l	Silica µg/1	dissSilica µg/l
E-1	29-Feb-88			0.005 *								
E-1	30-Mar-88			0.000								
E-1	14-Apr-88											
E-1	16-May-88			0.01 *								
E-1	15-Jun-88			0.01								
E-1	21-Jul-88											
E-1	29-Aug-88			0.01 *	0.01 *							
E-1	28-Sep-88											
E-1	25-Oct-88											
E-1	22-Nov-88			0.01 *	0.01 *							
È-1	20-Dec-88											
E-1	20-Jan-89											
E-1	17-Feb-89			0.01 *	0.01 *							
E-1	2-Mar-89											
E-1	6-Mar-89			0.13	0.05							
E-1	9-Apr-89											
E-1	4-May-89			0.13	0.12							
E-1	26-May-89	•										
E-1	7-Jun-89			0.005 *	0.005 *		0.099	0.068	0.007	0.007	ND	ND
E-1	5-Jul-89			0.12	0.11							
E-1	18-Sep-89			0.01 *	0.01 *							
E-1	28-Nov-89	0.0011	0.0011	0.0018	0.0011	<1						
E-1	7-Feb-90	0.0004	0.0003	0.011	0.0067							
E-1	9-Mar-90	0.0012	0.001	0.0015	0.0005 *							
E-1	5-Apr-90	0.00025 * 0.0007	0.000025 *	0.0062 0.0005 *	0.0051		•					
E-1 E-1	24-May-90 25-Jun-90	0.0007		0.0005 *								
E-1	25-Jul-90 26-Jul-90	0.00025		0.0005 *								
E-1	18-Sep-90	0.000025 *		0.0005 *								
E-1	15-Nov-90	0.000025 *		0.018								
E-1	10-1101-00	0.00020		0.010								
E-2	30-Mar-88											
E-2	14-Apr-88											
E-2	16-May-88											
E-2	15-Jun-88											
E-2	21-Jul-88											
E-2	29-Aug-88											
E-2	28-Sep-88				•							
E-2	25-Oct-88											
E-2	22-Nov-88											
E-2	20-Dec-88											
E-2	20-Jan-89											
E-2	17-Feb-89											
E-2	2-Mar-89											
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1. Statistic manager in the second second

## \* indicates value below MDL, number to left is one half MDL.

			ND	= Non Detect	nbie										
Station	Date	Temp.	Salinity	Conduct.	DO	pН	Turbid.	Secchi	Chia	F Coli	TDS	TSS	TOC	NO3	NH3
		•C	ppt		ppm		FTU	cm	mg/L	MPN/100ml				mg-N/L	mg-N/L
E-2	6-Mar-89	11	17.4			7	37	30	0.039277					0.43	0.39
E-2	4-May-89	18.2	31.7		8.1	8.1	47	35	0.121164					0.015 •	0.05
E-2	7-Jun-89	12.8	32.4		9.2	7.8	3.1	155	0.023037					0.015 *	0.025 *
E-2	5-Jul-89	18	28.5		7.7	7.8	4.2	140	0.01164					0.2	0.025 *
E-2	18-Sep-89	13	34		8.2		4.2	170	0.0119			14		0.16	0.1
E-2	28-Nov-89	11.8	30.2		8.1	7	4.4	120	0.008963			14		7.8	0.07
E-2	7-Feb-90	8	35		8.8	7.6	5.2 ·	70	0.011603		•	13		0.07	0.07
E-2	9-Mar-90	9	34.2		9	7.8	3.5	150	0.0281			28		0.17	0.07
E-2	5-Apr-90	11.9	33.8		7.5	8	3.7	130	0.0155			16		0.05	0.025 *
E-2	24-May-90	11.8	35.4		7.5	8	5.8	08	0.0314			36 32		0.05	0.08
E-2	25-Jun-90	14.3	33.9		6.8	7.6	6.2	70	0.0519			32 53		0.06 0.24	0.11 0.025 *
E-2	26-Jul-90	12.7	32		8	8	2.2	100	0.0359			9.2		0.24	0.025 *
E-2	18-Sep-90	10.4	30		8	7.6	2.2	160	0.099 0.13			¥.2 16		0.11	0.025
E-2	15-Nov-90	10.8	32.3		9.6	7.8		185	0.15			10		9.11	0.005
E-3	29-Feb-88	14	23		7.5			91.5		>16				0.13	0.05 *
E-3	30-Mar-88	15	31.5		8.4			••••	0.0974					0.05 *	ND
E-3	14-Apr-88	13.3	29.3	38900	9.5			46	0.0261	,				ND	ND
E-3	16-May-88	22	33.2		9.5	6	13	50.8	0.170544					0.015 *	0.025 *
E-3	15-Jun-88	21	33	46500	6.9	7.5	22	35.6	0.095931					0.13	0.19
E-3	21-Jul-88	18.1	33		10	7.99	16	56						0.015 *	0.13
E-3	29-Aug-88	16.9	31.3		8	7.54	8.4	100cm*						0.03 *	0.08
E-3	28-Sep-88	15.5	32.5		9.8	8.3	7.3	120	0.134283					0.15 *	0.025 *
E-3	25-Oct-88	13.5	31		8	8.1	3.6	>90	0.039087					0.15 *	0.09
E-3	22-Nov-88	13.1	32.2		8.2	7.9*	6.4	>70	0.014777			8		0.17	0.08
E-3	20-Dec-88	10	33		8.5	7.9*	3.2	>100	0.016551					0.21	0.06
E-3	20-Jan-89	9.5	32.8		9	7.9	4	~100	0.013595					0.04	0.1
E-3	17-Feb-89	9.5	31.5		8.8	7.8	5.3	134	0.020097					0.06	0.16
E-3	6-Mar-89	11	0.7	1100	7.8	7.5	62	20	0.104235					0.76	1.1
E-3	9-Apr-89	21.5	23.4		7.5										
E-3	10-Apr-89								0.070529						
E-3	10-Apr-89								0.33275						
E-3	4-May-89	21.7	28.8		9.2	8.4	11	75	0.017184					0.61	0.025 *
E-3	26-May-89	18	35		7.3	8.1		20							
E-3	7-Jun-89	16.5	32.4		7.3	7.8	7.4	>45	0.020771					0.015 *	0.025 *
E-3	5-Jul-89	21	30		6.1	7.7	25	730	0.037728					0.2	0.15
E-3	18-Sep-89	13.9	34.2		8.4	7.6	6.8	90	0.0138			68		0.14	0.1
E-3	28-Nov-89	11.4	30		8.9	7.5	3.8	>60	0.003743			18		0.15	0.13
E-3	7-Feb-90	7.5	27.9		8.4	7.6	16	40	0.025265			12		0.41	1.2
E-3	9-Mar-90	10	24.2		8.5	7.4	12	45	0.0284			36		0.34	0.6
E-3	5-Apr-90	13.1	31.2		7.4	. 8.1	7.3	>42	0.1447			41		0.03	0.09
E-3	24-May-90	15	35.7		7.7	8.3	22	35	0.069			66		0.06	0.06
E-3	26-Jun-90	18	33.8		6.5	8	22	30 65	0.0533			180		0.015 * 0.015 *	0.11 0.025 *
E-3	26-Jul-90	16.4	32		8.4	8.5	8.8	65 65	0.0441			64 28		0.015 -	0.025 *
E-3	18-Sep-90	14	30.3		7.6	7.3	8.8	. 00	CU.U			20		U.1	0.05

an an Sana an <mark>Thuang Kanggung</mark> Alamati Sana an Sanggung

		un-ionized							8780	ute c=chronic				
Station	Date	NH3	Total P	Diss P	DOC	Cd	diseCd	Cr	dissCr	Cu	diseCu	Pb	dissPb	total Ni
		mg-N/L	mg-P/L	mg-P/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E-2	6-Mar-89		0.47	0.44										
E-2	4-May-89		0.56	0.07										
E-2	7-Jun-89		-0.59	0.05	1.1	0.01 *	0.01	0.0025 *	0.0025 *	0.001 *	0.001 *	0.0025 *	0.0025	
E-2	5-Jul-89		0.06	0.08										
E-2	18-Sep-89		0.08	0.07										
E-2	28-Nov-89	0.000102	0.1 *	0.1 *										
E-2	7-Feb-90	0.000293	0.07	0.01 *										
E-2	9-Mar-90	0.000501	0.12	0.09										
E-2	5-Apr-90	0.000358	0.01 *	0.01 *										
E-2	24-May-90	0.001144	0.2	0.12										
E-2	25-Jun-90	0.000735	0.23	0.15					•					
E-2	26-Jul-90	0.000385	0.09	0.08										
E-2	18-Sep-90	0.000388	0.11	0.06										
E-2	15-Nov-90		0.09	0.04									•	
E-3	29-Feb-88		0.12	0.10		0.005 *	r	0.01 *		0.03		0.05 *		
E-3	30-Mar-88		0.18	. 0.18										
E-3	14-Apr-88		0.1	0.08										
E-3	16-May-88		0.65	0.3										
E-3	15-Jun-88		2.2	2										
E-3	21-Jul-88		0.15	0.1										
E-3	29-Aug-88		0.1 *	0.1 *										
E-3	28-Sep-88		0.1 *	0.1 *										
E-3	25-Oct-88		0.1 *	0.1 *										
E-3	22-Nov-88		0.29	0.21										
E-3	20-Dec-88		0.1 *	0.1 *										
E-3	20-Jan-89		0.1 *	0.1 *										
E-3	17-Feb-89		0.36	0.1 *	5	0.005 *	0.005	0.01 *	0.01 *	0.001 *	0.001 *	0.0025 *	0.0025	
E-3	6-Mar-89		1.1	0.92	28	0.005	0.005	0.01 *	0.01 *	0.007	0.005	0.001 *	0.001	
E-3	9-Apr-89													
E-3	10-Apr-89													
E-3	10-Apr-89													
E-3	4-May-89		0.53	0.16	3.3	0.005	0.005	0.01 *	0.01 *	0.004	0.001 *	0.05 *	0.05	
E-3	26-May-89													
E-3	7-Jun-89		0.15	0.07	1.8	0.01	0.01	0.0025 *	0.0025 *	0.001 *	0.001 *	0.0025 *	0.0025	
E-3	5-Jul-89		0.17	0.13	2.5	0.01	0.005	0.02	0.01 *	0.001 *	0.001 *	0.1 *	0.1	
E-3	18-Sep-89		0.1	0.05	0.5	• 0.01		0.025 *	0.025 *	0.001 *	0.001 *	0.002	0.001	
E-3	28-Nov-89	0.00051	0.1 *	0.1 *	0.5	* 0.00005		0.008	0.008	0.003	0.002	0.009	0.0005	
E-3	7-Feb-90	0.00486	0.59	0.52	8.7	0.00005		0.0046	0.0017	0.0013	0.0004	0.00005 *	0.00005	
E-3	9-Mar-90	0.001902	0.53	0.44	7.1	0.039	0.038	0.003	0.0028	0.0011	0.0007	0.0014	0.00005	
E-3	5-Apr-90	0.001748	0.63	0.01 *	2.9	0.00005		0.0037	0.0014	0.0016	0.00005 *	0.00005 *	0.00005	
E-3	24-May-90	0.002106	0.29	0.17	1	* 0.00005		0.005		0.00005 *		0.011		
E-3	26-Jun-90	0.002464	0.78	0.37	2.3	0.0003		0.02		0.0019		0.00005 *		
E-3	26-Jul-90	0.001475	0.15	0.11	1.9	0.00005	•	0.01		0.01		0.00005 *		
E-3	18-Sep-90	0.000169	0.16	0.09	0.5	• 0.00005		0.051		0.003		0.00005 *		
	10.000-00	3.000100	v. 10	0.00	v.v	v.vvvvv				v.v.v				

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Station	Date	Ag mg/L	diseAg mg/L	Zn mg/i	dissZn mg/L	Se µg/l	Fe µg/1	dissFe µg/i	Mn µg/l	dissMn µg/i	Silica µg/l	dissSilica µg/l
E-2	6-Mar-89											
E-2	4-May-89											
E-2	7-Jun-89		•	0.005 *	0.005 *		0.19	ND	0.009	0.005	ND	ND
E-2	5-Jul-89						-				1	
E-2	18-Sep-89											
E-2	28-Nov-89											
E-2	7-Feb-90											
E-2	9-Mar-90											
E-2	5-Apr-90											
E-2	24-May-90											
E-2	25-Jun-90										i	
É-2	26-Jul-90											
E-2	18-Sep-90										•	
E-2	15-Nov-90										:	
E-3	29-Feb-88			0.36								
E-3	30-Mar-88											
E-3	14-Apr-88											
E-3	16-May-88											
E-3	15-Jun-88											
E-3	21-Jul-88											•
E-3	29-Aug-88											
E-3	28-Sep-88											
E-3	25-Oct-88								,			
E-3 E-3	22-Nov-88											
	20-Dec-88 20-Jen-89											
E-3 E-3	17-Feb-89			0.07	0.01 *							
E-3	6-Mar-89			0.04	0.04							
E-3	9-Apr-89			0.01	0.01							
E-3	10-Apr-89											
E-3	10-Apr-89											
E-3	4-May-89			0.14	0.13							
E-3	26-May-89											
E-3	7-Jun-89			0.005 *	0.005 *		0.68	0.075	0.027	0.014	ND	ND ND
E-3	5-Jul-89			0.11	0.095							
E-3	18-Sep-89			0.01 *	0.01 *							
E-3	28-Nov-89	0.0019	0.0018	0.0026	0.0011	<1						
E-3	7-Feb-90	0.0002	0.0001	0.013	0.009							
E-3	9-Mar-90	0.0002	0.0001	0.0023	0.0013							
E-3	5-Apr-90	0.0003	0.0003	0.0017	0.0012							
E-3	24-May-90	0.000025 *		0.0005 *								
E-3	26-jun-90	0.000025 *		0.0038								
E-3	26-Jul-90	0.0005		0.02								
E-3	18-Sep-90	0.000025 *		0.0005 *								

(1) 2.14 (1998) (1997)

## \* indicates value below MDL, number to left is one half MDL ND = Non Detectable

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			ND	= Non Detect	able										
Station	Date	Temp.	Salinity	Conduct.	DO	pH	Turbid.	Secchi	Chia	F Coli	TDS	TSS	TOC	NO3	NH3
		• <b>c</b>	ppt		ppm		FTU	cm	mg/L	MPN/100ml				mg-N/L	mg-N/L
E-3	15-Nov-90	10.5	32.6		9.4	7.8		>117	0.071			8.8		0.12	0.077
E-4	29-Feb-88	15	7		4.0			61		>16				1.30	0.55
E-4	30-Mar-88	16	18		8.8			51	0.433					0.05 *	ND
E-4	14-Apr-88	16	25.7		5.5			46	0.0843					ND	ND
E-4	16-May-88	22	23. <del>9</del>		11.6	6.95	22	30.5	1.39689					0.015 *	0.025 *
E-4	15-Jun-88	24.5	30	45000	8.8	7.8	25	30.5	1.27908					0.05 *	0.73
E-4	21-Jul-88	25	38.8		10.8	7.96	20	41	0.297565					0.03	0.18
E-4	29-Aug-68	21	34.2		6.05	7.53	20	50						0.03 *	0.19
E-4	28-Sep-88	18.5	34.2		7.2	7.75	18	60	0.095826					0.15 *	0.08
E-4	25-Oct-88	13.5	31.8		6.2	7.9	12	85	0.204891					0.15 *	0.28
E-4	22-Nov-88	12.5	28		7.9	7.8	12	50	0.24235			ND		0.24	0.29
E-4	20-Dec-88	9	31.5		10	7.8	12	75	0.117037					0.2	0.17
E-4	20-Jan-89	8	18.1		6.8	8.2	12	~60	0.028373					0.55	2.6
E-4	17-Feb-89	9	12.4		5	7.4	15	50	0.062656					0.57	4.8
E-4	2-Mar-89	10.2	0	305	6	7.8		9							
E-4	6-Mar-89	10.7	0	270	4.8	7.5	54	15	0.40991					0.82	3.1
E-4	4-May-89	23	16.9		6.4	7.9	28	40	0.110917					1.5	0.07
E-4	7-Jun-89	19.4	28.8		7	7.7	34	25	0.063295					0.42	0.3
E-4	5-Jul-89	26	33.8		8.8	8.1	21	30	0.366821					0.03	0.025 *
E-4	18-Sep-89	16	34		6.4	7.7	32	35	0.0523	÷		42		0.25	0.4
E-4	28-Nov-89	8.5	20.9		7.9	7.3	8.6	55	0.020212			16		0.86	0.56
E-4	7-Feb-90	6	1.4	1120	7.6	7.4	23	30	0.122427			10		0.9	2.8
E-4	9-Mar-90	9.2 13.4	10.5	1210	8.7	7.1 7.7	24	25 30	0.0653 0.1188			25 52		0.72 0.7	3.3 0.16
E-4 E-4	5-Apr-90	13.4	10.5		5.2 7.3	8.2	18 28	30 37	0.1160			52 58		0.7	0.10
E-4	24-May-90 25-Jun-90	22	20.2		4.9	0.2 7.9	28 92	- 37 10	0.1201			460		0.34	1.4
E-4	25-Jul-90	21	30		4.8 5.7	8.1	50	12	0.3665			240		0.015 *	0.24
E-4	18-Sep-90	16.1	33		8	8	37	20	0.811			110		0.015 *	0.06
E-4	15-Nov-90	9,5	32.8		8.4	7.7	57	75	0.021			18		0.015 *	0.01
6-4	13-1101-00								0.021					0.010	0.01
E-5	29-Feb-88	15	6		3.0			61							
E-5	30-Mar-88	17	12.5		14			30	2.79		14516			0.2	ND
E-5	14-Apr-88	17	19.2		3.5			35.8	0.0594		23256			0.14	1.1
E-5	16-May-88	23	18.8		16. <b>8</b>	6.9	26	22.9	5.5539	26	21000			0.06	0.09
E-5	15-Jun-88						34?	22.9	1.42494		29000			0.05 *	0.67
E-5	21-Jul-88	24	38.5		12	8.53	17	33			45000			0.015 *	0.21
E-5	29-Aug-88	22.5	37.3		9.2	7.94	23	50		11	41000			0.03 *	0.22
E-5	28-Sep-88	19.7	36.3		12.5	8.4	20	45	0.832174		4400			0.15 *	0.025 *
E-5	25-Oct-88	14	31.7		8.2	8.15	17	40	0.060522		37000			0.15 *	0.15
E-5	22-Nov-88	12.3	25.5		8.6	. 8	24	30	2.116129	>2400	28000	27		0.36	0.71
E-5	20-Dec-88	8	26.5		10.5	7.8	36.	65	0.508344		. 29000			0.58	0.36
E-5	21-Dec-88	7	13.9			7.5					16000			0.67	1.1
E-5	20-Jan-89	8	10.9		6.4	<b>—</b> —	17		0.100487		13000			0.84	8
E-5	17-Feb-89	10	5.5		4.9	7.5	17	25	0.078025	>/#2400	7500			0.39	10

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		un-ionized								8=acu	te c=chronic	viciations			
Station	Dete	NH3		Total P	Diss P	DOC	Cd	disaCd	Cr	dissCr	Cu	dissCu	Pb	dissPb	total Ni
		mg-N/L		mg-P/L	mg-P/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E-3	15-Nov-90			0.06	0.05	5.5	0.0018		0.0005 *		0.005		0.00005 *		
E-4	29-Feb-88	0.001155		0.59	0.53		0.005 *		0.01 *		0.01 *		0.05 *		
E-4	30-Mar-88			0.43	0.41										
E-4	14-Apr-88			0.3	0.28										
E-4	16-May-88	7.03E-05		1.3	0.87										
E-4	15-Jun-88	0.010658		2.1	2.1										
E-4	21-Jul-88	0.00594		0.63	0.48										
E-4	29-Aug-88	0.001919		0.3	0.1 *										
E-4	28-Sep-88	0.001056		0.23	0.2										
E-4	25-Oct-88	0.003612		0.1 *	0.1 *										
É-4	22-Nov-68	0.002749		0.24	0.24										
E-4	20-Dec-88	0.001224		0.1 *	0.1 *										
E-4	20-Jan-89	0.04472	C	1	0.92										
E-4	17-Feb-89	0.015456		1.9	1.7										
E-4	2-Mar-89														
E-4	6-Mar-80	0.015593	C	2.4	. 1.9										
E-4	4-May-89	0.001939		0.84	0.44										
E-4	7-Jun-89	0.00369		0.24	0.23	6.6	0.01 *	0.01	0.0025 *	0.0025 *	0.003	0.001 *	0.0025 *	0.0025	
E-4	5-Jul-89	0.001233		0.34	0.28										
E-4	18-Sep-89	0.003908		0.22	0.11										
E-4	28-Nov-89	0.001277 0.00612	_	0.83 2.1	0.2 1.8										
E-4 E-4	7-Feb-90 9-Mar-90	0.00612	¢	2.1	1.0										
E-4	5-Apr-90	0.0001398		1.1	0.99				•						
E-4	24-May-90	0.009657		0.73	0.37										
E-4	25-Jun-90	0.03374		1.5	0.37										
E-4	26-Jul-90	0.008376		0.57	0.22										
E-4	18-Sep-90	0.001158		0.38	0.15										
E-4	15-Nov-90	0.001100		0.16	0.09										
E-5	29-Feb-88														
E-5	30-Mar-88			0.77	0.67										
E-5	14-Apr-88	0.002266		0.64	0.6										
E-5	16-May-88	0.000248		1.5	0.92		0.02		0.01 *		0.02		0.0005 *		
E-5	15-Jun-88			4.3	3.5										
E-5	21-Jul-88	0.02352		0.79	0.54								• • •		
E-5	29-Aug-88	0.006116		0.78	0.41		0.005 *	0.005	0.01 *	0.01 *	0.01 *	0.01 *	0.1 *	0.1	
E-5	28-Sep-88	0.00157		0.76	0.37										
E-5	25-Oct-88	0.003795		0.58	0.26						0.01 *	0.01 *	0.005 *	0.005	
E-5	22-Nov-88	0.010366		3.3	0.43	•	0.005 *	0.005	ND	0.03	0.036	0.001 *	0.0025 *	0.0025	
E-5	20-Dec-88	0.002434		0.29	0.21						0.004	0 004 A			
E-5	21-Dec-88	0.003652		0.92	0.51						0.001 *	0.001 *			
E-5	20-Jan-89	0.02244	-	2.6	2	20	0.005 *	0.005		0.04 +	0.005	0.002	0.000# +	A 000F	
E-5	17-Feb-89	0.0459	¢	3.7	2.3	20	· CUU.V	0.000	0.01 *	0.01 *	0.005	0.003	0.0025 *	0.0025	

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#### Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 1. Surface Water Quality

Station	Date	Ag mg/L	dissAg mg/L	Zn mg/l	dissZn mg/L	Se µg/l	Fe µg/l	dissFe µg/l	Mn µg/l	dissMn µg/l	Silica µg/l	<b>dissSilica</b> µg/i
E-3	15-Nov-90	0.000025 *		0.0005 *								
E-4	29-Feb-88			0.005 *								
E-4	30-Mar-88						-				•	
E-4	14-Apr-88											
E-4	16-May-88											
E-4	15-Jun-88											
E-4	21-Jul-88											
E-4	29-Aug-88											
E-4	28-Sep-88											
E-4	25-Oct-88											
E-4	22-Nov-88											
E-4	20-Dec-88											
E-4	20-Jan-89 17-Feb-89											
E-4	17-reb-09 2-Mar-89											
E-4	6-Mar-89											
E-4	4-May-89			•								
E-4	7-Jun-89			0.011	0.005 *		2.2	0.025	0.25	0.17	ND	ND
E-4	5-Jul-89			0.017	0.000		<b>6</b> 1 <b>6</b>	0.025	V.4V	9.17		10
E-4	18-Sep-89											
E-4	28-Nov-89											
E-4	7-Feb-90											
E-4	9-Mar-90											
E-4	5-Apr-90											
E-4	24-May-90											
E-4	25-Jun-90											
E-4	26-Jul-90											
E-4	18-Sep-90								•			
E-4	15-Nov-90											
E-5	29-Feb-88											
E-5	30-Mar-88											
E-5	14-Apr-88											
E-5	16-May-88			0.01 *								
E-5	15-Jun-88											
E-5	21-Jul-88		•									
E-5	29-Aug-88			0.01 *	0.01 *							
E-5	28-Sep-88				•							
E-5	25-Oct-88				•							
E-5	22-Nov-88			0.01 *	0.01.*							
E-5	20-Dec-88											
E-5	21-Dec-88			0.099	0.032							
E-5	20-Jan-89							• •				
E-5	17-Feb-89			0.05	0.01 *							
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#### \* indicates value below MDL, number to left is one half MDL. ND = Non Detectable

			ND	= Non Detect	abie										
Station	Date	Temp.	Salinity	Conduct.	DO	pH	Turbid.	Secchi	Chie	F Coli	TDS	T8S	TOC	NOS	NH3
		<b>.</b> C	ppt		ppm		FTU	cm	mg/L	MPN/100ml				mg-N/L	mg-N/L
E-5	2-Mar-89	10.5	0	332	4.7	7.6	66	7	0.93157					1.4	5
E-5	8-Mar-89	11	0	315	4.2	7.5	52	18	0.434022		360			0.85	3.6
E-5	10-Apr-89								0.049474			-			
E-5	4-May-89	21.5	6.3	9500	6.1	7.8	33	25	0.258002	1010	1200			1.3	0.36
E-5	26-May-89	23	16		7	8.1									
E-5	7-Jun-89	19.5	24.8		5.5	7.5	34	35	0.067515		16800			0.47	0.21
E-5	5-Jul-89	25	31	•	8.3	8	41	22	0.359767		38400			0.015 *	0.025 *
E-5	18-Sep-89	17	35.2		5.4	7.5	60	22	0.3687	3300	39000	96		0.21	0.92
E-5	23-Oct-89	15.5	29.2		7.9	7.6						58	9.8	0.55	0.15
E-5	28-Nov-89	10	17.3		7.5	7.4	20	35	0.056316		19000	49		1.3	0.5
E-5	16-Jan-90	11	0.5	820	6.2	6.8					680	22		1.4	3.3
E-5	7-Feb-80	7	1	900	7.2	7.5	16	45	0.090596	540	900	7.4		0.93	3.1
E-5	9-Mar-90	9		1020	8.1	7.2	14	45	0.0948		700	14		0.72	2.4
E-6	5-Apr-90	14	5	5800	5.6	7.5	32	23	0.2525		4900	47		0.09	0.26
E-5	24-May-90	17.5	22.5		4.7	7.9	31	42	0.1053	920	25000	100		0.27	0.43
E-5	25-Jun-90	21.2	24.3		3.3	7.8	120	5	0.5499		30000	730		0.15	2.2
E-5	26-Jul-90	21.7	34.3	•	11.1	8.7	35	12	1.3532	11	48000	270		0.015 *	0.025 *
E-5	18-Sep-90	16.2	34.5		10.4	7.9	37	20	2.706		47000	130		0.015 *	0.06
E-5	15-Nov-90	9.5	33.7		9	7.8		110	0.09	17	39000	12		0.11	0.08
E-5	6-May-94	18,5	6	9000	3.2	8			0.014		6100	42	19	0.35	0.21
E-6	29-Feb-88	14			1.6					>16				0.10	11.00
E-6	30-Mar-88	17	0.2		9.6			9	6.198		888			0.5	6.7
E-6	14-Apr-88	15	0.7	900	10.8				8.638		2160			3.4*	268
E-6	16-May-88	15.8	1.1	1700	2.1	7.55	62		4.711875	>2400000	1100			0.015 *	41
E-6	15-Jun-88	16	1.5	2320	3.5	8			7.6296		2000			0.05 *	61
E-6	21-Jul-88	25.5	3.2	4230	20	9.35					4100			0.96	5.7
E-6	22-Nov-88	13		650	5.1	7.35	14		0.174374	>2400	610	13		1.3	2.7
E-6	20-Dec-88	8.9			- 4	8*	41		1.702361		1100			0.59	24
E-6	21-Dec-88		1.2	1700	1.2	7.8*	v.high		6.058749		1500			0.015 *	110
E-6	20-Jan-89	10.8	0	700	2.3	7.65	27		0.359387		640			0.03	18
E-6	17-Feb-89	13.9	0.2	700	11.2	7.5	15		0.546174	>/=2400	560			0.05	14
E-6	2-Mar-89	11	0	462	5.7	7.5									
E-6	6-Mar-89		0	250	5.1	7.4	46		0.605219		350			1.4	2.5
E-6	4-May-89	23.5		800	9	8.3	30		0.868044	20900	570			0.31	7.5
E-6	7-Jun-89	17	0.3	620	10.4	8.3	26		5.714622		440			0.45	0.49
E-6	6-Jul-89	19	0.2	900	19	8.8	off scale		32.73172		770			3.2	4.2
E-6	18-Sep-89	16.8	1	1120	2.7	7.7	20		0.1534	2400000	950	28		2.1	9.6
E-6	23-Oct-89	14.9		700	5	7.7					580	86	63	2.6	4.7
E-6	28-Nov-89	10		900	3.5	7.6	51		0.710077		1000	110		7.8	15
E-6	16-Jan-90	11.7	0.2	415		. 7					400	17		2.3	4.9
E-6	8-Feb-90	7		457	9.4	7.8	22		0.170174	9200	440	40		0.95	4.3
E-6	9-Mar-90	13		530	8.3	7.9	25		0.1879		410	33		0.26	4.8
E-6	5-Apr-90	15.3		720	8	7.3	22		0.9237	-	520	36		0.72	5.4
E-6	24-May-90	12.8		590	4.1	7.3	50		3.0665	350000	450	130		0.015 *	2.7

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#### Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 1, Surface Water Quality

Station         Des         NH3         Teal P         Diss P         DOC         Cd         med-L         GU         med-L         med-L </th <th></th> <th></th> <th>un-ionized</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>•</th> <th>amaci</th> <th>ute c=chronic</th> <th>violations</th> <th></th> <th></th> <th></th>			un-ionized							•	amaci	ute c=chronic	violations			
E-5       2.Mar-90       0.0391       3.7       2.1         E-5       6.Mar-90       0.02006       2.4       4.2       0.005       0.001       0.011       0.001       0.001       0.051       0.00	Station	Date	NH3		Total P	Diss P	DOC	Cd	dissCd	Cr	diseCr	Cu	dissCu		dissPb	total Ni
E-5         0-44m-96         0.022304 c         2.9         2.4         4.2         0.005         0.01*         0.01*         0.012         0.007         0.01         0.001           E-5         10-4m-96         0.002208         1.4         0.97         17         0.005*         0.005         0.01*         0.001*         0.008         0.001*         0.005*         0.005           E-5         2-44m-98         0.00173         0.48         0.38         0.01*         0.005         0.001*         0.001*         0.008         0.001*         0.005*         0.005           E-5         7-44m-98         0.001435         0.41         0.005*         0.001         0.001*         0.0005*         0.0005         0.001* <th></th> <th></th> <th>mg-N/L</th> <th></th> <th>mg-P/L</th> <th>mg-P/L</th> <th>mg/L</th>			mg-N/L		mg-P/L	mg-P/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
E5         10.4pe-50         0.0025         0.005         0.005         0.011         0.014         0.008         0.001         0.005         0.005           E5         444pe-80         0.000236         0.33         0.34         11         0.005         0.005         0.014         0.008         0.007         0.008         0.001         0.014         0.008         0.001         0.001         0.001         0.001         0.001         0.0025         0.0025         0.0025         0.0025         0.0025         0.001 <t< td=""><td>E-5</td><td>2-Mar-89</td><td>0.0341</td><td></td><td>3.7</td><td>2.1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	E-5	2-Mar-89	0.0341		3.7	2.1										
E-5         44mm-90         0.00200         1.4         0.07         17         0.005         0.001         0.001         0.008         0.001         0.008         0.001         0.008         0.001         0.008         0.001         0.008         0.001         0.008         0.001         0.008         0.001         0.008         0.001         0.008         0.001         0.008         0.001         0.008         0.001         0.008         0.001         0.008         0.001         0.008         0.001         0.008         0.001         0.0001         0.001         0.	E-5	6-Mar-89	0.020304	C	2.9	2.4	42	0.005 *	0.005	0.01 *	0.01 *	0.012	0.007	0.01	0.001	
E.5         234 May 68         0.00173         0.06         0.01         0.01         0.001         0.002         0.002         0.0023         0.0023         0.0023         0.0023         0.0023         0.0023         0.0023         0.001         0.01         0.0002         0.0002         0.0002	E-5	10-Apr-89														
E-5       7-Jun-80       0.00173       0.08       0.30       0.11       0.014       0.000       0.007       0.003       0.0025       0.0025       0.0001       0.11       0.01       0.001       0.011       0.001       0.011       0.001       0.011       0.001       0.011       0.000       0.0005       0.0012	E-5	4-May-89	0.008208		1.4	0.97	17	0.005 *	0.005	0.01 *	0.01 *	0.006	0.001 *	0.05 *	0.05	
E-5         5-14-69         0.00028         0.33         0.34         11         0.005         0.001*         0.01*         0.000*         0.000*         0.001*         0.001*         0.000*         0.000*         0.000*         0.000*         0.000*         0.000*	E-5	26-May-89								-						
E.5         18-Sep-5e         0.001+46         1.3         0.13         5.2         0.01         0.025         0.025         0.005         0.001         0.000         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.00	E-5	7-Jun-89	0.00173		0.68		9.3		0.01		0.009				0.0025	
E5       25 - 25 - 45 - 60       0.021       0.022       0.000       0.0005       0.001       0.0005 <td>E-5</td> <td>5-Jul-89</td> <td>0.000928</td> <td></td> <td>0.53</td> <td>0.34</td> <td>11</td> <td>0.005 *</td> <td>0.005</td> <td>0.01 *</td> <td>0.01 *</td> <td>0.006</td> <td>0.001 *</td> <td></td> <td>0.1</td> <td></td>	E-5	5-Jul-89	0.000928		0.53	0.34	11	0.005 *	0.005	0.01 *	0.01 *	0.006	0.001 *		0.1	
E.5         22 Horse         0.005         0.0005         0.0005         0.0011         0.005         0.0005         0.0005           E.5         19-Jum-80         0.00580         c         2.7         2.2         2.3         0.0001         0.0005 <th0.0005< th=""> <th0.0005< td=""><td>E-5</td><td>18-Sep-89</td><td>0.006146</td><td></td><td>1.3</td><td>0.13</td><td>5.2</td><td>0.01 •</td><td>0.01</td><td>0.025 *</td><td>0.025 *</td><td>0.005</td><td>0.001 *</td><td>0.001 *</td><td>0.001</td><td></td></th0.0005<></th0.0005<>	E-5	18-Sep-89	0.006146		1.3	0.13	5.2	0.01 •	0.01	0.025 *	0.025 *	0.005	0.001 *	0.001 *	0.001	
E-5       16-Jan-80       0.00383       c       3.5       2.6       0.003       0.003       0.0004       0.0021       0.0005       0.0002       0.0002       0.0002       0.0002       0.00005       0.00005       0.0002       0.0002       0.00005       0.00005       0.0002       0.0002       0.0002       0.00005       0.00005       0.0002       0.0002       0.00005       0.00005       0.0002       0.0002       0.00005       0.00005       0.0002       0.00005       0.000	E-5	23-Oct-89	0.001131		0.42	0.22						0.001 *	0.001 *			
E-5         7-Feb-50         0.0027         0.0005         0.0007         0.00005         0.0005         0.0005         0.0005         0.0007         0.0005         0.00005         0.0003         0.0005         0.0005         0.0003         0.0005         0.0005         0.0003         0.0005         0.0005         0.0005         0.0005         0.0005         0.0003         0.0005	E-5	28-Nov-89	0.001675		0.29	0.2	14	0.00005 *	0.00005	0.011	0.005	0.001	0.001	0.0005 *	0.0005	
E-S.         S-Man-B0         CO0058         2.8         2.2         2.0         CO033         CO034         CO035         CO037         CO037         CO027         CO	E-5	16-Jan-90	0.00363	¢	3.5	2.6						0.005	0.0043 a			
E-6       5-Apr+60       0.001675       0.7       0.5       7.9       0.00005       0.0045       0.0018       0.0023       0.00005       0.00005         E-6       25-Jun+60       0.0007676       0.7       0.5       7.9       0.00005       0.0046       0.0018       0.0023       0.0016       0.0005         E-5       25-Jun+60       0.00024       1.1       0.17       7.3       0.00005       0.0025       0.0025       0.0005       0.0015       0.0005	E-5	7-Feb-90	0.012278	C	2.7	2.2	23	0.0001	0.0001	0.0034		0.0051	0.0037 a	0.0007	0.0008	
E-5       24 Haryed0       0.007676       0.7       0.5       7.9       0.00005       0.0046       0.0016       0.0012         E-5       25-0ur00       0.00004       c       2.8       1.8       19       0.0005       0.0098       0.014       0.00005         E-5       25-0ur00       0.00004       c       2.8       1.4       14       0.00005       0.0098       0.016       0.00005         E-5       15-3       15-3000       0.0001       0.00025       0.0026       0.00005       0.007       0.006       0.0005       0.0005       0.007       0.006       0.0005       0.007       0.007       0.0025       0.0005       0.001       0.001	E-5	9-Mar-90	0.00569		2.6	2	20	0.003	0.003	0.0004	0.0005 *	0.0027	0.0022	0.0005	0.00005	
E-5       25-June 00       0.0404 c       2.8       1.8       19       0.0005       0.079       0.014       0.00005*         E-5       25-June 00       0.00315       0.86       0.44       14       0.00005*       0.0068       0.018       0.00005*         E-5       15-Nor+00       0.29       0.28       7.1       0.0025*       0.005*       0.005*       0.005*       0.0005*       0.0005*         E-5       15-Nor+00       0.29       0.28       7.1       0.0025*       0.005*       0.005*       0.005*       0.0005*       0.009*         E-6       29-Feb-88       0.067553 c       -       -       -       0.005*       0.01*       0.077       0.006         E-6       16-May-68       0.82825 a       -       -       0.005*       0.01*       0.077       0.006         E-6       15-June 88       1.4213 a       -       -       -       0.005*       0.03       0.041       0.031       0.0025*       0.0025       -         E-6       12-June 88       1.4213 a       -       -       -       0.005*       0.03       0.031       0.041       0.031       0.0025*       0.0025       0.0025       0.0025       0.0	E-5	5-Apr-80	0.001625	C	1.7	0.48	6.2		0.00005	0.0045	0.0005 *	0.0036	0.0023	0.00005 *	0.00005	
E-5       28-Jul-60       0.00315       0.88       0.44       14       0.00005 *       0.0068       0.018       0.00005 *         E-5       18-8ap-60       0.00224       1.1       0.17       7.3       0.00005 *       0.006       0.0006 *       0.00005 *         E-5       18-8ap-60       0.00224       1.1       0.17       7.3       0.0005 *       0.005 *       0.007       0.006         E-6       14-Apr-88       1.85992 a       *       0.005 *       0.005 *       0.001 *       0.007       0.006       0.0025 *       0.002	E-5	24-May-90	0.007676		0.7	0.5	7.9	0.00005 *		0.0049		0.0018		0.012		
E-5       16-Sep-90       0.000624       1.1       0.17       7.3       0.00026 *       0.008 *       0.009       0.0006 *         E-5       15-Hon-90       0.29       0.28       7.1       0.00026 *       0.0005 *       0.005 *       0.005 *       0.005 *       0.005 *       0.001 *       0.0005 *       0.0005 *       0.001 *       0.001 *       0.002 *       0.0005 *       0.001 *       0.001 *       0.002 *       0.0005 *       0.001 *       0.001 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.0005 *       0.001 *       0.001 *       0.001 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 * </td <td>E-5</td> <td>25-Jun-90</td> <td>0.04004</td> <td>c</td> <td>2.8</td> <td>1.8</td> <td>19</td> <td>0.0005</td> <td></td> <td>0.079</td> <td></td> <td>0.014</td> <td></td> <td></td> <td></td> <td></td>	E-5	25-Jun-90	0.04004	c	2.8	1.8	19	0.0005		0.079		0.014				
E-5       15 Nov-90       0.29       0.28       7.1       0.0028       0.0005*       0.005*       0.005*       0.005*       0.0005*	E-5	26-Jul-90	0.00315		0.86	. 0.44	14	0.00005 *		0.0066		0.018		0.00005 *		
E-5       6-May-94       0.0005 *       0.005 *       0.005 *       0.005 *       0.005 *       0.002 *       0.009 *         E-6       30-Mar-98       0.05753 c       - <td>E-5</td> <td>18-Sep-90</td> <td>0.000924</td> <td></td> <td>1.1</td> <td>0.17</td> <td>7.3</td> <td>0.00005 *</td> <td></td> <td></td> <td></td> <td>0.009</td> <td></td> <td>0.00005 *</td> <td></td> <td></td>	E-5	18-Sep-90	0.000924		1.1	0.17	7.3	0.00005 *				0.009		0.00005 *		
E-6       29-Feb-86       0.07788       c         E-6       30-Mar-85       0.057553       c         E-6       14-Ap-88       1.85962       a         E-6       16-May-86       0.38285       a       0.005 °       0.01 °       0.07       0.008         E-6       16-May-86       1.4213       a	E-5	15-Nov-90			0.29	0.28	7.1	0.0026		0.0005 *		0.012				
E-6       30-Mar-88       0.057553       c         E-6       14-Apr-86       1.85992       a         E-6       16-May-88       0.39285       a       0.005 *       0.01 *       0.07       0.006         E-6       15-Jun-88       1.4213       a       *       0.005 *       0.01 *       0.07       0.006         E-6       21-Jul-88       1.8069       a       *       0.005 *       0.005       0.03       0.03       0.041       0.031       0.0025 *       0.0025 *       *         E-6       22-Nov-86       0.0923       a       *       0.005 *       0.005       0.01 *       0.001 *       0.0025 *       0.0	E-5	6-May-94						0.0005 *		0.005 *		0.005 *		0.002 *		0.009
E-6       30-Mar-88       0.057553       c         E-6       14-Apr-86       1.85992       a         E-6       16-May-88       0.39285       a       0.005 *       0.01 *       0.07       0.006         E-6       15-Jun-88       1.4213       a       *       0.005 *       0.01 *       0.07       0.006         E-6       21-Jul-88       1.8069       a       *       0.005 *       0.005       0.03       0.03       0.041       0.031       0.0025 *       0.0025 *       *         E-6       22-Nov-86       0.0923       a       *       0.005 *       0.005       0.01 *       0.001 *       0.0025 *       0.0																
E-6       14-Apr-86       1.85962       a         E-6       16-May-88       0.38265       a       0.005 °       0.01 °       0.07       0.008         E-6       15-Jun-86       1.4013       a       a       a       a       a         E-6       21-Jul-86       1.8069       a       a       a       a       a         E-6       22-Nov-88       0.012582       c       0.005 °       0.005       0.03       0.03       0.041       0.0025 °       0.0025 °       a         E-6       22-Nov-88       0.9023 a       *       0.005 °       0.005 °       0.01 °       0.001 °       0.0025 °       0.001 °       0.001 °       0.001 °       0.001 °       0.001 °       0.001 °       0.001 °       0.001 °       0.001 °       0.001 °       0.001 °       0.001 °<																
E-6       16-May-88       0.36285       a       •       0.005 °       0.01 °       0.07       0.006         E-6       15-Jun-88       1.4213       a       •       -       -       -         E-6       15-Jun-88       1.0096       a       •       -       -       -       -         E-6       22-Nov-86       0.012562       c       0.005 °       0.03       0.03       0.041       0.031       0.0025 °       •         E-6       22-Nov-86       0.0423       a       •       -       -       0.091       0.025 °       0.0025 °       •       -       <																
E-6       15-Jun-88       1.4213       a       *         E-6       21-Jul-88       1.8069       a       *         E-6       22-Hov-88       0.012582       c       0.005 * 0.005       0.03       0.03       0.041       0.031       0.0025 * 0.0025       *         E-6       22-Hov-88       0.9623       a       *       0.005 * 0.005       0.01 * 0.01 * 0.007       0.001 * 0.0025 * 0.0025       *         E-6       20-Jan-98       0.14292       a       *       0.005 * 0.005       0.01 * 0.01 * 0.007       0.001 * 0.001 * 0.0025 * 0.0025       *         E-6       17-Feb-89       0.09912       c       31       0.005 * 0.005       0.01 * 0.01 * 0.011       0.001 * 0.001 * 0.001 * 0.001       *         E-6       6-Mar-89       0.0112       c       38       0.005 * 0.005       0.01 * 0.01 * 0.011       0.001 * 0.001 * 0.001 * 0.001       *         E-6       6-Mar-89       0.02215       28       0.01 * 0.01 * 0.01 * 0.011       0.001 * 0.001 * 0.001 * 0.001 * 0.001 * 0.001 * 0.001 * 0.001 * 0.0025 * 0.0003 * 0.0001 * 0.01 * 0.01 * 0.01 * 0.01 * 0.01 * 0.00																
E-6       1.1415       a         E-6       21-Jul-88       1.8069       a         E-6       22-Nov-68       0.012562       0.005       0.005       0.03       0.03       0.041       0.031       0.0025       0.0025       *         E-6       20-Dac-88       0.9823       a       *       0.091       0.028       *         E-6       20-Jan-89       0.14262       a       *       0.091       0.007       0.001       *       0.0025       0.0025       *         E-6       20-Jan-89       0.14262       a       * <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.005 *</td> <td></td> <td>0.01 *</td> <td></td> <td>0.07</td> <td></td> <td>0.006</td> <td></td> <td></td>								0.005 *		0.01 *		0.07		0.006		
E-6       21-Nurbos       1.0006 *       0.005 *       0.005 *       0.005 *       0.003       0.03       0.041       0.0025 *       0.001 *       0.002 *       0.0002 *       0.0002 *       0.0002 *																
E-8.       20-Dec-88       0.348       a         E-8.       21-Dec-88       0.9823       a       *       0.091       0.028         E-6.       20-Jan-89       0.14292       a       *       0.001 *       0.001 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.001 *       0.					•											
E-8       21-Dac-88       0.9623       a       *       0.091       0.025         E-8       20-Jam-89       0.14292       a       *       -       -         E-8       17-Feb-89       0.09912       c       31       0.005 *       0.005       0.01 *       0.007       0.001 *       0.0025 *       0.0025 *       -         E-6       17-Feb-89       0.0112       c       38       0.005 *       0.005       0.01 *       0.01 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.002 *								0.005 *	0.005	0.03	0.03	0.041	0.031	0.0025 *	0.0025	-
E-6       20-Jan-89       0.14292       a       *         E-6       17-Feb-89       0.09912       c       31       0.005 *       0.005       0.01 *       0.007       0.001 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.001 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 * <td></td>																
E-6       17-Feb-89       0.0912       c       31       0.005 *       0.005       0.01 *       0.01 *       0.007       0.001 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.001 *       0.01 *       0.01 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0026 *       0.0026												0.091	0.028			
E-8       2-Mar-89         E-6       6-Mar-89       0.0112 c       38       0.005 * 0.005       0.01 * 0.01 * 0.011       0.001 * 0.001 * 0.001 * 0.001       *         E-6       4-May-89       0.62475 a       30       0.005 * 0.005       0.01 * 0.01 * 0.01 * 0.015       0.008       0.025 * 0.005       *         E-6       7-Jun-89       0.026215       28       0.01 * 0.01       0.0025 * 0.0025 * 0.007       0.003       0.0025 * 0.0025 * 0.0025       *         E-6       6-Jul-89       0.7098 a       64       0.005 * 0.005 0.01 * 0.01 * 0.01 * 0.01 * 0.031       0.005 * 0.0025 * 0.0026 a       0.003 0.0025 * 0.0026 a       0.003 0.001 *       *         E-6       18-Sep-89       0.12664 c       5.5       3.9					. •		••									
E-6       6-Mar-89       0.0112       c       38       0.005*       0.005       0.01*       0.01*       0.00			0.09912	¢			31	0.005 *	0.005	0.01 -	0.01 -	0.007	0.001 -	0.0025 *	0.0025	-
E-6       4-May-89       0.62475       a       30       0.005 *       0.005       0.01 *       0.01 *       0.015       0.008       0.05 *       0.005       *         E-6       7-Jun-89       0.026215       28       0.01 *       0.01       0.0025 *       0.007       0.003       0.0025 *       0.0025 *       0.007       0.003       0.0025 *       0.0025 *       0.007       0.003       0.0025 *       0.0025 *       0.007       0.003       0.0025 *       0.0025 *       0.007       0.003       0.0025 *       0.001 *       0.002 *       0.002 *       0.002 *       0.000 *       0.000 *																
E-6       7-Jun-89       0.026215       28       0.01 *       0.01       0.0025 *       0.007       0.003       0.0025 *       0.0025 *       0.007       0.003       0.0025 *       0.0025 *       0.007       0.003       0.0025 *       0.0025 *       0.007       0.003       0.0025 *       0.0025 *       0.007       0.003       0.0025 *       0.0025 *       0.001 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.005 *       0.0025 *       0.026 *       0.008 *       0.003       0.001 *       *       *       *       *       *       *       *       *       *       *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.01 *       0.025 *       0.026 *       0.003 *       0.001 *       0.002 *       0.026 *       0.003 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *       0.00005 *       0.00005 *       0.0005 *																-
E-6       6-Jul-89       0.7098       a       64       0.005 *       0.005       0.01 *       0.01 *       0.031       0.005       0.1 *       0.1       *         E-6       18-Sep-89       0.12864       c       49       0.01 *       0.01       0.025 *       0.025 *       0.026       0.026 a       0.003       0.001       *         E-6       23-Oct-89       0.0564       c       5.5       3.9       0.032       0.024 a       *       *       0.005 *       0.0005 * <td< td=""><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>•</td></td<>		-														•
E-6       18-Sep-89       0.12864 c       49       0.01 * 0.01 * 0.01 0.025 * 0.025 * 0.026       0.026 a       0.003 0.001 *         E-6       23-Oct-89       0.0564 c       5.5       3.9       0.032 0.024 a       0.032 0.024 a         E-6       28-Nov-89       0.09435 a       7.9       6.9       100       0.0009 0.00005 0.014 0.008 0.032 0.014 c       0.0005 * 0.0005 * 0.0005         E-6       16-Jan-90       0.009457 c       4.8       2.3       0.0061 0.0026       0.0028 0.0005 * 0.00005         E-6       8-Feb-90       0.035217 c       3.1       2.4       28       0.001 0.0005 * 0.0009 0.0005 * 0.0009 0.0005 * 0.00071       0.0028 0.0005 * 0.00005         E-6       9-Mar-90       0.07824 c       4       3.1       24       0.002 0.003 0.0005 * 0.0005 * 0.0005 * 0.0071       0.0028 0.0015 0.00005         E-6       5-Apr-90       0.026862 c       5.6       4.4       20       0.00005 0.0005 0.0006 0.0005 * 0.011       0.0028 0.002 0.0005																
E-6       23-Oct-89       0.0564       c       5.5       3.9       0.032       0.024       a         E-6       28-Nov-89       0.09435       a       7.9       6.9       100       0.0009       0.00005       0.014       0.008       0.032       0.014 c       0.0005 *       0.0005         E-6       16-Jan-90       0.009457 c       4.8       2.3       0.0011       0.00005       0.0029       0.0009       0.0061       0.0028       0.00005 *       0.00005         E-6       8-Feb-90       0.035217 c       3.1       2.4       28       0.0011       0.0005 *       0.0009       0.0061       0.0028       0.00005 *       0.00005         E-6       9-Mar-90       0.07824 c       4       3.1       24       0.002       0.003       0.0005 *       0.0071       0.0028       0.0015       0.00005         E-6       5-Apr-90       0.028082 c       5.6       4.4       20       0.0005 *       0.0006       0.0005 *       0.011       0.0028       0.002       0.00005					•											•
E-6       28-Nov-89       0.09435 a       7.9       6.9       100       0.0009       0.00005       0.014       0.008       0.032       0.014 c       0.0005 *       0.0005         E-6       16-Jan-90       0.009457 c       4.8       2.3       0.0081       0.0026         E-6       8-Feb-90       0.035217 c       3.1       2.4       28       0.0011       0.0005 *       0.0009       0.0061       0.0028       0.00005 *       0.00005         E-6       9-Mar-90       0.07824 c       4       3.1       24       0.002       0.003       0.0005 *       0.0071       0.0028       0.0015       0.00005         E-6       5-Apr-90       0.028082 c       5.6       4.4       20       0.0005 *       0.0005       0.0005 *       0.011       0.0028       0.002       0.0005				-		·	49	0.01 -	0.01	0.025 *	0.025 -		++	0.003	0.001	-
E-6         16-Jan-90         0.009457         c         4.8         2.3         0.0081         0.0026           E-6         8-Feb-90         0.035217         c         3.1         2.4         28         0.0011         0.00005         0.0009         0.0061         0.0028         0.00005         0.00005           E-6         9-Mar-90         0.07824         c         4         3.1         24         0.002         0.003         0.0005         0.0005         0.0071         0.0028         0.0015         0.00005           E-6         5-Apr-90         0.028082         c         5.8         4.4         20         0.00005         0.00005         0.0005         0.0005         0.011         0.0028         0.002         0.0005																
E-6 8-Feb-90 0.035217 c 3.1 2.4 28 0.0011 0.00005 0.0029 0.0009 0.0061 0.0028 0.00005 0.00005 E-6 9-Mar-90 0.07824 c 4 3.1 24 0.002 0.003 0.0005 0.0005 0.0071 0.0028 0.0015 0.00005 E-6 5-Apr-90 0.028082 c 5.6 4.4 20 0.00005 0.00005 0.0008 0.0005 0.011 0.0028 0.002 0.00005				_			100	0.0009	0.00005	0.014	0.008			0.0005 *	0.0005	
E-6 9-Mar-90 0.07824 c 4 3.1 24 0.002 0.003 0.0005 * 0.0005 * 0.0071 0.0028 0.0015 0.00005 E-6 5-Apr-90 0.026082 c 5.6 4.4 20 0.00005 * 0.00005 0.0006 0.0005 * 0.011 0.0028 0.002 0.00005							:									
E-6 5-Apr-90 0.026062 c 5.6 4.4 20 0.00005 * 0.00005 0.0006 0.0005 * 0.011 0.0026 0.002 0.00005																
E-6 24-May-90 0.011205 c 3.2 1.1 26 0.0001 0.0093 0.011 0.0045				-					0.00005		0.0005 *		0.0026		0.00005	
	E-6	24-May-90	0.011205	¢	3.2	1.1	26	0.0001		0.0093		0.011		0.0045		

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#### Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 1, Surface Water Quality

Station	Date	Ag mg/L	dissAg mg/L	Zn mg/l	dissZn mg/L	Se µg/i	F∙ µg⁄l	dissFe µg/i	Mn µg/l	dissMn µg/l	Silica µg/1	<b>dissSilice</b> µg/l
E-5	2-Mar-89	•	-	•	-	••						
E-5	6-Mar-89			0.11	0.08							
E-5	10-Apr-89											
E-5	4-May-89			0.06	0.04							
E-5	26-May-89								·			
E-5	7-Jun-89			0.013	0.005 *		2.9	0.011	0.58	0.46	ND	ND
E-5	5-Jul-89			0.12	0.12							
E-5	18-Sep-89			0.01 *	0.05							
E-5	23-Oct-89											
E-5	28-Nov-89	0.0018	0.0019	0.0078	0.0051	<1						
E-5	16-Jan-90											
É-5	7-Feb-90	0.000025 *	0.000025 *	0.016	0.011					÷		
E-5	9-Mar-90	0.00005 *	0.00005 *	0.028	0.0055							
E-5	5-Apr-90		0.000025 *	0.021	0.0051							
E-5	24-May-90	0.000025 *		0.0005 *								
E-5	25-Jun-90	0.000025 *		0.031								
E-5	26-Jul-90	0.0018		0.02								
E-5	18-Sep-90	0.0004		0.0075								
E-5	15-Nov-90	0.000025 *		0.015								
E-5	6-May-94	0.001 *		0.01 *								
E-6	29-Feb-88						*					
E-6	30-Mar-88											
E-6	14-Apr-88											
E-6	16-May-88			0.03								
E-6	15-Jun-88			0.00								
E-6	21-Jul-88											
E-6	22-Nov-88			0.07	0.01 *							
E-6	20-Dec-88											
E-6	21-Dec-88			0.23	0.064							
E-6	20-Jan-69											
E-6	17-Feb-89			0.05	0.04							
E-6	2-Mar-89											
E-6	6-Mar-89			0.15	0.007							
E-6	4-May-89			0.05	0.11							
E-6	7-Jun-89			0.014	0.005 *				•.		NC	ND
E-6	6-Jul-89			0.06	0.01 *	•	•				•	
E-6	18-Sep-89			0.01 *	0.06							
E-6	23-Oct-89											
E-6	28-Nov-89	0.0006	0.0004	0.11	0.038	<	:1					
E-6	16-Jan-90											
E-6	8-Feb-90	0.0001	0.0001	0.024	0.012							
E-6	9-Mar-90	0.00005 *		0.024	0.005							
E-6	5-Apr-90	0.000025 *		0.027	0.016							
E-6	24-May-90	0.000025 *	1	0.039								

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			ND	* indicates va = Non Detect		MDL, numt	ber to jeft is (	one half MD	L.						
Station	Date	Temp. °C	Salinity ppt	Conduct.	DO ppm	рH	Turbid. FTU	Secchi cm	Chia mg/L	F Coli MPN/100ml	TDS	TSS	TOC	NO3 mg-N/L	NH3 mg-N/L
E-6	25-Jun-90	16	0.8	1140	19	9.1	57	<b>WIH</b>	36.279		1100	270		0.06	1.5
E-6	25-Jul-90	20.5	0.0	1920	20	9.8	51		109.532	35000	1700	1200		0.015 *	3.6
E-6	6-May-94	16.6		700	3.2	7.8			0.017	33000	530	11	34	0.013 *	2.1
E-0	0-11187-04	10.0		700	J.2	7.0			0.017		000			0.05	<b>4</b> .1
E-7	29-Feb-88	13			5.5					>16				0.05 *	0.05 *
E-7	30-Mar-88	16	0		7.6				0.374		468			0.3	1.4
E-7	16-May-88	14	1	1600	2.3	7.75	11		14.8865		1100			0.015 *	86
E-7	15-Jun-88	14.9	3.2	35210	2.7	7.9			168		3200			0.05 *	170
E-7	20-Dec-88	9			10.5	7.9*	7.5		0.0663		440			0.06	0.06
E-7	20-Jan-89	11.8		412	15.2	8.7	3.5		0.047879		390			0.09	0.15
E-7	17-Feb-89	12.9		620		7	6.2		0.068074		330			0.015 *	0.12
E-7	2-Mar-89	11.2	0	221	9.8	7.7									
E-7	6-Mar-89		0	218	8.8	7.5	13		0.054761		300			0.81	0.24
E-7	4-May-89	21.8		500	10.5	8.6	14		0.344806		380			0.58	0.14
E-7	7-Jun-89	15.1	0.5	890	5.8	7.8	<b>25</b>		1.065055		630			0.09	32
E-7	6-Jul-89	completely dry													
E-7	18-Sep-89	dry													
E-7	23-Oct-89	16.1		770	8.2	7.5	-				600	32	37	0.2	0.68
E-7	28-Nov-89	10.9		520	8.4	7.5	18		0.299946		530	19		8.7	2.6
E-7	16-Jan-90	11.5	0.1	296	10.4	7					290	5.2		1.1	0.14
E-7	8-Feb-90	7		360	12.8	7.4	8		0.023581			12		0.41	0.08
E-7	9-Mar-90	13		383	12	8.1	6.5		0.0616		330	12		0.08	0.07
E-7	5-Apr-90	14.2		520	5.2	7.5	27		0.5727		400	60		0.07	0.44
E-7	24-May-90	10.8		570	5	7.2	8.3		0.3387		440	16		0.015 *	1.2
E-7	25-Jun-90	11.5	0.9	1120	0.7	7.2	93		5.63		930	380		0.015 *	49
E-7	26-Jul-90	dry													
E-8	29-Feb-88	12			6.4					>16				0.82	0.05 *
E-8	30-Mar-88	15	0		9.8				0.0493		380			0.1	0.18
E-8	16-May-88	16. <b>6</b>	0.2	650	4.5	6.99	6.1		0.088638		75000			0.015 *	0.52
E-8	22-Nov-88	13.2		600	7.25	7.6*	12		0.039012		600	ND		1.4	1.2
E-8	20-Dec-88	8.6			9.5	7.6	5.4		0.041377		510			1.5	0.12
E-8	20-Jan-89	9		405	11.8	7.65	4.1		0.047879		410			0.63	0.13
E-8	17-Feb-89	11.5	1.8	700	11.4	5.87	3.1		0.046697		340			0.16	0.025 *
E-8	2-Mar-89	10.5	0	221	10.2	7.8									
E-8	6-Mar-89	11.5	0	220	9.8	7.7	16		0.020583		320			1.1	0.38
E-8	4-May-89	19.2		490	7.4	8.3	5.7		0.039277		390			1.7	0.025 *
E-8	7-Jun-89	15.5	0.3	560	4.2	7.5	11		0.347218		390			0.06	3
E-8	6-Jul-89	completely dry			-										
E-8	18-Sep-89	dry													
E-8	23-Oct-89	14		620	7.5	. 7.2					640	55	57	6.5	4.3
E-8	28-Nov-89	8.4		520	9.6	7.5	<b>6.9</b>		0.027698		670	6.8		5.8	0.69
E-8	16-Jan-90	10.5		292	10.2	6.8					300	7.2		1.5	0.21
E-8	8-Feb-90	6		312	11.8	7.3	11		0.008609		350	18		0.57	0.07
E-8	9-Mar-90	10		340	12.5	7.9	6.4		0.0068		310	11		0.34	0.025 *

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#### Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 1. Surface Water Quality

Black         Dite         Hit3         Total P         Dite         P         descrip         Cd         descrip         cl         mg/L			un-ionized					•			amaci	ite c=chronic	violations			
mg-Hu         mg-PL         mg/L         <	Station	Dete	NH3		Total P	Diss P	DOC	Cd	dissCd	Cr	dissCr	Cu	dissCu	Pb	dissPb	total Ni
E-6       25-Jun-60       0.3015 a       4.8       2.2       7.4       0.00005 °       0.0001       0.017       0.032       0.00009         E-6       25-Jun-60       0.916 a       15       2.2       7.4       0.0005 °       0.005 °       0.005 °       0.005 °       0.005 °       0.0005 °       0.005 °       0.005 °       0.0005 °       0.005 °					ma-P/L	ma-P/L			ma/L		mg/L	mg/L	ma/L		mg/L	mg/L
E-6         28-Jui-00         0.916         15         2.6         190         0.0001         0.017         0.002         0.00005*           E-7         29-Fab-66         -         -         -         -         0.0005*         0.0005*         0.0005*         0.0002*         0.0000           E-7         29-Fab-66         -         -         -         -         -         -         0.0005*         0.0005*         0.0005*         0.0002*         0.0000           E-7         29-Fab-66         0.0122         -	E-6	25-Jun-90			-	-			•		•	0.012	•			•
E-8       6-Mary-94       0.0005 *       0.005 *								0.0001				0.032				
E-7       30-Mar-88       0.0182 c       ·         E-7       15-Mar-88       2.022 a       ·         E-7       15-Jun-88       2.0072       ·         E-7       20-bar-88       0.0072       ·         E-7       20-bar-88       0.00258       ·         E-7       20-bar-89       0.00258       ·         E-7       7-7       7-7       7-7         E-7       2-Mar-69       0.00145       ·         E-7       7-1       7-7       8-Mar-69       0.00145         E-7       7-1       7-7       8-Mar-69       0.001464       -         E-7       7-1       0.004       0.002       -       -         E-7       7-7       8-Mar-69       0.001464       0.97       0.02         E-7       7-7       8-Mar-69       0.001464       0.97       0.82         E-7       8-Mar-69       0.001464       0.97       0.92       -         E-7       8-Mar-69       0.00014       0.46       0.47       0.001       0.002         E-7       2-Mar-69       0.00014       0.46       0.44       0.46       -         E-7       2-Mar-69 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>0.009</td></td<>																0.009
E-7       30-Mar-88       0.0182 c       ·         E-7       15-Mar-88       2.022 a       ·         E-7       15-Jun-88       2.0072       ·         E-7       20-bar-88       0.0072       ·         E-7       20-bar-88       0.00258       ·         E-7       20-bar-89       0.00258       ·         E-7       7-7       7-7       7-7         E-7       2-Mar-69       0.00145       ·         E-7       7-1       7-7       8-Mar-69       0.00145         E-7       7-1       7-7       8-Mar-69       0.001464       -         E-7       7-1       0.004       0.002       -       -         E-7       7-7       8-Mar-69       0.001464       0.97       0.02         E-7       7-7       8-Mar-69       0.001464       0.97       0.82         E-7       8-Mar-69       0.001464       0.97       0.92       -         E-7       8-Mar-69       0.00014       0.46       0.47       0.001       0.002         E-7       2-Mar-69       0.00014       0.46       0.44       0.46       -         E-7       2-Mar-69 <td< td=""><td></td><td>•</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>		•														
E-7 30-marked 0.00162 0 E-7 15-0ar-88 2.022 a · E-7 15-0ar-88 2.022 a · E-7 20-0c-88 0.0072 · E-7 20-0c-88 0.00258 · E-7 20-0c-88 0.00258 · E-7 20-0c-89 0.00558 2.2 1.7 · E-7 30-0c-89 0.00558 1.7 0.41 · E-7 30-0c-89 0.00558 1.7 0.82 · E-7 30-0c-89 0.00558 1.7 0.84 · E-7 22-0c-89 0.00558 0.044 0.40 · E-4 30-0c-88 0.00014 0.8 0.77 0.84 · E-7 22-0c-89 0.00054 0.1 · 0.4 · E-3 20-0c-88 0.0009 1.5 1.2 · E-3 20-0c-88 0.00094 0.1 · 0.4 · E-3 20-0c-88 0.00058 0.88 0.88 2.1 0.005 · 0.005 0.01 · 0.01 · 0.002 0.001 · 0.0025 · 0.0025 · E-3 20-0c-88 0.00058 0.55 0.41 0.3 0.005 0.01 · 0.01 · 0.002 0.001 · 0.0025 · 0.0025 · E-3 20-0c-88 0.00058 0.55 0.55 0.01 · 0.01 · 0.002 0.001 · 0.001 · 0.0025 · 0.0025 · E-3 20-0c-88 0.00058 0.55 0.55 0.01 · 0.01 · 0.002 0.001 · 0.001 · 0.0025 · 0.0025 · E-3 20-0c-88 0.00058 0.55 0.55 0.01 · 0.01 · 0.002 0.001 · 0.001 · 0.002 · 0.001 · 0.001 · 0.002 · E-3 20-0c-88 0.00058 0.55 0.55 0.01 · 0.01 · 0.002 0.001 · 0.001 · 0.002 · 0.001 · 0.001 · 0.002 · E-3 20-0c-88 0.00058 0.55 0.55 0.01 · 0.01 · 0.002 0.001 · 0.001 · 0.002 · 0.005 · 0.005 · E-3 20-0c-88 0.00058 0.55 0.55 0.51 · 0.005 0.01 · 0.01 · 0.002 0.001 · 0.001 · 0.001 · 0.002 · E-3 20-0c-88 0.00058 0.55 0.55 0.51 · E-3 20-0c-88 0.00058 0.55 0.55 0.51 · E-3 15-8-9-80 0.00058 0.55 0.55 0.50 · E-3 15-8-9-80 0.00058 0.55 0.005 0.01 · 0.01 · 0.002 · 0.005 · 0.005 · E-3 15-8-9-80 0.00058 · E-3	E-7	29-Feb-88			•											
E-7 15-Jun-88 2.822 a · · · · · · · · · · · · · · · · · ·	E-7	30-Mar-88	0.0182	C	•											
E-7 15-Jun-88 2.822 a · · · · · · · · · · · · · · · · · ·	E-7	16-May-88	1.032		*											
E-7 20-Jan-80 0.013275 * * * * * * * * * * * * * * * * * * *		15-Jun-88	2.822	8	*											
E-7 17-Feb-80 0.000258 E-7 6-Mar-89 0.00145 E-7 6-Mar-89 0.00196 E-7 7 6-Mar-89 0.0196 E-7 7 6-Mar-89 0.0196 E-7 7 6-Mar-89 0.01968 E-7 7 6-Mar-89 0.00196 E-7 23-Oct-80 0.000268 2.2 1.7 0.0004 0.002 E-7 23-Oct-80 0.000268 2.9 2.3 E-7 16-Mar-80 0.00027 1 0.78 E-7 25-Mar-80 0.00027 1 0.78 E-7 3-Mar-80 0.00027 1 0.78 E-7 3-Mar-80 0.00027 1 0.78 E-7 24-Mar-90 0.01386 1.7 0.94 E-7 25-Mar-90 0.000358 1.7 0.94 E-8 29-Feb-88 0.00043 0.45 0.45 E-8 29-Feb-88 0.00043 0.45 0.45 E-8 29-Feb-88 0.000728 0.77 0.64 E-8 29-Feb-88 0.000728 0.77 0.64 E-8 29-Feb-88 0.000728 0.77 0.64 E-8 29-Mar-90 0.000728 0.56 0.41 0.3 0.005 0.001 0.001 0.002 0.001 0.0025 0.0025 E-8 324Mar-90 0.000728 0.58 0.86 21 0.0005 0.01 0.01 0.01 0.0022 0.001 0.0025 0.0025 E-8 324Mar-90 0.000728 0.58 0.41 0.3 0.005 0.005 0.01 0.01 0.000 0.0001 0.002 0.001 0.0025 0.0025 E-8 4Mar-90 0.000728 0.58 0.41 0.3 0.005 0.005 0.01 0.01 0.0002 0.001 0.002 0.001 0.0025 0.0025 E-8 324Mar-90 0.000728 0.58 0.58 0.41 0.3 0.005 0.01 0.01 0.000 0.000 0.002 0.001 0.002 0.0000 0.000 0.000 0.000 0.0000 0.000 0.000 0.00	E-7	20-Dec-88	0.00072		•											
E-7 17-Feb-80 0.000258 E-7 6-Mar-89 0.00145 E-7 6-Mar-89 0.00196 E-7 7 6-Mar-89 0.0196 E-7 7 6-Mar-89 0.0196 E-7 7 6-Mar-89 0.01968 E-7 7 6-Mar-89 0.00196 E-7 23-Oct-80 0.000268 2.2 1.7 0.0004 0.002 E-7 23-Oct-80 0.000268 2.9 2.3 E-7 16-Mar-80 0.00027 1 0.78 E-7 25-Mar-80 0.00027 1 0.78 E-7 3-Mar-80 0.00027 1 0.78 E-7 3-Mar-80 0.00027 1 0.78 E-7 24-Mar-90 0.01386 1.7 0.94 E-7 25-Mar-90 0.000358 1.7 0.94 E-8 29-Feb-88 0.00043 0.45 0.45 E-8 29-Feb-88 0.00043 0.45 0.45 E-8 29-Feb-88 0.000728 0.77 0.64 E-8 29-Feb-88 0.000728 0.77 0.64 E-8 29-Feb-88 0.000728 0.77 0.64 E-8 20-Mar-80 0.000278 0.56 0.41 0.3 0.005 0.001 0.001 0.002 0.001 0.0025 0.0025 E-8 40-Mar-90 0.000280 0.88 0.88 21 0.0005 0.001 0.01 0.001 0.0025 0.0025 E-8 3-Mar-90 0.000280 0.58 0.41 0.3 0.005 0.01 0.01 0.002 0.001 0.0025 0.0025 E-8 3-Mar-90 0.000280 0.58 0.58 0.41 0.3 0.005 0.01 0.01 0.0002 0.001 0.0025 0.0025 E-8 4-Mar-90 0.000280 0.58 0.58 0.41 0.3 0.005 0.005 0.01 0.01 0.0002 0.001 0.002 0.001 0.0025 0.0025 E-8 3-Mar-90 0.000280 0.58 0.58 0.41 0.3 0.005 0.005 0.01 0.001 0.002 0.001 0.002 0.0005 0.005 E-8 10-Mar-90 0.000280 0.58 0.58 0.41 0.3 0.005 0.005 0.01 0.007 0.002 0.001 0.002 0.0025 0.0025 E-8 10-Mar-90 0.000280 0.58 0.58 0.41 0.3 0.005 0.005 0.01 0.007 0.0022 0.001 0.005 0.005 E-8 10-Mar-90 0.000280 0.58 0.58 0.41 0.3 0.005 0.005 0.01 0.001 0.002 0.001 0.005 0.005 E-8 10-Mar-90 0.000280 0.58 0.58 0.41 0.3 0.005 0.005 0.01 0.007 0.0022 0.0025 0.0025 E-8 10-Mar-90 0.000280 0.58 0.58 0.41 0.3 0.005 0.005 0.01 0.007 0.002 0.0005 0.005 E-8 10-Mar-90 0.000280 0.58 0.58 0.41 0.3 0.005 0.005 0.01 0.007 0.0022 0.0025 0.0025 E-8 10-Mar-90 0.000280 0.58 0.58 0.41 0.58 0.005 0.005 0.005 0.001 0.007 0.0002 0.0025 0.0025 0.0025 0.0025 0.0025 0.0025 0.0025 0.0025 0.0025 0.0025 0.0025 0.0025 0.0025 0.0025 0.0005 0.001 0.0007 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0	E-7	20-Jan-89	0.013275		•	٠	+									
E-7       2-Mar-80         E-7       6-Mar-80       0.00145         E-7       6-Mar-80       0.0196         E-7       7-Jun-80       0.4736         E-7       7-Jun-80       0.005566       2.2         E-7       16-Sap-80       0.000246       0.0002         E-7       16-Sap-80       0.000246       0.0002         E-7       16-Sap-80       0.000246       0.2         E-7       16-Sap-80       0.000246       0.2         E-7       16-Sap-80       0.000246       0.41         E-7       16-Sap-80       0.000246       0.41         E-7       16-Sap-80       0.000246       1.7         E-7       16-Sap-80       0.000142       0.0002         E-7       24-Mary-80       0.003386       1.7       0.94         E-7       25-Jun-80       0.00044       0.40       1.6         E-7       25-Jun-80       0.00043       0.45       0.45         E-6       29-Fab-88       0.44       0.40       1.2         E-6       29-Fab-88       0.44       0.40       1.2         E-6       29-Fab-88       0.0004       0.1*       0.01*       0.001*<		17-Feb-89	0.000258													
E-7       44my-69       0.0196         E-7       6-Jul-89         E-7       6-Jul-89         E-7       16-3mp-99         E-7       23-Oct-89       0.000296         E-7       23-Oct-89       0.000297         E-7       23-Oct-89       0.000297         E-7       25-Mar-90       0.00027         E-7       10-78         E-7       24-May-80       0.00124         0.0012       0.0002         E-7       25-Jun-80       0.003396         1.7       0.94         E-7       25-Jun-80       0.03396         1.7       0.94         E-7       25-Jun-80       0.03396         1.7       0.94         E-7       25-Jun-80       0.00144         0.44       0.40         E-7       25-Jun-80       0.00144         0.44       0.40         E-7       25-Jun-80       0.00044         0.10       0.44       0.40         E-8       20-Mar-88       0.0014       0.4         E-4       20-Jun-89       0.00096       1.5         E-5       22-Mar-88       0.00014       0.4 <tr< td=""><td></td><td>2-Mar-89</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr<>		2-Mar-89														
E-7       7-Jun-89       0.4736       a         E-7       6-Jul-89       b       c       2.2       1.7         E-7       18-Sap-80       0.0002596       2.2       1.7       0.001       0.002         E-7       25-Nov-80       0.000299       1.7       0.41       0.0012       0.0002         E-7       16-Jan-90       0.00029       1.7       0.41       0.0012       0.0002         E-7       5-Apr-60       0.003396       1.7       0.44       0.82       0.82         E-7       5-Apr-60       0.003396       1.7       0.44       0.40       0.5         E-7       24-May-30       0.003396       1.0.5       0.5       0.01       0.01       0.002         E-7       25-Apr-60       0.03396       1.7       0.44       0.45       0.45       0.45       0.45       0.45         E-7       25-Apr-60       0.03396       0.45       0.45       0.45       0.46	E-7	6-Mar-89	0.00145													
E-7       6-Jul-80         E-7       18-Sap-88         E-7       23-Oxt-88       0.0002696       2.2       1.7         E-7       25-Nov-88       0.000269       1.7       0.41         E-7       16-Jan-80       0.00027       1       0.78         E-7       5-Apr-90       0.000366       0.97       0.82         E-7       5-Apr-90       0.003186       0.97       0.82         E-7       25-Jun-60       0.00366       1.7       0.94         E-7       25-Jun-60       0.03362       1.7       0.94         E-7       25-Jun-60       0.03366       1.7       0.94         E-7       25-Jun-60       0.03367       a       7.1         E-7       28-Jul-60       0.001286       0.44       0.40         E-8       10-Mars8       0.00094       1.5       1.2         E-8       20-Jun-80       0.00096       1.5       1.2         E-8       12-Jun-80       0.00096       0.77       0.64         E-8       12-Jun-85       0.00058       0.01 *       0.01 *       0.001 *       0.001 *         E-8       12-Jun-86       0.000582       0.88       0.	E-7	4-May-89	0.0196													
E-7       18-Sep-86         E-7       23-0x1-80       0.005566       2.2       1.7         E-7       25-Hor-86       0.014684       2.9       2.3         E-7       16-Jan-40       0.00029       1.7       0.41       0.0012       0.0002         E-7       16-Jan-40       0.00129       1.0       0.78       0.0012       0.0002         E-7       5-Apr-50       0.00312       1       0.66       0.0012       0.0002         E-7       25-Mar-80       0.003396       1.7       0.94       0.77       0.94         E-7       25-Jun-90       0.33867       a       9.7       7.1	E-7	7-Jun-89	0.4736													
E-7       23-Oct-969       0.005968       2.2       1.7         E-7       16-4n-00       0.000269       1.7       0.41       0.0012       0.0002         E-7       16-4n-00       0.00029       1       0.78       0.0012       0.0002         E-7       54-59-60       0.00027       1       0.78       0.0012       0.0002         E-7       54-59-60       0.000312       1       0.6       0.0014       0.0014         E-7       24-Mar-90       0.00316       1.7       0.94       0.0014       0.0014         E-7       24-Mar-90       0.00346       1.7       0.94       0.0014       0.0014         E-7       24-Mar-90       0.00345       0.44       0.40       0.4       0.41         E-7       25-Jun-90       0.00343       0.45       0.44       0.40       0.01       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025	E-7	6-Jul-89														
E-7       28-Nov-58       0.014644       c       2.9       2.3         E-7       16-Jan-60       0.000299       1.7       0.41       0.0012       0.0002         E-7       8-Fab-60       0.001248       0.977       0.92         E-7       9-Mar-90       0.00128       1.7       0.41         E-7       9-Mar-90       0.00128       1.7       0.92         E-7       24-May-90       0.00336       1.7       0.94         E-7       25-Jun-90       0.03367       a       9.7       7.1         E-7       28-JuH90       0.03367       a       9.7       7.1         E-7       28-JuH90       0.03367       a       9.7       7.1         E-8       29-Feb-88       0.044       0.40	E-7	18-Sep-89														
E-7       16-Jan-80       0.000269       1.7       0.41       0.0012       0.0012       0.0002         E-7       8-Feb-60       0.00027       1       0.78       0.02       0.0012       0.0002         E-7       8-Feb-60       0.00148       0.077       0.92       0.0012       0.0012       0.0012         E-7       5-Apr-60       0.00312       1       0.6       0.0012       0.0012       0.0012         E-7       24-May-60       0.003396       1.7       0.94       0.97       0.92       0.0148       0.45         E-7       25-Jun-60       0.033867       a       9.7       7.1       0.94       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0025       0.002	E-7	23-Oct-89	0.005596		2.2	1.7						0.004	0.002			
E-7       8-Feb-80       0.00027       1       0.78         E-7       9-Man=40       0.001846       0.97       0.92         E-7       9-Man=40       0.003396       1.7       0.94         E-7       24-May=90       0.03396       1.7       0.94         E-7       25-Jun=90       0.33867       a       9.7       7.1         E-7       25-Jun=90       0.33867       a       9.7       7.1         E-8       10-Man=88       0.000443       0.45       0.45         E-8       10-Man=88       0.00014       0.8       0.74         E-8       20-Jun=08       0.000728       0.77       0.64         E-8       20-Jun=89       0.000844       0.1*       0.4         E-8       20-Jun=89       0.29       0.21       8.2       0.005*       0.01*       0.002       0.001*       0.0025*       0.0025         E-8       12-Man=89       0.003629       0.88       0.86       2.1       0.005*       0.01*       0.01*       0.001*       0.001*       0.001*       0.001*       0.001*       0.001*       0.001*       0.001*       0.001*       0.001*       0.001*       0.001*       0.001*	E-7	28-Nov-89	0.014664	C	2.9	2.3										
E-7       9-Mar-90       0.001848       0.97       0.92         E-7       5-Apr-90       0.00312       1       0.6         E-7       5-Apr-90       0.00312       1       0.6         E-7       25-Jun-90       0.13867 a       9.7       7.1         E-7       25-Jun-90       0.13867 a       9.7       7.1         E-7       25-Jun-90       0.13867 a       9.7       7.1         E-8       30-Mar-98       0.000443       0.40	E-7	16-Jan-90	0.000269		1.7	0.41						0.0012	0.0002			
E-7 5-Apr-80 0.00312 1 0.6 E-7 24-May-90 0.003396 1.7 0.94 E-7 25-Jun-90 0.13867 a 9.7 7.1 E-7 25-Jun-90 0 E-8 29-Feb-88 0.00144 0.40 E-8 29-Feb-88 0.00144 0.45 0.45 E-8 16-May-88 0.00104 0.8 0.74 E-8 22-Nov-88 0.00099 1.5 1.2 E-8 20-Jan-89 0.00084 0.1 * 0.4 E-8 20-Jan-89 0.00084 0.1 * 0.4 E-8 20-Jan-89 0.00084 0.1 * 0.4 E-8 21-Nov-88 0.0001538 0.58 0.41 8.2 0.005 * 0.005 0.01 * 0.01 * 0.002 0.001 * 0.0025 * 0.0025 E-8 4-May-89 0.003629 0.88 0.86 21 0.005 * 0.005 0.01 * 0.01 * 0.002 0.001 * 0.001 * 0.001 E-8 4-May-89 0.001538 0.58 0.41 8.3 0.005 * 0.005 0.01 * 0.01 * 0.002 0.001 * 0.001 * 0.001 E-8 4-May-89 0.001538 0.58 0.41 8.3 0.005 * 0.005 0.01 * 0.01 * 0.002 0.001 * 0.001 * 0.005 E-8 6-Jul-89 0.01538 0.58 0.41 8.3 0.005 * 0.005 0.01 * 0.01 * 0.002 0.001 * 0.005 * 0.005 E-8 18-Sep-89 0.000036 E-8 18-Sep-89 0.000035 E-8 18-Sep-89 0.00000	E-7	8-Feb-90	0.00027		1	0.78										
E-7       24-May-90       0.003396       1.7       0.94         E-7       25-Jun-90       0.13867       a       9.7       7.1         E-7       25-Jun-90       0.13867       a       9.7       7.1         E-7       25-Jun-90       0.13867       a       9.7       7.1         E-7       28-Jun-90       0.13867       a       9.7       7.1         E-8       29-Feb-85       0.00141       0.45       0.45       0.45         E-8       16-Mey-85       0.00141       0.8       0.74       0.64         E-8       20-Jan-86       0.000726       0.77       0.64       0.44       0.44         E-8       20-Jan-89       0.00284       0.1       0.4       0.4       0.44         E-8       20-Jan-89       0.00284       0.1       0.4       0.4       0.005       0.01       0.002       0.001       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025       0.001       0.001       0.001       0.001       0.001       0.001       0.001       0.001       0.001       0.001       0.001       0.001       0.001       0.00	E-7	9-Mar-90	0.001848		0.97	0.92										
E-7       25-Jun-90       0.13867 a       9.7       7.1         E-7       28-Jul-90       0.13867 a       9.7       7.1         E-7       28-Jul-90       0       0.13867 a       9.7       7.1         E-8       29-Feb-88       0.000443       0.40       0.45       0.45         E-8       16-May-86       0.000443       0.45       0.45         E-8       16-May-86       0.0009       1.5       1.2         E-8       22-Nov-86       0.00096       1.5       1.2         E-8       20-Dac-86       0.000726       0.77       0.64         E-8       17-Feb-86       0.29       0.21       8.2       0.005 *       0.01 *       0.01 *       0.002 *       0.001 *       0.0025 *       0.0025 *         E-8       17-Feb-86       0.29       0.21       8.2       0.005 *       0.01 *       0.01 *       0.001 *       0.001 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.001 *       0.001 *       0.001 *       0.001 *       0.001 *       0.002 *       0.001 *       0.002 *       0.001 *       0.002 *       0.001 *       0.002 *       0.0025 *       0.002	E-7	5-Apr-90	0.00312			0.6										
E-7       29-Jul-90         E-8       29-Feb-88       0.44       0.40         E-8       30-Man-88       0.000443       0.45       0.44         E-8       30-Man-88       0.00104       0.8       0.74         E-8       16-May-88       0.0009       1.5       1.2         E-8       20-Jan-89       0.00084       0.1       0.4         E-8       17-Feb-89       0.29       0.21       8.2       0.005       0.01       0.01       0.0022       0.001       0.0025       0.0025         E-8       2-Man-89       0.003629       0.88       0.86       21       0.005       0.01       0.01       0.002       0.001       0.001       0.001       0.002       0.001       0.001       0.002       0.001       0.002       0.001       0.002       0.001       0.002       0.001       0.002       0.001       0.002       0.002 <td< td=""><td>E-7</td><td>24-May-90</td><td>0.003396</td><td></td><td>1.7</td><td>0.94</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	E-7	24-May-90	0.003396		1.7	0.94										
E-8       29-Feb-86       0.44       0.40         E-8       30-Mar-88       0.000443       0.45       0.45         E-8       16-May-86       0.00104       0.8       0.74         E-8       16-May-86       0.00099       1.5       1.2         E-8       20-Dac-86       0.000726       0.77       0.64         E-8       20-Jan-89       0.00084       0.1       0.4         E-8       17-Feb-89       0.20       0.21       8.2       0.005       0.01       0.01       0.002       0.001       0.0025       0.0025         E-8       2-Mar-89       0.203629       0.86       0.86       21       0.005       0.01       0.01       0.002       0.001       0.001       0.001       0.0025       0.0025       0.001         E-8       6-Mar-89       0.003629       0.86       0.86       21       0.005       0.01       0.01       0.002       0.001       0.001       0.001       0.002       0.001       0.001       0.002       0.001       0.002       0.001       0.002       0.001       0.002       0.001       0.002       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025 </td <td>E-7</td> <td>25-Jun-90</td> <td>0.13867</td> <td>8</td> <td>9.7</td> <td>7.1</td> <td></td>	E-7	25-Jun-90	0.13867	8	9.7	7.1										
E-8       30-Mar-88       0.000443       0.45       0.45         E-8       16-May-88       0.00104       0.8       0.74         E-8       16-May-88       0.0009       1.5       1.2         E-8       20-Dac-68       0.000726       0.77       0.64         E-8       20-Jac-68       0.000844       0.1       0.4         E-8       17-Feb-89       0.29       0.21       8.2       0.005       0.01 *       0.01 *       0.0025 *       0.0025 *         E-8       4-Mar-89       0.001538       0.58       0.41       8.3       0.005 *       0.005       0.01 *       0.001 *       0.001 *       0.001 *       0.0025 *	E-7	<b>26-Jul-90</b>														
E-8       30-Mar-88       0.000443       0.45       0.45         E-8       16-May-88       0.00104       0.8       0.74         E-8       16-May-88       0.0009       1.5       1.2         E-8       20-Dac-68       0.000726       0.77       0.64         E-8       20-Jac-68       0.000844       0.1       0.4         E-8       17-Feb-89       0.29       0.21       8.2       0.005       0.01 *       0.01 *       0.0025 *       0.0025 *         E-8       4-Mar-89       0.001538       0.58       0.41       8.3       0.005 *       0.005       0.01 *       0.001 *       0.001 *       0.001 *       0.0025 *	<b>E.</b> •	20.E.b.88			0.44	0.40										
E-8 16-Mary-88 0.00104 0.8 0.74 E-8 22-Nov-88 0.000728 0.77 0.64 E-8 20-Dec-88 0.000728 0.77 0.64 E-8 20-Jan-89 0.000884 0.1 ° 0.4 E-8 17-Feb-89 0.29 0.21 8.2 0.005 ° 0.005 0.01 ° 0.01 ° 0.002 0.001 ° 0.0025 ° 0.0025 E-8 2-Mar-89 0.003629 0.88 0.96 21 0.005 ° 0.005 0.01 ° 0.01 ° 0.005 0.001 ° 0.001 ° 0.001 E-8 4-Mary-89 0.001538 0.56 0.41 8.3 0.005 ° 0.005 0.01 ° 0.01 ° 0.002 0.001 ° 0.05 ° 0.05 E-8 7-Jun-88 0.02418 c 17 0.01 0.01 0.0025 ° 0.0005 ° 0.0005 ° 0.005			0.000442													
E-8       22-Nov-88       0.0099       1.5       1.2         E-8       20-Dac-88       0.000728       0.77       0.64         E-8       20-Jan-89       0.000884       0.1       0.4         E-8       17-Feb-89       0.29       0.21       8.2       0.005       0.01       0.01       0.002       0.001       0.0025       0.0025         E-8       17-Feb-89       0.003629       0.88       0.86       21       0.005       0.005       0.01       0.01       0.002       0.001       0.002       0.001       0.001       0.001       0.002       0.001       0.002       0.001       0.002       0.001       0.002       0.001       0.002       0.002       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025       0.0025												~				
E-8       20-Dec-88       0.000728       0.77       0.84         E-8       20-Jan-89       0.000884       0.1 *       0.4         E-8       17-Feb-89       0.29       0.21       8.2       0.005 *       0.005       0.01 *       0.002       0.001 *       0.0025 *       0.0025         E-8       17-Feb-89       0.003629       0.88       0.86       21       0.005 *       0.005       0.01 *       0.01 *       0.002 *       0.001 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.000 *       0.00																
E-8       20-Jan-89       0.000884       0.1 *       0.4         E-8       17-Feb-89       0.29       0.21       8.2       0.005 *       0.005 *       0.01 *       0.002       0.001 *       0.0025 *       0.0025 *         E-8       2-Mar-89       0.003629       0.88       0.86       21       0.005 *       0.005 *       0.01 *       0.01 *       0.002 *       0.001 *       0.002 *       0.000 *       0.000 *       0.000 * <td></td>																
E-8       17-Feb-89       0.29       0.21       8.2       0.005 *       0.005       0.01 *       0.01 *       0.002       0.01 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.0025 *       0.001 *       0.002 *       0.001 *       0.002 *       0.000 *       0.000 *       0.000 *																
E-8       2-Mar-89         E-8       6-Mar-89       0.003629       0.88       0.86       21       0.005 *       0.005       0.01 *       0.005       0.001 *       0.002 *       0.001 *       0.002 *       0.000 *       0.000 *       0.000 *       0.000 *       0.000 *       0.000 *       0.000 *       0.000 *       0.000 *       0.000 *       0.000 *			0.000004					0.005 1	0.005	0.04.1	0.04 *	0.000	0.001 1	0.0005 1	0.0005	
E-8       6-Mar-89       0.003629       0.88       0.86       21       0.005 *       0.005       0.01 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.002 *       0.000 *       0.000 *       0.000 *       0.000 *       0.000 *       0.000 *       0.0000 *       0.000					0.28	0.21	9.2	0.000	0.000	0.01	0.01	0.002	0.001	0.0025	0.0025	
E-8       4-May-89       0.001538       0.56       0.41       8.3       0.005 *       0.005       0.01 *       0.01 *       0.002       0.001 *       0.05 *       0.05         E-8       7-Jun-89       0.02418 c       17       0.01       0.01       0.0025 *       0.0025 *       0.004       0.002       0.0025 *       0.0025 *       0.002       0.0025 *       0.0025 *       0.002       0.0025 *       0.0025 *       0.002       0.0025 *       0.0025 *       0.002       0.0025 *       0.0025 *       0.002       0.0025 *       0.0025 *       0.002       0.0025 *       0.0025 *       0.002       0.0025 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *			0 003030		0.99	0.00	24	0.008 1	0.005	0.04.4	0.04 *	0.005	0.004	0.004 *	0.004	
E-8       7-Jun-89       0.02418 c       17       0.01       0.01       0.0025 *       0.004       0.002       0.0025 *       0.0025         E-8       6-Jul-89       0.015007 c       0       0       0.01       0.0025 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *       0.0005 *       0.0024 *       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014       0.0014																
E-8 6-Jul-89 0.015007 c E-8 18-Sep-89 0.003008 E-8 23-Oct-89 0.000235 6.4 5.6 0.037 0.027 a E-8 28-Nov-89 0.000174 1.5 1.1 24 0.0003 0.0001 0.002 0.001 0.004 0.007 0.0005 * 0.0005 E-8 16-Jan-90 0.000335 1.3 0.15 * 0.0024 0.0014					0.36	0.41										
E-8 18-Sep-89 0.003008 E-8 23-Oct-89 0.000235 6.4 5.6 0.037 0.027 a E-8 28-Nov-89 0.000174 1.5 1.1 24 0.0003 0.0001 0.002 0.001 0.004 0.007 0.0005 0.0005 E-8 16-Jan-90 0.000335 1.3 0.15 * 0.0024 0.0014							17	0.01	0.01	0.0025 -	0.0025 "	0.004	0.002	0.0025 *	0.0020	
E-8 23-Oct-89 0.000235 6.4 5.6 0.037 0.027 a E-8 28-Nov-89 0.000174 1.5 1.1 24 0.0003 0.0001 0.002 0.001 0.004 0.007 0.0005 0.0005 E-8 16-Jan-90 0.000335 1.3 0.15 ° 0.0024 0.0014																
E-8 28-Nov-89 0.000174 1.5 1.1 24 0.0003 0.0001 0.002 0.001 0.004 0.007 0.0005 0.0005 E-8 16-Jan-90 0.000335 1.3 0.15 0 0.0024 0.0014		•										0.027	0.007 -			
E-8 16-Jan-90 0.000335 1.3 0.15 * 0.0024 0.0014								0.0000	0.0004	0.000	0.004			0.000E +	0.0007	
							24	0.0003	0.0001	0.002	0.001			0.0005 -	0.0005	
E-6 0-140-50 0.00003 0.43 0.24 11 0.0003 0.0001 0.0005 0.0005 0.0007 0.0017 0.0017 0.0005 0.00005								0.0002	0.0004	0.0005 -	0.0005 -			0.0005	0.00007	,
E-8 9-Mar-90 0.0001 0.43 0.3 9.1 0.002 0.002 0.0005 * 0.0005 * 0.0024 0.002 0.0007 0.00005	6-0	OS-MIN-S	0.0001		U.43	0.3	<b>U</b> .1	U.UU4	0.002	0.0003 *	v.0005 *	0.0024	0.002	V.UUU/	0.0000	

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#### Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 1. Surface Water Quality

Station	Date	Ag mg/L	dissAg mg/L	Zn mg/l	dissZn mg/L	Se µg/l	Fe µg/i	dissFe µg/l	Mn µg/i	dissMn µg/l	Silica µg/i	dissSilica µg/i
E-6	25-Jun-90	0.000025 *		0.023								
E-6	26-Jul-90	0.0003		0.3								
E-6	6-May-94	0.001 *		0.01 *								
E-7	29-Feb-88											
E-7	30-Mar-88											
E-7	16-May-88											
E-7	15-Jun-88											
E-7	20-Dec-88											
E-7	20-Jan-89											
E-7 E-7	17-Feb-89 2-Mar-89											
E-7	2-Mar-89 6-Mar-89											
E-7	<b>4-May-89</b>											
E-7	4-may-09 7-Jun-89										ND	ND
E-7	6-Jul-89										RL	
E-7	18-Sep-89											
E-7	23-Oct-89			•								
E-7	28-Nov-89					<1						
E-7	16-Jan-90											• .
E-7	8-Feb-90											
E-7	9-Mar-90											
E-7	5-Apr-90											
E-7	24-May-90											
E-7	25-Jun-90											
E-7	26-Jul-90											
E-8	29-Feb-88											
E-8	30-Mar-88								•			
E-8	16-May-88											
E-8	22-Nov-88											
E-8	20-Dec-88											
E-8	20-Jan-89											
E-8	17-Feb-89			0.01 *	0.01 *							
E-8	2-Mar-89											
E-8	6-Mar-89			0.03	0.05							
E-8	4-May-89		•	0.04	0.06							
E-8	7-Jun-89			0.014	0.005 *						NC	D ND
E-8	6-Jul-89						•					
E-8 E-8	18-Sep-89 23-Oct-89											
E-8	23-Oct-89 28-Nov-89	0.00005 *	0.00005 *	0.03	0.040	<1						
E-8	26-Nov-69 16-jan-90	0.00005 -	0.00005 -	0.03	0.018							
E-8	8-Feb-90	0.000025 *	0.000025 *	0.02	0.012							
E-8	9-Mar-90	0.000025 *	0.00005 *	0.0063	0.0078							
	0-100	0.0000	<b>0.0000</b>	J.VVVJ	3.0010							

#### Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 1. Surface Water Quality

## \* indicates value below MDL, number to left is one half MDL.

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			ND	= Non Detect	abie											
Station	Dete	Temp.	Selinity	Conduct.	DO	pH	Turbid.	Secchi	Chia	F Coll	TDS	TS	8	TOC	NOS	NHS
		•C	ppt		ppm		FTU	cm	mg/L	MPN/100ml					mg-N/L	mg-N/L
E-8	5-Apr-90	12.5		500	7.6	7	4		0.016		390	2	*		0.04	0.025 *
E-8	24-May-90	11.9		510	6.8	7.3	4.2		0.0271		440	<10			0.26	0.025 *
E-8	25-Jun-90	13.3	0.2	580	5.2	7.4	4		0.1129		510	19			0.03	2.8
E-8	26-jul-90	dry														

#### WQ1-1. Appendix Page 16

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1970 MR348 484 484

		un-ionized							8=80	ute c=chroni	c violations			
Station	Date	NH3	Total P	Diss P	DOC	Cd	dissCd	Cr	dissCr	Cu	dissCu	РЬ	dissPb	total Ni
		mg-N/L	mg-P/L	mg-P/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/i.	mg/L	mg/L	mg/L
E-8	5-Apr-90	0.014616	0.3	0.24	7.1	0.00005 *	0.00005	0.0005 *	0.0005 *	0.0017	0.0011	0.0006	0.00005	
E-8	24-May-00	0.0001	0.77	0.66	8.2	0.00005 *		0.0021		0.001		0.0063		
E-8	25-Jun-00	0.014616 c	1.5	1.2	9.2	0.0002		0.0005 *		0.0021		0.00005 *		
E-8	26-Jul-90													

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Station	Dete	Ag mg/L	dissAg mg/L	Zn mg/l	dissZn mg/L	8е µg/i	Fe µg/l	dissFe µg/l	Mn µg/l	dissMn µg/i	Silica µg/1	dissSilica µg/i
E-8 E-8 E-8	5-Apr-90 24-May-90 25-Jun-90	0.000025 * 0.000025 * 0.000025 *	0.000025 *	0.014 0.006 0.0046	0.0073							
E-8	26-Jul-90	0.000020										

WQ1-1. Appendix Page 18

and the advertise for the transformer

### Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 2. Field Parameters

E-1         29 Fab-58         11         14         23         75         91.5           E-3         29 Fab-58         15         6         3.0         61           E-4         29 Fab-58         15         6         3.0         61           E-5         29 Fab-58         14         23         5.5         61           E-6         29 Fab-58         14         1.5         5.5         6           E-7         29 Fab-58         110         70         0         10.5         32         8.5         70           E-1         30 Mar-88         11:10 AM         70         0         10.5         32         8.5         70           E-3         30 Mar-88         71:130 A         152         0         12         31.5         8.4         65           E-3         30 Mar-88         71:30 A         152         12         31.5         8.4         65           E-3         30 Mar-88         71:30 A         44         15         31.5         8.4         65           E-3         30 Mar-88         11:40 AM         44         15         31.5         8.4         61           E-3         30 Mar-88	Station	Date	Time	Water Column Depth	Samp. Dep. cm	Temp. *C	Salinity ppt	Conduct.	DO	pH	Turbid.	Secchi cm	Flow cfs
E-3       29Fab-88       14       23       7.5       91.5         E-4       29Fab-88       15       6       3.0       91.5         E-6       29Fab-88       15       6       3.0       91.5         E-7       29Fab-88       13       5.5       5.5       5.5         E-8       29Fab-88       1110 AM       70       0.0.5       32       8.5       70         E1       30-Mar-88       1110 AM       70       10.5       32       8.5       70         E2       30-Mar-88       11130 A       152       0       12       31.5       8.4       65         E2       30-Mar-88       71130 A       152       0       12       31.5       8.4       65         E3       30-Mar-88       1146 AM       44       15       31.5       8.4       65         E4       30-Mar-88       100 PM       100       0       17       12.5       14       90         E4       30-Mar-88       100 PM       100       0       15       0       90         E5       30-Mar-88       12.0 PM       100       16       0       7.6       90 <t< td=""><td></td><td></td><td></td><td></td><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>						-							
E-4       28-Fab-88       15       7       4.0       61         E-5       28-Fab-88       14       1.6       61         E-7       28-Fab-88       12       6.4       61         E1       30-Mar-88       11:10 AM       70       0       10.5       32       6.5         E1       30-Mar-88       11:10 AM       70       0       10.5       32       6.5       70         E1       30-Mar-88       11:10 AM       70       0       12       31.5       6.4       65         E2       30-Mar-88       11:10 AM       70       105       32       6.5       70         E2       30-Mar-88       11:10 AM       70       10.5       32       6.5       70         E3       30-Mar-88       11:10 AM       44       0       15       31.5       6.4       65         E4       30-Mar-88       11:10 AM       44       0       15       31.5       6.4       65         E5       30-Mar-88       11:40 AM       44       0       15       6.5       51         E5       30-Mar-88       12:00 PM       100       16       13.5       6.4       51 <td></td>													
E-5       25 Frab-86       15       6       3.0       61         E-5       25 Frab-86       13       5.5       5.5         E-7       25 Frab-86       12       6.4         E1       30-Man-86       11:10 AM       70       0       10.5       32       6.5         E1       30-Man-86       11:10 AM       70       0       10.5       32       6.5         E2       30-Man-86       11:10 AM       70       10       15       8.6       65         E3       30-Man-86       11:10 AM       70       10       15       32       6.5       66         E3       30-Man-86       11:10 AM       44       0       15       31.5       8.4       65         E3       30-Man-86       11:06 AM       44       0       15       31.5       8.4       51         E4       30-Man-86       120 PM       >100       10       17       12.5       14       30         E5       30-Man-86       130 PM       100       10       17       12.5       14       30         E6       30-Man-86       33:10 PM       0       15       0       9.5       137													
E-5       29-Fabe83       14       1.6         E-7       29-Fabe83       13       5.5         E-8       29-Fabe83       12       6.4         E1       30-Mare88       11:10 AM       70       0       10.5       32       8.5       70         E1       30-Mare88       11:10 AM       70       10.5       32       8.5       70         E2       30-Mare88       11:10 AM       70       10.5       31.5       8.4       65         E2       30-Mare88       11:46 AM       44       16       31.5       8.4       65         E3       30-Mare88       11:46 AM       44       16       18       8.8       51         E4       30-Mare88       12:40 PM       40       16       18       8.8       51         E4       30-Mare88       12:40 PM       100       17       12:5       14       30         E5       30-Mare88       100 PM       100       16       13:5       8.4       9         E5       30-Mare88       100 PM       0       17       12:5       14       30         E5       30-Mare88       100 PM       0       17													
E-7       29-Fab-88       13       5.5         E-1       30-Mar-88       11:10 AM       70       0       10.5       32       8.5         E1       30-Mar-88       11:10 AM       70       10.5       32       8.5       70         E2       30-Mar-88       11:10 AM       70       10.5       32       8.5       70         E2       30-Mar-88       11:10 AM       44       0       15       31.5       8.4       65         E3       30-Mar-88       11:06 AM       44       15       31.5       8.4       51         E4       30-Mar-88       100 PM       44       15       31.5       8.4       51         E4       30-Mar-88       100 PM       100       0       17       12.5       14       30         E5       30-Mar-88       310 PM       100       16       13.5       14       55         E6       30-Mar-88       310 PM       0       15       0       98       17         E1       14-Apr-68       10:40 AM       183       0       12.5       32.7       11.4       24         E2       13-Apr-68       10:20 AM       61 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>6</td><td></td><td></td><td></td><td></td><td>. 61</td><td></td></t<>							6					. 61	
E-8       28-Fab-88       12       6.4         E1       30-Mar-88       11:10 AM       70       10.5       32       8.5       70         E1       30-Mar-88       11:10 AM       70       10.5       32       8.5       70         E2       30-Mar-88       11:10 AM       152       0       12       31.5       8.4       65         E2       30-Mar-88       11:10 AM       44       0       15       31.5       8.4       65         E3       30-Mar-88       11:46 AM       44       15       31.5       8.4       65         E4       30-Mar-88       12:40 PM       >100       16       18       8.8       51         E5       30-Mar-88       12:40 PM       >100       16       13.5       14       90         E6       30-Mar-88       12:40 PM       100       16       0       7.6       90         E7       30-Mar-88       12:40 PM       100       16       0       7.6       91         E1       14-Apr-88       10:40 AM       183       0       12.5       32.7       10.4       91         E2       13-Apr-88       10:20 AM       91 </td <td></td>													
E1       30 Mar-88       11:10 AM       70       0       10.5       32       8.5       70         E2       30 Mar-88       11:10 AM       70       10.5       32       6.5       65         E2       30 Mar-88       11:30 A       152       0       12       31.5       8.4       65         E3       30 Mar-88       11:46 AM       44       0       15       31.5       8.4       65         E3       30 Mar-88       11:26 AM       44       0       15       31.5       8.4       65         E4       30 Mar-88       11:26 AM       44       0       16       18       8.8       61         E4       30 Mar-88       100 PM       100       0       17       12.5       14       30         E5       30 Mar-88       120 PM       20       0       17       0.2       9.6       9         E6       30 Mar-88       100 PM       100       17       0.2       9.5       137         E1       14 Apr-88       10:40 AM       183       0       12.5       32.7       10.4       >91         E2       13 Apr-88       10:20 AM       16       12.5 <td></td>													
E1       30-Mar-86       11:10 AM       70       10.5       32       8.5         E2       30-Mar-86       711:30 A       152       0       12       31.5       8.4       65         E3       30-Mar-86       711:30 A       44       0       15       31.5       8.4       65         E3       30-Mar-86       11:46 AM       44       0       15       31.5       8.4       65         E3       30-Mar-86       12:40 PM       >100 0       0       16       18       8.8       51         E4       30-Mar-86       1:00 PM       0       0       17       12.5       14       30         E5       30-Mar-86       1:00 PM       100       0       17       0.2       9.6       9         E6       30-Mar-86       2:35 PM       20       0       17       0.2       9.6       9         E7       30-Mar-86       10:40 AM       163       0       12       32       9.5       137         E1       14-Apr-86       10:40 AM       163       0       12.5       32.7       10.4       961         E2       13-Apr-86       10:26 AM       61       12.5<	E-8	29-Feb-88				12			6.4				
E1       30-Mar-86       11:10 AM       70       10.5       32       8.5         E2       30-Mar-86       711:30 A       152       0       12       31.5       8.4       65         E3       30-Mar-86       711:30 A       44       0       15       31.5       8.4       65         E3       30-Mar-86       11:46 AM       44       0       15       31.5       8.4       51         E4       30-Mar-86       12:40 PM       >1000 0       0       17       12.5       14       30         E5       30-Mar-86       1:00 PM       100       0       17       12.5       14       30         E6       30-Mar-86       1:00 PM       100       16       13.5       14       9         E6       30-Mar-86       2:05 PM       0       17       0.2       9.6       9         E7       30-Mar-86       3:10 PM       0       15       0       9.6       137         E1       14-Apr-88       10:40 AM       183       0       12.5       32.7       10.4       961         E2       13-Apr-86       10:26 AM       61       12.5       32.4       11.2       <	E1	30-Mar-88	11:10 AM	70	0	10.5	32		8.5			70	
E2       30 Mar-88       11:46 AM       44       0       15       31.5       8.6         E3       30 Mar-88       11:46 AM       44       0       15       31.5       8.4         E4       30 Mar-88       12:40 PM       >100 cm       0       16       18       8.6       51         E4       30 Mar-88       12:40 PM       >100 cm       0       16       18       8.6       51         E5       30 Mar-88       130 PM       100       0       17       12.5       14       30         E6       30 Mar-88       130 PM       100       16       13.5       14       30         E6       30 Mar-88       130 PM       0       16       0       7.6       9         E7       30 Mar-88       10:40 AM       183       0       12       32.7       10.4       91         E2       13 Apr-88       10:20 AM       46       12.5       32.7       10.4       91         E2       13 Apr-88       10:20 AM       61       13.5       20.3       92       21.5         E3       13 Apr-88       10:20 AM       61       13.5       20.3       92       22.5	E1	30-Mar-88	11:10 AM		70	10.5	32		8.5				
E3       304me-83       11:48 AM       44       0       15       31:5       8.4         E3       304me-83       11:48 AM       >100cm       0       16       18       8.8       51         E4       304me-83       12:40 PM       >1000       16       18       8.8       51         E4       304me-83       130 PM       1000       16       13.5       14       30         E5       304me-83       130 PM       100       16       13.5       14       90         E6       304me-83       235 PM       20       0       17       0.2       9.6       9         E7       304me-83       310 PM       0       15       0       9.5       137         E1       14-Apr-88       10:40 AM       183       9.5       137       12         E2       13-Apr-88       11:25 AM       46       12.5       32.7       10.4       961         E2       13-Apr-88       11:25 AM       61       12.5       32.7       11.2       9.5         E3       13-Apr-88       10:00 AM       61       0       33.2       9.2       9.5         E3       13-Apr-88	E2	30-Mar-88	711:30 A	152	0	12	31.5		8.4			65	
E3       30-Mar-88       11:46 AM       44       0       15       31.5       8.4         E3       30-Mar-88       11:46 AM       44       15       31.5       8.4         E4       30-Mar-88       12:40 PM       >100 m       16       18       8.8       51         E4       30-Mar-88       12:00 PM       >100 m       14       21       8.5       51         E5       30-Mar-88       130 PM       100 m       16       13.5       14       30         E6       30-Mar-88       235 PM       20       0       17       0.2       9.6       9         E7       30-Mar-88       3:10 PM       0       15       0       9.8       137         E1       14-Apr-88       10:40 AM       183       0       12.5       32.7       10.4       >91         E2       13-Apr-88       11:25 AM       46       12.5       32.7       11.2       21         E2       13-Apr-88       10:20 AM       61       12.5       32.4       11.4       21         E2       13-Apr-88       10:20 AM       61       13.5       28.3       39900       9.5       28.5       28.5       <	E2	30-Mar-88	711:30 A		152	12	31.5		9.6	1			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		30-Mar-88		44	0	15	31.5		8.4				
E4       30-Mar-86       12:0 PM       100       0       17       12.5       14       30         E5       30-Mar-86       1:00 PM       100       0       17       12.5       14       30         E5       30-Mar-86       2:05 PM       20       0       17       0.2       9.6       9         E7       30-Mar-86       2:05 PM       0       16       0       7.6       9.8         E6       30-Mar-86       3:10 PM       0       15       0       9.8       127       32.0       9.5       137         E1       14-Apr-88       10:40 AM       163       9       9.5       127       10.4       >91         E2       13-Apr-86       11:25 AM       91       0       12.5       32.7       10.4       >91         E2       13-Apr-86       11:25 AM       91       12.5       32.4       11.4       20       21       32.1       22       23       38600       9.5       33       34       34       34       34       34       35       32.3       34       34       34       34       34       34       34       34       34       34       34       34 </td <td>E3</td> <td>30-Mar-88</td> <td>11:46 AM</td> <td></td> <td>44</td> <td>15</td> <td>31.5</td> <td></td> <td>8.4</td> <td></td> <td></td> <td></td> <td></td>	E3	30-Mar-88	11:46 AM		44	15	31.5		8.4				
E4       30-Mar-88       120 PM       100       0       17       12.5       14       30         E5       30-Mar-88       100 PM       100       16       13.5       14       30         E5       30-Mar-88       20.5 PM       20       0       17       0.2       9.6       9         E7       30-Mar-86       3:10 PM       0       16       0       7.6       9         E8       30-Mar-86       3:10 PM       0       15       0       9.8       137         E1       14-Apr-88       10:40 AM       183       0       12.5       32.7       10.4       >91         E2       13-Apr-86       11:25 AM       91       0       12.5       32.7       11.2         E2       13-Apr-86       11:25 AM       91       12.5       32.4       11.4         E2       13-Apr-86       11:25 AM       91       12.5       32.3       9.5       137         E3       13-Apr-86       1000 AM       61       0       13.3       28.3       38900       9.5       14         E3       13-Apr-86       1000 AM       61       13.5       28.3       9.4       46	E4	30-Mar-68	12:40 PM	>100cm	0	16	18		8.8			51	
E5       30-Mar-88       100 PM       100 16       13.5       14         E6       30-Mar-86       2:35 PM       20       0       17       0.2       9.6       9         E7       30-Mar-86       2:35 PM       0       16       0       7.6       9.6       9         E8       30-Mar-86       3:10 PM       0       15       0       9.5       137         E1       14-Apr-86       10:40 AM       183       9.5       137         E2       13-Apr-86       11:25 AM       91       0       12.5       32.7       10.4       >91         E2       13-Apr-86       11:25 AM       91       12.5       32.4       11.4       21       22.1         E2       13-Apr-86       12:00 AM       61       0       13.3       29.3       36600       9.5         E3       13-Apr-86       10:00 AM       61       0       13.5       29.3       9.2         E3       13-Apr-86       10:00 AM       61       13.5       29.3       9.4       46         E3       13-Apr-86       12:00 PM       0       16       25.7       5.5       46         E4       13-Apr-8	E4	30-Mar-88			>1m	. 14	21		8.5				
E6       30-Mar-88       2.35 FM       20       0       17       0.2       9.6       9         E7       30-Mar-88       2.55 FM       0       16       0       7.6       9         E8       30-Mar-88       3:10 PM       0       183       9.5       137         E1       14-Apr-88       10:40 AM       183       0       12.5       32.7       10.4       >91         E2       13-Apr-88       11:25 AM       91       0       12.5       32.7       11.2         E2       13-Apr-86       11:25 AM       91       0       3.3       29.5       11.2         E3       13-Apr-86       11:25 AM       91       0       3.2       3.2       11.2         E3       13-Apr-86       10:00 AM       61       0       3.3       29.3       9.2         E3       13-Apr-86       10:00 AM       61       0       3.5       29.3       9.2         E3       13-Apr-86       10:00 AM       61       13.5       29.3       9.2       9.2         E3       13-Apr-86       12:20 FM       0       3.6       13.6       46         E4       13-Apr-86       12:50	E5	30-Mar-88	1:00 PM	100	0	17	12.5		14			30	
E7       30-Mar-88       2:55 PM       0       16       0       7.6         E8       30-Mar-88       3:10 PM       0       15       0       9.8         E1       14-Apr-88       10:40 AM       183       9.5       137         E2       13-Apr-88       11:25 AM       91       0       12.5       32.7       10.4       >91         E2       13-Apr-88       11:25 AM       91       0       12.5       32.7       11.2       11.4         E2       13-Apr-88       11:25 AM       91       0       32.1       11.4       11.4         E2       13-Apr-88       10:00 AM       61       0       33.5       29.3       38600       9.5         E3       13-Apr-88       10:00 AM       61       13.5       29.3       9.2       46         E3       13-Apr-88       10:00 AM       61       13.5       29.3       9.4       46         E3       13-Apr-88       12:05 PM       0       16       25.7       5.5       46         E4       13-Apr-88       12:25 PM       122       0       16       26.7       5.5       46         E4       13-Apr-88       <	E5	30-Mar-88	1:00 PM	•	100	16	13.5		14				
E8       30-Mar-86       3:10 PM       0       15       0       9.8         E1       14-Apr-86       10:40 AM       183       9.5       137         E1       14-Apr-86       10:40 AM       183       9.5       137         E2       13-Apr-86       11:25 AM       91       0       12.5       32.7       10.4       >91         E2       13-Apr-86       11:25 AM       91       0       12.5       32.7       11.2       9.5       91         E2       13-Apr-86       11:25 AM       91       12.5       32.7       11.2       9.5       91       9	<b>E6</b>	30-Mar-88	2:35 PM	20			0.2					9	
E1       14-Apr-86       10:40 AM       183       0       12       32       9.5       137         E1       14-Apr-86       10:40 AM       183       9.5       9.5       9.5         E2       13-Apr-86       11:25 AM       91       0       12.5       32.7       10.4       >91         E2       13-Apr-86       11:25 AM       46       12.5       32.7       11.2       11.4         E2       13-Apr-86       11:25 AM       91       12.5       32.7       11.2       11.4         E2       13-Apr-86       11:25 AM       91       12.5       32.4       11.4       11.4         E2       14-Apr-86       12:20 AM       61       0       32.1       11.4       11.	E7	30-Mar-88	2:55 PM		0	16	0		7.6				
E1       14-Apr-88       10:40 AM       183       9.5         E2       13-Apr-88       11:25 AM       91       0       12.5       32.7       10.4       >91         E2       13-Apr-88       11:25 AM       91       0       12.5       32.7       11.2         E2       13-Apr-88       11:25 AM       91       12.5       32.4       11.4         E2       13-Apr-88       12:10 PM       0       32.1	E8	30-Mar-88	3:10 PM		0	15	0		9.8				
E1       14-Apr-88       10:40 AM       183       9.5         E2       13-Apr-88       11:25 AM       91       0       12.5       32.7       10.4       >91         E2       13-Apr-88       11:25 AM       91       0       12.5       32.7       11.2         E2       13-Apr-88       11:25 AM       91       12.5       32.4       11.4         E2       13-Apr-88       12:10 PM       0       32.1	F1	14.Anr.88	10-40 444	183	0	12	37		95			137	
E2       13-Apr-88       11:25 AM       91       0       12.5       32.7       10.4       >91         E2       13-Apr-88       11:25 AM       46       12.5       32.7       11.2         E2       13-Apr-86       11:25 AM       91       12.5       32.7       11.2         E2       13-Apr-86       11:25 AM       91       12.5       32.4       11.4         E2       14-Apr-86       12:10 PM       0       32.1							~~						
E2       13-Apr-88       11:25 AM       46       12.5       32.7       11.2         E2       13-Apr-88       11:25 AM       91       12.5       32.4       11.4         E2       14-Apr-88       12:10 PM       0       32.1       38900       9.5         E3       13-Apr-88       10:00 AM       61       0       13.3       20.3       38900       9.5         E3       13-Apr-88       10:00 AM       61       0       13.5       29.3       9.4         E3       13-Apr-88       10:00 AM       61       13.5       29.3       9.4         E3       13-Apr-88       10:00 AM       61       13.5       29.3       9.4         E3       13-Apr-88       11:25 AM       11.5       24.3       9.4         E3       13-Apr-88       11:25 PM       0       16       25.7       5.5       46         E4       13-Apr-88       12:25 PM       122       0       16       25.7       5.5       46         E4       13-Apr-88       12:40 PM       0       17       19.2       3.5       5         E5       13-Apr-88       12:40 PM       0       16       21.2 <t< td=""><td></td><td></td><td></td><td>91</td><td></td><td>12.5</td><td>327</td><td></td><td></td><td></td><td></td><td>&gt;91</td><td></td></t<>				91		12.5	327					>91	
E2       13-Apr-88       11:25 AM       91       12.5       32.4       11.4         E2       14-Apr-86       12:10 PM       0       32.1				•••									
E2       14-Apr-88       12:10 PM       0       32.1         E3       13-Apr-88       10:00 AM       61       0       13.3       29.3       38600       9.5         E3       13-Apr-88       10:00 AM       61       0.5       13.5       29.3       9.2         E3       13-Apr-86       10:00 AM       61       13.5       29.3       9.2         E3       13-Apr-86       10:00 AM       61       13.5       29.3       9.4         E3       13-Apr-86       10:00 AM       61       13.5       29.3       9.4         E3       13-Apr-86       12:55 PM       0       16       25.7       5.5       46         E4       13-Apr-88       12:55 PM       122       0       16       26.7       5.5       46         E4       13-Apr-88       12:55 PM       122       16       27.9       5       5         E4       13-Apr-88       12:40 PM       0       17       19.2       3.5       5         E5       13-Apr-88       12:40 PM       0       16       21.2       3.4       5         E5       13-Apr-88       10:45 PM       0       16       21.2													
E3       13-Apr-88       10:00 AM       61       0       13.3       29.3       38900       9.5         E3       13-Apr-88       10:00 AM       61       13.5       29.3       92         E3       13-Apr-88       10:00 AM       61       13.5       29.3       9.2         E3       13-Apr-88       10:00 AM       61       13.5       29.3       9.4         E3       13-Apr-88       11:55 AM													
E3       13-Apr-88       10:00 AM       30.5       13.5       29.3       9.2         E3       13-Apr-88       10:00 AM       61       13.5       29.3       9.4         E3       13-Apr-88       11:55 AM				61	-	13.3		38800	9.5				
E3       13-Apr-88       10:00 AM       61       13.5       29.3       9.4         E3       13-Apr-88       11:55 AM													
E3       13-Apr-88       11:55 AM       46         E3       14-Apr-88       12:40 PM       0       31.8         E4       13-Apr-88       12:55 PM       122       0       16       25.7       5.5       46         E4       13-Apr-88       12:55 PM       61       16       28       6       46         E4       13-Apr-88       12:55 PM       61       16       28       6       46         E4       13-Apr-88       12:55 PM       122       16       27.9       5       46         E4       13-Apr-88       12:40 PM       0       25.3       5       5       5         E5       13-Apr-88       7:03 PM       0       16.1       17.9       5.7       5.7         E5       13-Apr-88       7:03 PM       0       16.1       17.9       5.7       5.7         E5       13-Apr-88       10:45 PM       0       16       21.2       3.4       5.7         E5       14-Apr-88       3:00 AM       0       15       22.5       0.2       2.6         E5       14-Apr-88       3:00 AM       0       15       19       2.6       2.6													
E3       14-Apr-88       12:40 PM       0       31.8         E4       13-Apr-88       12:55 PM       122       0       16       25.7       5.5       46         E4       13-Apr-88       12:55 PM       61       16       26       6         E4       13-Apr-88       12:55 PM       122       16       27.9       5         E4       13-Apr-88       12:40 PM       0       25.3												46	
E4       13-Apr-88       12:55 PM       122       0       16       25.7       5.5       46         E4       13-Apr-88       12:55 PM       61       16       26       6         E4       13-Apr-88       12:55 PM       122       16       27.9       5         E4       13-Apr-88       12:40 PM       0       25.3		•			0		31.8						
E4       13-Apr-88       12:55 PM       61       16       26       6         E4       13-Apr-88       12:55 PM       122       16       27.9       5         E4       14-Apr-88       12:40 PM       0       25.3		•		122	0	16			5.5			46	
E4       13-Apr-88       12:55 PM       122       16       27.9       5         E4       14-Apr-88       12:40 PM       0       25.3					61								
E4       14-Apr-88       12:40 PM       0       25.3         E5       13-Apr-88       2:47 PM       0       17       19.2       3.5         E5       13-Apr-88       7:03 PM       0       16.1       17.9       5.7         E5       13-Apr-88       10:45 PM       0       16       21.2       3.4         E5       14-Apr-88       3:00 AM       0       15       22.5       0.2         E5       14-Apr-88       6:25 AM       0       15       19       2.6         E5       14-Apr-88       12:06 PM       0       16       2.6         E5       14-Apr-88       12:06 PM       0       16       2.6         E5       14-Apr-88       12:00 PM       0       16       2.6         E5       14-Apr-88       12:00 PM       0       16       35.6         E5       14-Apr-88       3:00 PM       0       18.7       3.9													
E5       13-Apr-88       2:47 PM       0       17       19.2       3.5         E5       13-Apr-88       7:03 PM       0       16.1       17.9       5.7         E5       13-Apr-88       10:45 PM       0       16       21.2       3.4         E5       14-Apr-88       3:00 AM       0       15       22.5       0.2         E5       14-Apr-88       6:25 AM       0       15       19       2.6         E5       14-Apr-88       12:06 PM       0       16       16       16         E5       14-Apr-88       12:06 PM       0       16       16       16         E5       14-Apr-88       12:00 PM       0       16       16       16         E5       14-Apr-88       10:0 PM       0       16       16       16         E5       14-Apr-88       3:00 PM       0       18.7       3.9       3.9		•			0								
E5       13-Apr-88       7:03 PM       0       16.1       17.9       5.7         E5       13-Apr-88       10:45 PM       0       16       21.2       3.4         E5       14-Apr-88       3:00 AM       0       15       22.5       0.2         E5       14-Apr-88       6:25 AM       0       15       19       2.8         E5       14-Apr-88       12:06 PM       0       16		• •				17			3.5		•		
E5       13-Apr-88       10:45 PM       0       16       21.2       3.4         E5       14-Apr-88       3:00 AM       0       15       22.5       0.2         E5       14-Apr-88       6:25 AM       0       15       19       2.6         E5       14-Apr-88       12:08 PM       0       16       35.6         E5       14-Apr-88       1:00 PM       35.6       3.9         E5       14-Apr-88       3:00 PM       0       19.7       3.9		•			0		17.9						
E5       14-Apr-88       3:00 AM       0       15       22.5       0.2         E5       14-Apr-88       6:25 AM       0       15       19       2.6         E5       14-Apr-88       12:08 PM       0       16       35.6         E5       14-Apr-88       1:00 PM       35.6       35.6         E5       14-Apr-88       3:00 PM       0       19.7       3.9		•		•									
E5 14-Apr-88 6:25 AM 0 15 19 2.6 E5 14-Apr-88 12:08 PM 0 16 E5 14-Apr-88 1:00 PM 35.6 E5 14-Apr-88 3:00 PM 0 19.7 3.9					-								
E5 14-Apr-88 12:08 PM 0 16 E5 14-Apr-88 1:00 PM 35.6 E5 14-Apr-88 3:00 PM 0 19.7 3.9		• • •											
E5 14-Apr-88 1:00 PM		•											
E5 14-Apr-88 3:00 PM 0 19.7 3.9						17 V						35.6	
		•			0		19.7		3.9				
		13-Apr-88			0	15		900					

WQ1-2. Appendix Page 1

#### Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 2. Field Parameters

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Station	Date	Time	Water Column Depth cm	Samp. Dep. cm	Temp. °C	Salinity ppt	Conduct.	DO	рH	Turbid.	Secchi cm	Flow cfs
E6	13-Apr-88	7:20 PM		0	14.8	0.5	900	10				
E6	13-Apr-88	11:10 PM		ŏ	13.7	0.8		5.8				
E6	14-Apr-88	3:30 AM		ŏ	13	2.5	2900	2.1				
E6	14-Apr-88	6:35 AM		õ	13.5	7.5	2000	0.7				
E6	14-Apr-88	2:50 PM	•	ŏ		3	4170	6.3				
E1	15-May-88	3:10 PM	137									
E1	15-May-88	3:10 PM	107	0	15.2	33.5		11.2	7.55	3.7	137	
E1	15-May-88	3:10 PM		30.5	15	33.5		11.2				
E1	15-May-88	3:10 PM		61	15	33.5						
E1	15-May-88	3:10 PM		91.5	15	33.5		11.4				
E2	15-May-88	3:45 PM	107	0	18.5	33.2		5.8	7.2	12	71.1	
E2	15-May-88	3:45 PM		107	18	33.5		9.4				
E3	15-May-88	4:10 PM		0	22	33.2		9.5	6	13	50.8	
E3	15-May-88	4:10 PM	50.8	50.8	22.2	33		9.5				
E4	15-May-88	4:35 PM		0	22	23.9		11.6	6.95	22	30.5	
E4	15-May-88	4:35 PM	96.5	96.5	22.1	23.5		11.6				
E5	15-May-88	3:00 PM		0	23	18. <b>8</b>		16.8	6.9	26	22.9	
E5	15-May-88	3:00 PM		30.5				16.8				
E5	15-May-88	3:00 PM		61				16.6				
E5	15-May-88	3:00 PM	91.5	91.5	23	18.6		15.8				
E6	16-May-88	10:53 AM		0	15.8	1.1	1700	2.1	7.55	62		0
E7	16-May-88	10:07 AM		0	14	1	1600	2.3	7.75	11		0
E8	16-May-88	10:30 AM		0	16.6	0.2	650	4.5	6.99	6.1		0.04
E1	15-Jun-88	2:15 PM	91.5							3.6	91.5	
Et	15-Jun-88	4:20 PM		0	14.5	33	40000	11.5	7.2			
E2	15-Jun-88	2:55 PM								4.2	78.7	
E2	15-Jun-88	3:48 PM		0	16	33	42000	10	7.1			
E2	15-Jun-88	3:48 PM		152.4	16	34	42500	9.3				
E3	15-Jun-88	3:40 PM	38.1							22	35.6	
E3	15-Jun-88	2:20 PM		0	21	33	46500	6.9	7.5			
E3	15-Jun-88	2:20 PM		91.4	18	35	46500	6.5				
E4	15-Jun-88	5:17 PM	106,7							25	30.5	
E4	15-Jun-88	1:40 PM		0	24.5	30	45000	8.8	7.6			
E4	15-Jun-88	1:40 PM		61	22	31.5	45000	7.8				
E4	15-Jun-88	1:40 PM		122	22	32	47000					
E5	15-Jun-88	6:00 PM	· 71.1							34?	22.9	
E6	15-Jun-88	10:10 AM		0	16	1.5	2320	3.5	8	34??		0
<b>E6</b>	16-Jun-88											
E7	15-Jun-88	9:55 AM		0	14.9	3.2	3520	2.7	7.9			0
	16-Jun-88									<b>?</b> ??		
E8	15-Jun-88		completely dry									
	15-Jun-88		• • •									
E1	21-Jul-88	5:00 PM		0	15.8	32.6		11	8.3 <del>9</del>	1.7	152	

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WQ1-2. Appendix Page 2

#### Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 2. Field Parameters

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Station	Date	Time	Water Column Depth cm	Samp. Dep. cm	Temp. *C	Salinity ppt	Conduct.	DO	pН	Turbid.	Secchi cm	Flow cfs
E1	21-jul-88	5:00 PM	163	157	15.8	32.6						
E2	21-Jul-88	5:35 PM		0	17	32.3		9.9	7.04	4.5	109	
E2	21-Jul-88	0.001 m	198	198	16.5	32.1		0.0	1.04			
E3	21-Jul-88	5:55 PM	190	0	18.1	33		10	7.99	16	56	
E3	21-Jul-88	5.50 FM	61	61	18.1	33		10	1.00	10		
E4	21-Jul-88	6:23 PM	01	0	25	38.8		10.8	7.96	20	41	
E4	21-Jul-88	0.23 FM	127	127	25.5	38.2		10.0	7.00	~~		
E5	21-Jul-88	6:42 PM	127	0	23.5	38.5		12	8.53	17	33	
E5	21-Jul-88	0.42 FM		U	27	38.5		12	0.00			
E6	21-Jul-88	(~1:00 PM)		0	25.5	3.2	4230	>20	9.35	0.9*		
E7	21-Jul-88	(~1.00 F M)	completely dry	U	20.0	J.2	4230	~20	<i>a.</i>	0.0		
E8	21-Jui-88		completely dry									
E1	29-Aug-88	2:20 PM	>170	0	15.1	31.8		8.8	7.81		170	
E1	29-Aug-88	2:20 PM	-110	152	15.1	31.8		9.9				
E1	30-Aug-88	2:10 PM		0	14.1	01.0		0.0		1.8		
E2	29-Aug-88	2:45 PM	110	ŏ	15.2	32		8.9	7.72	1.4		
E2	29-Aug-88	2:45 PM		110	15.1	31.5		8.9				
E2	30-Aug-88	2:30 PM		0		01.0		0.0		4.2		
E3	29-Aug-88	3:05 PM	90	ŏ	16.9	31.3		8	7.54			
E3	29-Aug-88	3:05 PM		90	16.5	31.7		8				
E3	30-Aug-88	2:45 PM		0	10.0	0		•		8.4		
E4	29-Aug-88	3:30 PM	150	0	21	34.2		6.05	7.53	V.7	50	
E4	29-Aug-88	3:30 PM		150	21	34.9		6	1.00			
E4	30-Aug-88	3:15 PM		0		04.0		· ·		20		
E5	29-Aug-88	3:50 PM	140	ŏ	22.5	37.3		9.2	7.94	20	50	
E5	29-Aug-88	3:50 PM	6 - THE	140	23	37.2		9.3	1.04			
E5	30-Aug-88	3:35 PM		0				0.0		23		
E6	29-Aug-88	0.001 m	completely dry	· ·						20		
E7	29-Aug-88		completely dry									
E8	29-Aug-88		completely dry									
E1	28-Sep-88	1:25 PM	200	0	15.1	32.2		9.75	8	3.6	195	
E1	28-Sep-88	1:25 PM		200	15.1	32.2		9.7				
E2	28-Sep-88	1:55 PM	200	0	15.2	32.3		9.8	8.25	4.4	175	
E2	28-Sep-88	1:55 PM		200	15.2	32.3		9.8				
E3	28-Sep-88	2:11 PM	100	0	15.5	32.5		9.8	8.3	7.3	120	
E3	28-Sep-88	2:11 PM		100	15	32.6		9.8				
E4	28-Sep-88	2:33 PM	1.6	0	18.5	34.2			7.75	18	60	
E4	28-Sep-88	2:33 PM		1.5		34.2		7.2				
E5	28-Sep-88	2:46 PM	135	0	19.7	36.3		12.5	8.4	20	45	
E5	28-Sep-88	2:46 PM		100	19.8	35.7		12.6				
E1	25-Oct-88	1:05 PM	>200	Û	13.4	30.4		8.4	7.9		180	
E1	25-Oct-88	1:05 PM		200								
E1	26-Oct-88	2:10 PM								2.4		

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WQ1-2. Appendix Page 3

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#### Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 2, Field Parameters

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Station	Date	Time	Water Column Depth cm	Samp. Dep. cm	Temp. *C	Salinity ppt	Conduct.	DO	рH	Turbid.	Secchi cm	Flow cfs
E2	25-Oct-88	1:25 PM	185	0	13.3	31.2		8.4	8		160	
E2	25-Oct-88	1:25 PM	•	140		31.2		8.35				
E2	26-Oct-88	2:30 PM								3.6		
E3	25-Oct-88	1:40 PM	90	0	13.5	31		8	8.1		>90	
E3	25-Oct-88	1:40 PM		90	13.5	31		8				
E3	26-Oct-88	1:25 PM								3,6		
E4	25-Oct-88	2:00 PM	155	0	13.5	31.8		6.2	7.9		85	
E4	25-Oct-88	2:00 PM		155	13.5	31.8		6				
E4	26-Oct-88	3:40 PM								12		
E5	25-Oct-88	2:44 PM	135	0	14	31.7		8.2	8.15		40	
E5	25-Oct-88	2:44 PM		135	14	31.7		. 8				
E5	26-Oct-88	12:45 PM								17		
E1	22-Nov-88	11:50 AM	138	0	12.2	32.3		8.5	7.15	4	125	
E1	22-Nov-88	11:50 AM		138		32.3						
E2	22-Nov-88	12:10 PM	190	0	12	33.2		8.3		5.7	105	
E3	22-Nov-88	12:40 PM	70	0	13.1	32.2		8.2		6.4	70	
E3	22-Nov-88	12:40 PM		70		32.2						
E4	22-Nov-88	1:03 PM	140	0	12.5	28		7.9		12	50	
E4	22-Nov-88	1:03 PM		140	12.5	29.5		7.9				
E5	22-Nov-88	1:35 PM	120	0	12.3	25.5		8.6		24	30	
E5	22-Nov-88	1:35 PM		120	12.3	25.5	050		7.35			
E6	22-Nov-88	10:20 AM		0	13		650	5.1	7.35	14		
E7	22-Nov-88	completely dry		0	13.2		600	7.25		12		
E8	22-Nov-88	3:40 PM	,	U	13.2		000	1.25				
E1	20-Dec-88	8:40 AM	210	0	10.2	33		8	7.5	4.5	>210	
E1	20-Dec-88	8:40 AM		210	10.2	33		8				
E1	21-Dec-88	9:30 AM		0	10.1	33.5						
E2	20-Dec-88	8:55 AM	200	0	10	33.5		9	7.7	2.8	>200	
E2	20-Dec-88	8:55 AM		200	10	33.5		9				
E2	21-Dec-88	10:09 AM		0	10.1	33.2						
E3	20-Dec-88	9:52 AM	100	0	10	33		8.5	7.8	3.2	>100	
E3	20-Dec-88	9:52 AM		100	10	33		8.5				
E3	21-Dec-88	10:40 AM		0	9	33.5						
E4	20-Dec-88	10:12 AM	175	0	9	31.5		10		12	75	
E4	20-Dec-88	10:12 AM		175	9	31.5		9.5				
E4	21-Dec-88	11:15 AM	•	0	7.5	16						
E4	21-Dec-88	11:15 AM		50	7	21.2						
E4	21-Dec-88	11:15 AM		100	6.5 8 5	23						
E4	21-Dec-88	11:15 AM	400	150	6.5	25.5		40 E		20	05	
E5	20-Dec-88	10:28 AM	162	0	8	26.5		10.5		36	65	
E5	20-Dec-88	10:28 AM		162	8	27		10.5				
E5	21-Dec-88	11:50 AM		0 50	7 7	13.9 14.2						
E5	21-Dec-88	11:50 AM		100	7	14.2						
E5	21-Dec-88	11:50 AM		100	'	10						

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#### Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 2. Field Parameters

Station	Date	Time	Water Column Depth cm	Samp. Dep. cm	Temp. °C	Salinity ppt	Conduct.	DO	рH	Turbid.	Secchi cm	Flow cfs
E5	21-Dec-88	11:50 AM		150	6.8	15.5						
E6	20-Dec-88	1:15 PM		0	8.9			4		41		
E6	21-Dec-88	1:30 PM		Ō		1.2	1700	1.2				14
E7	20-Dec-88	1:32 PM		0	9			10.5		7.5		
E8	20-Dec-88	1:45 PM		0	8.6			9.5		5.4		
E1	20-Jan-89	9:30 AM	175	0	9.5	34.1		8.5	7.8	6.3	100	
E1	20- <b>Jan-8</b> 9	9:30 AM		175		34.1						
E2	20-Jan-89	10:10 AM		0	9.7	33.5		8.2	7.75	5.4		
E2	20-Jan-89	10:10 AM		Bottom		33.5		_				
E3	20-Jan-89	10:40 AM	~100	0	9.5	32.8		9	7.9	4	~100	
E3	20-Jan-89	10:40 AM		~100		32.8						
E4	20-Jan-89	11:25 AM	~150	0	8	18.1		6.8	8.2	12	~60	
E4	20-Jan-89	11:25 AM		50		19						
E4	20-Jan-89	11:25 AM		100		23.8		7				
E4	20-Jan-89	11:25 AM		150		24		7.5				
E5	20-Jan-89	12:02 PM	~125	0	8	10.9		6.4		17		
E5	20-Jan-89	12:02 PM		100		12.5		6.2				
E5	20-Jan-89	12:02 PM		125		12.5						
E6	20-Jan-89	1:33 PM		0	10.8	0	700	2.3	7.65	27		
E7	20-Jan-89	2:12 PM		0	11.8		412	15.2	8.7	3.5		
E8	20-Jan-89	2:40 PM		0	9		405	11.8	7.65	4.1		
E1	17-Feb-89	9:02 AM	195	0	9	35.8		12.3	7.9		>195	
E1	17-Feb-89	9:02 AM	190	195	9	35.8		12.3	1.5		-165	
E1	18-Feb-89	~10:30AM		0	•	55.0		12.0		1.3		
E2	17-Feb-89	9:40 AM	200	ő	8.8	33.1		10.3	7.8	1.4	>200	
E2	17-Feb-89	9:40 AM	200	200	9	32.9		10.3	7.0		-200	
E2	17-Feb-89	2:10 PM		0	12	33.5		10.0				
E2	17-Feb-89	2:10 PM		213	12	34						
E2	18-Feb-89	~10:30AM		0		~				1.9		
bay upfrom 2	17-Feb-89	2:30 PM		v		29						
bay upfrom 2	17-Feb-89	2:40 PM			14	25		•				
bay upfrom 2	17-Feb-89	2:45 PM			15	28						
2-3pier	17-Feb-89	2:50 PM			14	22						
E3	17-Feb-89	10:10 AM	135	0	9.5	31.5		8.8	7.8		134	
E3	17-Feb-89	10:10 AM	100	135	9.5	32		8.8	7.0		10-1	
E3	17-Feb-89	4:00 PM	. 35	õ	12.7	18.4		0.0			>35	
E3	18-Feb-89	~10:30AM		ō	*****	10.4				5.3	- 00	
E4	17-Feb-89	10:55 AM	130	ŏ	9	12.4		5	7.4	<b>w.v</b>	50	
E4	17-Feb-89	10:55 AM		100	•	20.5		*	* • •			
E4	17-Feb-89	10:55 AM		130	9	23.4		5.6				
E4	17-Feb-89	3:25 PM	82	0	11.5	7		0.0			45	
E4	17-Feb-89	3:25 PM	ve	82	14.5	7.6					77	
E4	17-Feb-89	5:05 PM	70	0	11	5.5					45	
E4	17-Feb-89	5:05 PM		70	10.5	7						

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# Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 2. Field Parameters

Station	Date	Time	Water Column Depth cm	Samp. Dep. cm	Temp. °C	Salinity ppt	Conduct.	DO	рH	Turbid.	Secchi cm	Flow cfs
E4	18-Feb-89	~10:30AM		0						15		
E5	17-Feb-89	8:20 AM		õ	9	7.2	8800	4.7	7.3			
E5	17-Feb-89	11:30 AM	90	õ	10	5.5		4.9	7.5		25	
<b>E5</b>	17-Feb-89	11:30 AM		90	10	5.5		4.8				
E5	17-Feb-89	3:00 PM	70	0	11	3.3					35	
E5	17-Feb-89	3:00 PM		70	10.5	4.2						
E5	18-Feb-89	~10:30AM		0						.17		
EG	17-Feb-89	1:40 PM		Ō	13.9	0.2	700	11.2	7.5	15		some
E6	17-Feb-89	6:00 PM		Ō								1
E7	17-Feb-89	1:48 PM		0	12.9		620		7	6.2		some
E8	17-Feb-89	2:04 PM		0	11.5	1.8	700	11.4	5.8?	3.1		
E1	2-Mar-89	1:35 PM	170	0	10.8 ·	6.5	8100	<b>9.6</b>	7.3		15	
E1	2-Mar-89	1:35 PM		170	10	6.5	0008					
E2	2-Mar-89	1:20 PM	65	0	11	4.8	5500	9.3	6.8	78	15	
E4	2-Mar-89	2:35 PM	140	0	10.2	0	305	6	7.8		9	
E4	2-Mar-89	2:35 PM		140	10.2	0	305					
E5	2-Mar-89	2:45 PM	160	0	10.5	0	332	4.7	7.6	66	7	
E5	2-Mar-89	2:45 PM		160	10.5	0	328					
E6	2-Mar-89	3:30 PM		0	11	0	462	5.7	7.5			est20-30cfs
E6R	2-Mar-89	3:30 PM		. 0	10.8	0	220	10	7.7	56		
E7	2-Mar-89	4:00 PM		0	11.2	0	221	9.8	7.7			. 11.5
E7R	2-Mar-89	4:00 PM		0	14	0	195	7.3	7.4	22		
E8	2-Mar-89	4:17 PM		0	10.5	0	221	<b>10.2</b> ·	7.8			
E1	6-Mar-89	10:25 AM	175	0	10	32.7		11.5*	7.7	2.8	170	
E1	6-Mar-89	10:25 AM		175		32.7		11.5*				
E1	7-Mar-89	11:45 AM		0	11.5	31.5						
E1	7-Mar-89	11:45 AM		200		31.5						
BetE1-E2	6-Mar-89	~11:20AM		0	10	32.2						
BetE1-E2	6-Mar-89	~11:25AM		0								
E2	6-Mar-89	11:03 AM	190	0	11	17.4		10*	7	37	30	
E2	6-Mar-89	11:03 AM		20		22.5						
E2	6-Mar-89	11:03 AM		30		28						
E2	6-Mar-89	11:03 AM		40		29.8						
E2	6-Mar-89	11:03 AM		50		30						
E2	6-Mar-89	11:03 AM		80		30.3		10.5*				
E2	6-Mar-89	11:03 AM		150		30.3		11*				
E2	6-Mar-89	11:03 AM		200		30.3						
E2	7-Mar-89	12:00 PM		0	12	28					95	
E2	7-Mar-89	12:00 PM		50		29						
E2	7-Mar-89	12:00 PM		100		29.5						
E2	<b>7-Mar-89</b>	12:00 PM		1.5		30.5						
E2	7-Mar-89	12:00 PM		200	11	31						
E2+	7-Mar-89	12:00 PM		0	11	31.5					125	
E2-3	7-Mar-89	~1210AM	160	0	11.5	30					100	

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# Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 2. Field Parameters

Station	Date	Time	Water Column Depth cm	Samp. Dep. cm	Temp. *C	Salinity ppt	Conduct.	DO	рH	Turbid.	Secchi cm	Flow cfs
E2-3	7-Mar-89	~1215AM		0	12	20						
E2-3	7-Mar-89	~1215AM		50	•=	31						
E2-3	7-Mar-89	~1215AM		100	10.5	31.5						
E3	6-Mar-89	12:12 PM	80	0	11	0.7	1100	7.8	7.5	62	20	
E3	6-Mar-89	12:12 PM		40	••	1.5	1100	1.0		v.	20	
E3	6-Mar-89	12:12 PM		50		2.8						
E3	6-Mar-89	12:12 PM		60		5						
E3	6-Mar-89	12:12 PM		70		8.5						
E3	6-Mar-89	12:12 PM		80	10	12.2		7.8				
E3	7-Mar-89	12:20 PM	150	0	13.5	12.6		•••			35	
E3	7-Mar-89	12:20 PM		50	11	28.7						
E3	7-Mar-89	12:20 PM		100	10.8	29.3						
E3	7-Mar-89	12:20 PM		150	10.5	29.5						
E4	6-Mar-89	12:50 PM	140	0	10.7	0	270	4.8	7.5	54	15	
E4	6-Mar-89	12:50 PM		140	10.7	ō		4.65		•••	••	
E4	7-Mar-89	12:45 PM	150	0	13	0.2	470				30	
E4	7-Mar-89	12:45 PM		0.5	12.5	0.2						
E4	7-Mar-89	12:45 PM	•	100		0.2						
E4	7-Mar-89	12:45 PM		1.5		0.2						
E5	6-Mar-89	9:30 AM		0	10.5	0	292					
E5	6-Mar-89	9:30 AM		100	10.5	ō	292					
E5	6-Mar-69	1:15 PM	120	0	11	ō	315	4.2	7.5	52	18	
E5	6-Mar-89	1:15 PM		120	11	•	325	4.2				
E5	7-Mar-89	10:00 AM		0	11.7	0	258					
E5	7-Mar-89	10:00 AM		100	11.7	Ō						
E5	7-Mar-89	10:00 AM		bottom	••••	Ō						
E6	6-Mar-89	3:08 PM	50	0		Ō	250	5.1	7.4	46		58
E7	6-Mar-89	4:00 PM	65	Ō		ō	218	8.8	7.5	13		10
E8	6-Mar-89	4:15 PM		Ő	11.5	Ō	220	9.8	7.7	16		
E1	9-Apr-89	3:30 PM	175	0	15	31		9.1			>175	
E1	9-Apr-89	3:30 PM		175	14	31.8						
E3	9-Apr-89	3:45 PM	80	0	21.5	23.4		7.5			75	
E3	9-Apr-89	3:45 PM		80	20.8	23.5						
E6	12-Apr-89											4cfs
E1	4-May-89	3:05 PM	195	0	15	32.2		8.6	8	4.3	140	
E1	4-May-89	3:05 PM	~~	195	15	32.2		8.6	• •		~~	
E2	4-May-89	3:48 PM	50	0	18.2	31.7		8.1	8.1	47	35	
E2	4-May-89	3:48 PM		50	18.2	31.7		8.1				
E3	4-May-89	1:30 PM		-	<u> </u>	<u></u>		• -				
E3	4-May-89	2:33 PM	75	0	21.7	28.8		9.2	8.4	11	75	
E3	4-May-89	2:33 PM		75	21.7	28.8		9.2			-	
E4	4-May-89	12:57 PM	107	0	23	16.9		6.4	7.9	28	40	

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## Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 2. Field Parameters

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Station	Date	Time	Water Column Depth cm	Samp. Dep. cm	Temp. *C	Salinity ppt	Conduct.	DO	pH	Turbid.	Secchi cm	Flow cfs
E4	4-May-89	12:57 PM		107	22.5	18		6.4				
E5	4-May-89	12:07 PM	90	0	21.5	6.3	9500	6.1	7.8	33	25	
E5	4-May-89	12:07 PM	••	90	21.5	6.3		6.1				
E6	4-May-89	5:45 PM		0	23.5	0.0	800	9	8.3	30		.5cfs
E7	4-May-89	6:00 PM		ŏ	21.8		500	10.5	8.6	14		
E8	4-May-89	6:10 PM		õ	19.2		490	7.4	8.3	5.7		
E1	26-May-89	4:15 PM			15	31.5		8.9	8			
	· · · · ·		40		15	31.5		7.3	8.1		20	
E3	26-May-89	3:42 PM	40					7.3			20	
E5	26-May-89	5:30 PM			23	16		'	8.1			
E1	7-Jun-89	3:43 PM	170	0	13	31.3		9.3	8	2.6	>170	
E1	7-Jun-89	3:43 PM		170		31.3						
E1	8-Jun-89	7:55 PM										
E2	7-Jun-89	4:10 PM	215	0	12.8	32.4		9.2	7.8	3.1	155	
E2	7-Jun-89	4:10 PM		200	12.5	32.1						
E2	8-Jun-89	7:17 PM		_				-				
E3	7-Jun-89	4:40 PM	45	0	16.5	32.4		7.3	7.8	7.4	>45	
E3	7-Jun-89	4:40 PM		45	16.5	32.4						
E3	8-Jun-89	6:25 PM										
E3.5	8-Jun-89	6:00 PM						_				
E4	7-Jun-89	5:00 PM	95	0	19.4	28.8		7	7.7	34	25	
E4	7-Jun-89	5:00 PM		95	19.3	29		8.5				
E4	8-Jun-89	5:03 PM		-								
E5	7-Jun-89	5:23 PM	95	0	19.5	24.8		5.5	7.5	34	35	
E5	7-Jun-89	5:23 PM		95	19.6	24.8		5.5				
E5	8-Jun-89	5:21 PM										
E6	7-Jun-89	12:30 PM		0	17	0.3	620	10.4	8.3	26		
E7	7-Jun-89	12:12 PM		0	15.1	0.5	890	5.8	7.8	25		
<b>E8</b>	7-Jun-89	12:00 PM		0	15.5	0.3	560	4.2	7.5	11		
E1	5-Jul-89	5:19 PM		0	19	27		8.2	7.8	3.4	150	
E1	5-Jul-89	5:19 PM		bottom	20	27		8.2				
E1	5-Jul-89	5:40 PM										
E2	5-Jul-89	5:08 PM		0	18	28.5		7.7	7.8	4.2	140	
E2	5-Jul-89	5:08 PM		bottom	18	28.5		7.6				
E2	5-Jul-89	5:30 PM										
E2	5-Jul-89	6:00 PM	•									
E3	5-Jul-89	4:50 PM	~75	0	21	30		6.1	7.7	25	730	
E3	5-Jul-89	4:50 PM		bottom	21	29		6.1				•
E3	5-Jul-89	5:00 PM										
E4	5-Jul-89	4:05 PM	104	0	26	33.8		8.8	8.1	21	30	
E4	5-Jul-89	4:05 PM		104	26	33.4		8.3				
E5	5-Jul-89	3:15 PM	80	0	25	31		8.3	8	41	22	
E5	5-Jul-89	3:15 PM		80	25	31		8.4				
E6	6-Jul-89	10:00 AM		0	19	0.2	900	19	8.8	too turbid		

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# Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 2. Field Parameters

Station	Date	Time	Water Column Depth cm	Samp. Dep. cm	Temp. *C	Salinity ppt	Conduct.	DO	рH	Turbid.	Secchi cm	Flow cfs
E7	6-Jul-89	completely dry										
E8	6-Jul-89	completely dry										
E1	21-Aug-89	2:15 PM	70								>70	
E1	21-Aug-89	6:07 PM	170	0	15	34.1		8.8			120	
E1	21-Aug-89	7:00 PM	170	0	15.1	34.1		8.4	8		80	
E1	21-Aug-89	7:50 PM	185	0	15.4	34		8.2	8		90	
E1	21-Aug-89	9:00 PM	142	0	16	34.3		7.6	8			
E1	21-Aug-89	10:05 PM		0	16.5	34			7.9			
E2	21-Aug-89	2:45 PM	110								>110	
E2.5	21-Aug-89	2:15 PM	100								100	
E3	21-Aug-89	2:00 PM	75								60	
E3	21-Aug-89	3:30 PM	95	0	15.5	34.1		8.4	7.7			
E3	21-Aug-89	3:30 PM		95	15.3	34.1		8.4				
E3	21-Aug-89	6:20 PM	70	0	17.2	34.5		7.3	7.8		50	
E3	21-Aug-89	8:10 PM		0	17.8	35.2		6.2	7.8			
E1	18-Sep-89	2:05 PM	210	0	13	34		8.2	7.7	1.7	>210	
E1	18-Sep-89	2:05 PM		200	13	34		8				
E2	18-Sep-89	2:58 PM	>200	0	13	34		8.2		4.2	170	
E2	18-Sep-89	2:58 PM		200	13	34		9.1				
E2	18-Sep-89	7:15 PM		0	15	34		6.9	7.7			
E2	19-Sep-89	12:15 AM		0	14.3	34.3		5.3	7.7			
E2	19-Sep-89	6:30 AM		O	11.8	34.7		6.3	7.7			
E3	18-Sep-89	3:25 PM	95	0	13.9	34.2		8.4	7.6	6.8	90	
E3	18-Sep-89	3:25 PM		95	13.9	34.2		8. <del>9</del>				
E4	18-Sep-89	4:06 PM	155	0	16	34		6.4	7.7	32	35	
. E4	18-Sep-89	4:06 PM		155	16	34		6.6				
E5	18-Sep-89	4:35 PM	130	0	17	35.2		5.4	7.5	60	22	
E5	18-Sep-89	4:35 PM		130	17	35.2		5.7				
E5	18-Sep-89	6:45 PM		0	17.1	35.9		5.1	7.4			
E5	18-Sep-89	11:50 PM		0	15	38		2.7	7.2			
E5	19-Sep-89	6:00 AM		0	14	36.4		2.8	7.5			
E6	18-Sep-89	5:50 PM		0	16.8	1	1120	2.7	7.7	20		0
E7	18-Sep-89	•										
E8	18-Sep-89	dry										
E5	23-Oct-89	3:20 PM		0	15.5	29.2		7.9	7.6			
E6	23-Oct-89	2:00 PM		0	14.9		700	5	7.7			3
· E7	23-Oct-89			0	16.1		770	8.2	7.5			
<b>E8</b>	23-Oct-89	1:35 PM		0	14		620	7.5	7.2			
E1	28-Nov-89	10:50 AM	210	0	12	31		8	7.4	4	120	
E1	28-Nov-89	10:50 AM		210	12			8				
E2	28-Nov-89	10:25 AM										
E2	28-Nov-89	11:45 AM	>220	0	11.8	30.2		8.1	7	4.4	120	

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# Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 2. Field Parameters

Station	Date	Time	Water Column Depth cm	Samp. Dep. cm	Temp. °C	Salinity ppt	Conduct.	DO	рH	Turbid.	Secchi cm	Flow cfs
E2	28-Nov-89	11:45 AM		200	11.8			8				
E3	28-Nov-89	12:45 PM	60	0	11.4	30		8.9	7.5	3.8	>60	
E3	28-Nov-89	12:45 PM		60	11.4	30		9				
E4	28-Nov-89	1:55 PM	102	0	8.5	20.9		7. <del>9</del>	7.3	8.6	55	
E4	28-Nov-89	1:55 PM		102	8.5	22.5		7.8				
E5	28-Nov-89	2:30 PM	85	0	10	17.3		7.5	7.4	20	35	
E5	28-Nov-89	2:30 PM		85	10	17.3		7.4				
E6	28-Nov-89	4:25 PM		0	10		900	3.5	7.6	51		est1-2
E7	28-Nov-89	4:48 PM		0	10.9		520	8.4	7.5	18		0.25
E8	28-Nov-89	5:03 PM		0	8.4		520	9.6	7.5	6.9		0.25
<b>E5</b>	16-Jan-90	~12:00		0	11	0.5	820	6.2	6.8			
E6	16-Jan-90	2:40 PM		0	11.7	0.2	415		7			"good"jcr
E7	16-Jan-90	3:05 PM		0.	11.5	0.1	298	10.4	7			
E8	16-Jan-90	3:35 PM		0	10.5		292	10.2	6.8			•
E1	7-Feb-90	11:33 AM	200	0	8.2	35.1		8.9	7.8	5.2	95	
E1	7-Feb-90	11:33 AM		190	8.2	35.1		8.9				
E2	7-Feb-90	9:30 AM	>200	0	8	35		8.8	7.6	5.2	70	
E2	7-Feb-90	9:30 AM		200	8	35		8.8				
E2	7-Feb-90	12:50 PM		0								
E3	7-Feb-90	10:00 AM	140	0	7.5	27.9		8.4	7.6	16	40	
E3	7-Feb-90	10:00 AM		25		29						
E3	7-Feb-90	10:00 AM		50		32.5						
E3	7-Feb-90	10:00 AM		100		35.3						
E3	7-Feb-90	10:00 AM		200		35.3		8.2				
E3	7 5-5 00	1:05 PM						•				
E3A	7-Feb-90 7-Feb-90	4.80 044	120	0	6	1.4	1120	7.6	7.4	23	30	
E4 E4	7-Feb-90	1:50 PM 1:50 PM	120	120	6	2	1620	6.8	1.9	23		
E5	7-Feb-90	2:22 PM	95	0	7	1	900	7.2	7.5	16	45	
E5	7-Feb-90	2:22 PM	55	95	6.5	1	900	7.2		10		
EG	8-Feb-90	4:40 PM		0	7	•	457	9.4	7.8	22		12
E7	8-Feb-90	5:00 PM		ŏ	7		360	12.8	7.4	8		
E8	8-Feb-90	5:10 PM		ō	6		312	11.8	7.3	11		
E1	9-Mar-90	11:15 AM	200	0	9	34.5		8**	7.8	3.1	140	
E1	9-Mar-90	11:15 AM		200	9	34.5		12.5**				
E1	9-Mar-90	10:18 AM	•									
E1	10-Mar-90	10:12 AM		0	8.2	35		8.6				
E2	9-Mar-90	11:36 AM	>220	0	9.5	33.5		8.3**	7.8	3.5	150	
E2	9-Mar-90	11:36 AM		200	9.5	33.5		12.5**				
E2	9-Mar-90	12:55 PM			•							
E2	10-Mar-90	11:18 AM		0	9	34.2		9				
E3	9-Mar-90	10:50 AM	70	0	9	26		11.0**	7.4	12	45	
E3	9-Mar-90	10:50 AM		70	9	27		13.0**				

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## Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 2. Field Parameters

Station	Date	Time	Water Column Depth cm	Samp. Dep. cm	Temp. *C	Salinity ppt	Conduct.	DO	pН	Turbid.	Secchi cm	Flow cfs
E3	9-Mar-90	12:30 PM										
E3	10-Mar-90	11:10 AM		· 0	10	24.2		8.5			_	
E4	9-Mar-90	10:07 AM	120	0	8	1	1120	7.7**	7.1	24	25	
E4	9-Mar-90	10:07 AM		120	8	1	1120	8.8**				
E4	9-Mar-90	11:35 AM		_								
E4	10-Mar-90	10:56 AM		0	9.2	0.1	1210	8.7			4-	
E5	9-Mar-90	9:40 AM	80	0	7.5 .		850	6.6**	7.2	14	45	
E5	9-Mar-90	9:40 AM		80	7.5		850	7.8**				
E5	9-Mar-90	11:23 AM		•	_			• •				
E5	10-Mar-90	10:42 AM		0	9		1020	8.1				
E6	9-Mar-90	2:34 PM		0	13		530	8.3**	7.9	25		47
E6	10-Mar-90	4:00 PM		0				1010	• •			17
E7	9-Mar-90	3:00 PM		0	13		383	12**	8.1	6.5		
<b>E8</b>	9-Mar-90	3:15 PM	•	0	10		340	12.5** ** DO meter erratic	7. <del>9</del>	6.4		
E1	5-Apr-90	11:54 AM	160	0	11.2	34.5		8	7.8	2.6	>160	
E1	5-Apr-90	11:54 AM		160	11	34.5		7.8				
E2	5-Apr-90	11:26 AM	210	0	11.9	33.8		7.5	8	3.7	130	
E2	5-Apr-90	11:26 AM		210	11.2	34.4		7.9				
E2	5-Apr-90	2:32 PM		0	13.5	32.5		7. <del>9</del>	7.6			
E2	5-Apr-90	6:16 PM		0	14	29.8		9.95	8.2			
E2	5-Apr-90	10:20 PM		0	10.2	34.3		8.8	8			
E2	6-Apr-90	6:00 AM		0	14	27		7.9				
E2	6-Apr-90	10:40 AM		0	10.5	34.7		7.6	7.9			
E3	5-Apr-90	11:12 AM	42	0	13.1	31.2		7.4	8.1	7.3	>42	
E3	5-Apr-90	11:12 AM		42	13.1	31.2		7.4				
E3	5-Apr-90	10:50 AM										
E4	5-Apr-90	10:15 AM	110	0	13.4	10.5		5.2	7.7	18	30	
E4	5-Apr-90	10:15 AM		110	13. <b>8</b>	14.1		4.4				
E5	5-Apr-90	· 9:20 AM	80	0	14	5	5800	5.6	7.5	32	23	
E5	5-Apr-90	9:20 AM		80	14.3	5	5800	4.8				
E5	5-Apr-90	3:03 PM		0	15.1	1.7	2310	5.7	8			
E5	5-Apr-90	6:50 PM		0	14.3	1.2	1680	5.4	7.9			
E5	5-Apr-90	10:55 PM		0	14	2.7	3500	4.4	7.8			
E5	6-Apr-90	6:25 AM		0	15	1	1600	1.1	-			
E5	6-Apr-90	11:23 AM		0	13.3	5.2	7100	4.2	7.6			
E6	5-Apr-90	8:00 AM	•	0	12.8		700	1.2	7.3			
E6	5-Apr-90	3:25 PM		0	15.3		720	8	7.3	22		1
E6	5-Apr-90	7:23 PM		0	15		720	7.8	8.3			
E6	5-Apr-90	11:16 PM		0	13.9		720	1.55	7.7			
E6	6-Apr-90	6:40 AM		0	14		650 700	1.5	-			
E6	6-Apr-90	11:43 AM		0	12.5		700	1.9	7.6			
E7	5-Apr-90	1:27 PM		0	14.2		520	5.2	7.5	27		some
<b>E8</b>	5-Apr-90	1:50 PM		0	12.5		500	7.6	7	4		none

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## Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 2. Field Parameters

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Station	Date	Time	Water Column Depth cm	Samp. Dep. cm	Temp. °C	Salinity ppt	Conduct.	DO	рH	Turbid.	Secchi cm	Flow cfs
E1	24-May-90	11:12 AM	135	0	9.5	34.9		8.5	7.9	4.4	>135	
E2	24-May-90	11:48 AM	120	Ō	11.8	35.4		7.5	8	5.8	80	
E3	24-May-90	2:40 PM	95	Ō	15	35.7		7.7	8.3	22	35	
E3	24-May-90	2:40 PM		95	15	35.7		7.7				
E3	24-May-90	2:15 PM		••				•••				
E4	24-May-90	12:45PM	74	0	17.1	26.2		7.3	8.2	28	37	
E4	24-May-90	12:45 PM	••	74	17.1	26.2		7.3				
E5	24-May-90	1:35 PM	70	0	17.5	22.5		4.7	7.9	31	42	
E5	24-May-90	1:35 PM		70	17.5	22.5		4.7				
E6	24-May-90	9:55 AM		0	12.8		590	4.1	7.3	50		0
E7	24-May-90	9:15AM		ō	10.8		570	5	7.2	8.3		0.5
E8	24-May-90	9:35AM		Ō	11.9		510	6.8	7.3	4.2		0
E5	31-May-90	6:08AM		0		1		2.9				
E5	31-May-90	6:42AM		0				2.6				
E6	31-May-90	6:30AM		0				0.6				1.1
<b>E6</b>	31-May-90	7:00AM		0				2.4				
E1	25-Jun-90	1:05PM	140	0	12	32.5		8.5	7.8	1.9	>140	
E2	25-Jun-90	1:45PM	120	0	14.3	33.9		6.8	7.6	6.2	70	
E3	25-Jun-90	4:35PM	100	0	18	33.8		6.5	8	22	30	
E3	25-Jun-90	4:35PM		100	18	33.8		6.5				
E4	25-Jun-90	3:55PM	100	0	22	30		4.9	7.9	92	10	
E4	25-Jun-90	3:55PM		100				4.9		400	-	
E5	25-Jun-90	3:05PM	62	0	21.2	24.3		3.3	7.8	120	5	
E5	25-Jun-90	3:05PM		62	21.2	24.3		3.2				
E5	26-Jun-90	5:50 AM		0	16.5	26.2		3.1	8.7	~		
E6	25-Jun-90	11:15AM		0	16	0.8	1140	19	9.1	57		
E7	25-Jun-90	10:35AM		0	11.5	0.9	1120	0.7	7.2	93		
<b>E8</b>	25-Jun-90	10:40AM		0	13.3	0.2	580	5.2	7.4	4		
E1	26-Jul-90	2:15PM	175	0	11.2	32		7.4	8.1	1.6	170	
E2	26-Jul-90	2:20PM	183	0	12.7	32		8	8	2.2	100	
E3	26-Jul-90	4:45PM	80	0	16.4	32		8.4	8.5	8.8	65	
E3	26-Jul-90	4:45PM		80	16.4	32		8.4				
E4	26-Jul-90	4:04PM	110	0	21	35		5.7	8.1	50	12	
E4	26-Jul-90	4:04PM		110	21	35		5.5				
E5	26-Jul-90	3:25PM	. <b>84</b>	0	21.7	34.3		11.1	8.7	35	12	
E5	26-Jul-90	3:25PM		84	21.7	34.3		11.1				
E6	<b>26-Jul-90</b>	11:35 AM		0	20.5		1920	>>20	9.8			
E7	26-Jul-90		dry									
E8	<b>26-Jul-90</b>		dry									
E3	10-Sep-90	2:42PM		0	16.5	27.2		9.2				
E3	10-Sep-90	2:42PM		bottom				9.2				
E5	10-Sep-90	3:47PM		0	19.5	33.9		10.5				

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# Appendix WQ1. Water Quality in Estero Americano and Americano Creek Part 2. Field Parameters

Station	Date	Time	Water Column Depth cm	Samp. Dep. cm	Temp. *C	Salinity ppt	Conduct.	DO	pН	Turbid.	Secchi cm	Flow cfs
E5	10-Sep-90	3:47PM		bottom	19.5	33.9		10.5				
E1	18-Sep-90	11:22 AM	210	0	10.3	30.3		8.6	7.5	2.4	>210	
E2	18-Sep-90	12:45 PM	215	0	10.4	30		8	7.6	2.2	160	
E2	18-Sep-90	12:45 PM		215	10.4	30		8				
E3	18-Sep-90	2:40 PM	115	0	14	30.3		7.6	7.3	8.8	65	
E3	18-Sep-90	2:40 PM		115	14	30.3						
E4	18-Sep-90	2:12 PM	120	0	16.1	33		8	8	37	20	
E4	18-Sep-90	2:12 PM		120	16.1	33						
E5	18-Sep-90	1:43 PM	105	0	16.2	34.5		10.4	7.9	37	20	
E5	18-Sep-90	1:43 PM		105	16.2	34.5						

WQ1-2. Appendix Page 13

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Relative grade

<b>-</b>	<b>_</b> .		ND=	Non Deter								_				
Station	Date	Time	bar open or closed	depth cm	sampie depth	<b>se</b> cchi cm	Temp *C	Sal ppt	Conduct.	DO ppm	рH	Turbid FTU	Chla µg/l	Flow cfs	F Coli MPN/100ml	TDS
S-2	5-Jul-89	10:20 AM	0	195	surface	170	18.4	29		8.4	8.2	4.4	2.69			
S-2	5-Jul-89	10:20 AM	0		bottom		17	29.5		9.2						
S-2	18-Sep-89	10:05 AM	0		bottom		15.3	37		7.4						
S-2	18-Sep-69	10:05 AM	0		surface		15.3	37		6.4	8.2	2.1	0.833			
S-2	28-Nov-89	1:48 PM	o	187	0	175	10.8	30.4		7.5	7.4	3.8	0.92			
S-2	28-Nov-89	1:48 PM	0		187		10.8	32		7.9						
S-2	8-Feb-90	~1:00 PM	C	>200	0	38	7.5	6.5		17.2	8.3	16	113.86			
S-2	8-Feb-90	~1:00 PM	C		100		7.5	14.5		12.2						
S-2	8-Feb-90	~1:00 PM	C		200		7.5	24		2						
S-2	8-Feb-90	~1:00 PM	C		275			26.6		1.2						
S-2	10-Mar-90	1:28 PM	0	200	0	55	11	17.2		9	7.7	10	5.3			
S-2	10-Mar-90	1:28 PM	0		50			17								
S-2	10-Mar-90	1:28 PM	0		100			30		7.4						
S-2	10-Mar-90	1:28 PM	0		200		9	31		7.3						
S-2	6-Apr-90	1:04 PM	0	195	0	140	13.7	10.5	12500	7.9	8.3	3.8	11.76			
S-2	6-Apr-90	1:04 PM	0		195		12.9	30.2		2		2.4	5.3			
S-2	25-May-90		C	250	0	100	15	18.7		8.9	8.3	5	9.42			
S-2	25-May-90		C		100		14	19.2		7.6						
S-2	25-May-90		c		200		13.8	19.2		7.2						
S-2	26-Jun-90	3:00 PM	C	>200	0	120	18.5	15.3		8.6	8.1	4.6	15.18			
S-2	26-Jun-90	3:00 PM	c		100		18.5	15.3								
S-2	26-Jun-90	3:00 PM	c		200		15.8	16.2		6.2						
S-2	27-Jul-90	1:20 PM	C	215	0	130	17	16.4		7.6	8.4	4.1	12.53			
S-2	27-Jul-90	1:20 PM	c		100		16.5	16.3		7.6						
S-2	27-Jul-90	1:20 PM	C		200		16	16.5		6.5						
S-2	19-Sep-90	5:40 PM	C	~150	0	~50	15.9	17.6		8.5	8.2	2.7	4			
S-2	19-Sep-90	5:40 PM	C		150		15	17.6		8.6						
S-2	16-Nov-90	3:30 PM		150	0	>150	12	19.5		9.8	8.4		3			
S-2	16-Nov-90	3:30 PM		150	150		12	20		9.8						
S-4	16-May-88		?		0		17.9	15.5		4.7	7.25	11	9.48		130	
S-4	15-Jun-88	10:43 AM	?		0		20	17.2	26200	5.5	8	4.4	9.59			20000
S-4	21- <b>Jul-88</b>	12:07 PM	?		0		21.1	21		5.9	8.07	4.1	lost			23000
S-4	29-Aug-88		?		0		22	23.2		6.3	7.95	7. <del>5</del>	4.16		ND	30000
S-4	28-Sep-88		?		0		18.8	28.2		5.4	8.2	7.1	4.22			30000
S-4	25-Oct-88		?		0		14.8	24.9	31800	5	8.4	4.7	4.11			29000
S-4	22-Nov-88		?		0		14.2	20.2		18.9	8.8				2400	
S-4	20-Dec-88		?		0		8.5	21.1		11.6	8.7	12	177.33			
S-4	20-Jan-89		0		0		11	7.8	10000	12.3	8.75	13	64.55			
S-4	17-Feb-89		- <b>O</b>	•	0		13	7	9000	20	8.8	27	242.35			
S-4	6-Mar-89	2:45 PM	0		0			1.1	1600	7	7.2	51	8.54			
S-4	4-May-89	5:23 PM	0		0		21	·12.2		14.6	9.2	. 15	110.92		380	
S-4	7-Jun-89	12:58 PM	0		0		18.5	22.8		8.4	8.5	15	31.35			
S-4	5-Jul-89	12:25 PM	0		0		additional	info see m	te							
S-4	5-Jul-89	12:25 PM	0		bottom		20.5	26.2		5.7						
S-4	18-Sep-89	10:50 AM	0		bottom		15.5	38		7.5						
S-4	5-Jul-89	12:25 PM	0		120	80	21	26.2		5.9	8.2	8.3	4.25			
S-4	18-Sep-89				surface		15.5	38		7.2	8.2	2.2	1.212		79	
S-4	28-Nov-89	12:50 PM	0		0											

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### Appendix WQ2. Water Quality in Estero de San Antonio and Stemple Creek

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Ct-M	Dete	Time	TSS	NO3	NH3	un-ionized NH3	NO2	Total P	Diss P	a=acute DOC	o=chronic violation	, Cđ	Cr	Cu
Station	Date	Time	199	mg-N/L	mg-N/L	mg-N/L	mg-N/L	mg-P/L	mg-P/L	mg/l	Tot. org. C	mg/l	mg/t	mg/l
<b>S-2</b>	5-Jul-89	10:20 AM		0.03	ND			0.34	0.31					
S-2	<b>5-Jul-89</b>	10:20 AM												
S-2	18-Sep-89	10:05 AM												
S-2	18-Sep-89	10:05 AM	14	ND	0.09			1.1	0.96	5.1		ND	ND	0.003
S-2	28-Nov-89	1:48 PM	8.4	0.23	0.56	0.0018868		0.1	* 0.24	2	0.	00005	* 0.006	0.001
S-2	28-Nov-89	1:48 PM												
S-2	8-Feb-90	~1:00 PM	19	0.84	1.2	0.0290104		1	0.76					
S-2	8-Feb-90	~1:00 PM												
S-2	8-Feb-90	~1:00 PM												
S-2	8-Feb-90	~1:00 PM												
S-2	10-Mar-90	1:28 PM	10	0.67	0.73	0.0052624		0.71	0.51					
S-2	10-Mar-90	1:28 PM												
S-2	10-Mar-90	1:28 PM												
S-2	10-Mar-90	1:28 PM												
S-2	6-Apr-90	1:04 PM	16	0.015		0.0084054		0.5	0.49					
S-2	6-Apr-90	1:04 PM	48	0.04	0.15	0.0045673		0.22	0.26					
S-2	25-May-90	11:10 AM	25	0.16	0.025 *	0.0009177		0.64	0.58					
S-2	25-May-90	11:10 AM				•				•				
S-2	25-May-90	11:10 AM												
S-2	26-Jun-90	3:00 PM	29	0.015	0.19	0.0061994		1.3	1.3					
S-2	26-Jun-90	3:00 PM												
S-2	26-Jun-90	3:00 PM												
S-2	27-jul-90	1:20 PM	5.6	0.07	0.05	0.0027325		1.6	1.4					
S-2	27- <b>jul-90</b>	1:20 PM												
S-2	27-Jul-90	1:20 PM												
S-2	19-Sep-90	5:40 PM	3.2	0.015	0.025 *	0.0007906		2.1	1.9					
S-2	19-Sep-90	5:40 PM												
S-2	16-Nov-90	3:30 PM	18	0.015	0.074	0.0027164		2.7	2.4					
S-2	16-Nov-90	3:30 PM												
S-4	16-May-88	9:05 AM		0.3	0.22	0.0008954	0.08	0.7	0.57					
S-4	15-Jun-88	10:43 AM		ND	0.23	0.00644	ND	1.6	0.9					
S-4	21-Jul-88	12:07 PM		0.09	0.27	0.008856	ND	0.95	0.95					
S-4	29-Aug-88			ND	0.16	0.004384	0.03	1.9	1.8					
S-4	28-Sep-88				0.11	0.00418	ND		2.4					
S-4	25-Oct-88			ND	0.19	0.008493	0.04	2.6	2.4					ND
S-4	22-Nov-88		73	0.12	8.5	0.85 a	ND	4.6	2					
S-4	20-Dec-88			0.09	1.1	0.05995 c	ND	2.6	2.2					
S-4	20-Jan-89			0.73	2.4	0.18744 a	0.1	2.1	2					
S-4	17-Feb-89		•	0.07	0.85	0.0884 c		2.3	1.7					
S-4	6-Mar-89	2:45 PM		0.61	1.1			1.1	0.78					
S-4	4-May-89	5:23 PM		0.57	ND	0.0061		0.94	0.51					
S-4	7-Jun-89	12:58 PM		ND	0.07	0.005012								
S-4	5-Jul-89	12:25 PM				0.00222								
S-4	5-Jul-89	12:25 PM				0.00073								
S-4	18-Sep-89													
S-4	5-Jul-89	12:25 PM		0.17	0.05			0.69	0.63					
S-4	18-Sep-89		ND	ND	ND			1.3	1					
S-4		12:50 PM							•					

WQ2. Appendix Page 2

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# Appendix WQ2. Water Quality in Estero de San Antonio and Stemple Creek

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Station	Date	Time	Pb mg/l	Ag mg/t	Zn mg/l	dissCd mg/l	dissCr mg/l	dissCu mg/l	dissPb mg/l	dissAg mg/l	diseZn mg/i
Ś-2	5-Jul-89	10:20 AM									
S-2	5-Jul-89	10:20 AM									
S-2	18-Sep-89	10:05 AM									
S-2	18-Sep-89	10:05 AM	ND		ND	10					
S-2	28-Nov-89	1:48 PM	0.0005 *	0.002	0.011	ND 0.00005 *	ND	0.003	ND		ND
S-2	28-Nov-89	1:48 PM	0.0005	0.002	0.011	0.0005 -	0.005	0.004	0.0005 *	0.0019	0.0054
S-2	8-Feb-90	~1:00 PM									
S-2	8-Feb-90	~1:00 PM									
S-2	8-Feb-90	~1:00 PM									
S-2	8-Feb-90	~1:00 PM									
S-2	10-Mar-90	1:28 PM									
S-2	10-Mar-90	1:28 PM									
S-2	10-Mar-90	1:28 PM									
S-2	10-Mar-90	1:28 PM									
S-2	6-Apr-90	1:04 PM									
S-2	6-Apr-90	1:04 PM									
S-2	25-May-90	11:10 AM									
S-2	25-May-90	11:10 AM									
S-2	25-May-90	11:10 AM									
S-2	26-Jun-90	3:00 PM									
S-2	26-Jun-90	3:00 PM									
S-2	26-Jun-90	3:00 PM									
S-2	27-Jul-90	1:20 PM									
S-2	27-Jul-90	1:20 PM									
S-2	27-Jui-90	1:20 PM									
S-2	19-Sep-90	5:40 PM									
S-2	19-Sep-90	5:40 PM									
S-2	16-Nov-90	3:30 PM									
S-2	16-Nov-90	3:30 PM									
S-4	16-May-88	9:05 AM									
S-4	15-Jun-88	10:43 AM									
S-4	21-Jul-88	12:07 PM									
S-4	29-Aug-88	5:25 PM									
S-4	28-Sep-88	10:30 AM									
S-4	25-Oct-88	3:40 PM	ND					0.001 *	0.005 *		
S-4	22-Nov-88	2:25 PM						0.001	0.005		
S-4	20-Dec-88	11:20 AM									
S-4	20-Jan-89	12:10 PM									
S-4	17-Feb-89	12:50 PM	•								
S-4	6-Mar-89	2:45 PM									
S-4	4-May-89	5:23 PM									
S-4	7-Jun-89	12:58 PM									
S-4	5-Jul-89	12:25 PM									
S-4	5-Jul-89	12:25 PM									
S-4	18-Sep-89	10:50 AM									
S-4	5-Jul-89	12:25 PM									
S-4	18-Sep-89	10:50 AM									
S-4	28-Nov-89	12:50 PM									

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WQ2. Appendix Page 3

### Appendix WQ2. Water Quality in Estero de San Antonio and Stemple Creek

			NO	Non Detec	iable Inverservi	MLAL, HUITHA	BE LO HERL HE C	kno mani wa	- <b>A.</b> .							
Station	Date	Time	ber open	depth	sample	secchi	Temp	Sai	Conduct.	DO	pH	Turbid	Chia	Flow	F Coli	TDS
Vanon			or closed	cm	depth	cm	•C	ppt	<i><b>Q</b>01122000</i>	ppm	<b>b</b>	FTU	µg/t	cfs	MPN/100ml	100
S-4	28-Nov-89	1:34 PM	0	158	0	98	11.1	27		4.4	7.1	6.2	3.16			
S-4	28-Nov-89	1:34 PM	ŏ		158	••	11.1	26.8		4.3	•••					
S-4	8-Feb-90	2:50 PM	Č.	>200	0	25	9	3.9		10.6	7.9	28	149.36		350	
S-4	8-Feb-90	2:50 PM	c		100		8.5	12		4.8						
S-4	8-Feb-90	2:50 PM	c		200		8.5	23		0.7						
S-4	10-Mar-90	2:32 PM	ō	150	0	40	11	3.1		8.7	7.7	16	21.43			
S-4	10-Mar-90	2:32 PM	ō		150		10	22		2.5						
S-4	6-Apr-90	2:38 PM	0		0	60	14	4		6.6	8.6	4.7	10.43			
S-4	6-Apr-90	2:38 PM	0		50		15	4		6.5	••••		12.25			
S-4	6-Apr-90	2:38 PM	ō		100		15	19		2.1						
S-4	6-Apr-90	2:38 PM	0		150		15	30		2.1		2.6				
S-4	25-May-90	12:35 PM	c	163	C	85	15.4	16.1		6.4	8.4	7.2	8.19			
S-4	25-May-90	12:35 PM	c		163		15	18		4.6						
S-4	26-Jun-90	4:48 PM	C	165	0	65	18.3	12.9		9.3	8.7	6.5	44.12			
S-4	26-Jun-90	4:48 PM	C		100		18.3	12.9		9.4						
S-4	26-Jun-90	4:48 PM	c		165		18.3	12.9		9.2						
S-4	27-Jul-90	12:55 PM	C	180	0	60	16.5	13.4		9.1	8.8	7.6	27.06			
S-4	27-Jui-90	12:55 PM	C		100			13.6		8.8						
S-4	27-Jul-90	12:55 PM	C		150			14		4						
S-4	19-Sep-90	7:20 PM	C	165	0	120	16	15.2		5.3	8.1	5.4	3.9			
S-4	19-Sep-90	7:20 PM	C		162		16	15.2		5.3						
S-4	16-Nov-90	4:20 PM		130	0	>130	12.3	18.2		8.4	8.4		2.2			
S-4	16-Nov-90	4:20 PM		130	130		12	18.2		8.5						
S-4	6-May-94						17	14.5	20500	6.7	8.5		0.01*			15600
											_					
S-6t	5-Jul-89	11:40 AM		125	0	40	20	22.2		10.4	9	22	80.42			
S-6	5-Jul-89	11:40 AM			bottom	\$	20	23		7.2						
S-6	18-Sep-89	11:15 AM			bottom		17	35.8		4.1	•					
S-6	5-Jul-89	11:40 AM			125	40	20	22.2		10.4	9	22	80.42			
S-6	18-Sep-89	11:15 AM			surface		17	35.8		4.1	8.2	5.4	9.098			
S-6	28-Nov-89	1:15 PM	0	145	0	45	10.1	19.2		2.1	7	16	36.73			
S-6	28-Nov-89	1:15 PM	0		145		9.2	19.9		1.6	~ .	~				
S-6	8-Feb-90	2:12 PM	C	>200	0	18	8.3	0.5	650	6.5	7.4	52	33.91			
S-6	8-Feb-90	2:12 PM			50			0								
S-6	8-Feb-90	2:12 PM	C		100			18.5		0.7						
S-6	8-Feb-90	2:12 PM	C		150		• •	23.3								
S-6	8-Feb-90	2:12 PM		160	200 0	30	8.2	26.2	700	0.3	7.6	24	00 47			
5-6 5-6	10-Mar-90	~1:00 PN ~1:00 PN		100	160	30	11		700 750	8.8 8.6	7.0	24	22.17			
	10-Mar-90						11	1.5	2300							
5-6 5-6	6-Apr-90 6-Apr-90	7:00 AM 2:00 PM		170	0	65	14 14.5	1.5	2580	4 8.3	8.2	4.5	22.97			
5-6	6-Apr-90	2:00 PM		170	170	8	14	29	2000	0.65	0.2	<b>-</b> .5 2.3	17.67			
S-6	25-May-90	11:55 AN		194	0	60	18	13.5		>20	9.4	6.6	88.67		41	
5-6 5-6	25-May-90 25-May-90			। जन्म	100		10	13.5		8	<b>J</b> .7	0.0	00.07		71	
5-6	25-May-90 25-May-90				100		15	15		6.7						
3-6 S-6	25-May-90 26-Jun-90	3:48 PM		>200	0	50	22	8.4		16.2	9.2	15	91.11			
S-6	26-Jun-90	3:48 PM		-200	100		19	9		2.5-3.0	<b></b>	10	Ø1.11			
S-6	26-Jun-90	3:48 PM			>200		17.5	13		0.3		88	96.44			
S-6	27-Jul-90			210	0	40	18	11.3	15500	16.5	9.3	6.4	168.59			
	F1-AM-9A					-10					÷		100.00			

# \* indicates value below MDL, number to left is one half MDL.

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WQ2. Appendix Page 4

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### Appendix WQ2. Water Quality in Estero de San Antonio and Stemple Creek

						un-ionized				a=acute d	-chronic violat	ions				
Station	Date	Time	TSS	NO3	NH3	NH3	NO2	Total P	Diss P	DOC	Tot. org. C	Cd		Cr	Cu	
				mg-N/L.	mg-N/L	mg-N/L	mg-N/L	mg-P/L	mg-P/L	mg/i	•	mg/l		mg/l	mg/l	
S-4	28-Nov-89	1:34 PM	9.6	0.35	1.3	0.0022346	•	0.9	0.6							
S-4	28-Nov-89	1:34 PM														
S-4	8-Feb-90	2:50 PM	29	0.94	2.5	0.0264437		1.7	1.1	26		0.0006		0.0046	0.0089	
S-4	8-Feb-90	2:50 PM														
S-4	8-Feb-90	2:50 PM														
S-4	10-Mar-90	2:32 PM	20	0.87	1.2	0.0093708		0.92	0.9	18		0.003		0.0026	0.0055	
S-4	10-Mar-90	2:32 PM	37	0.47	1.1	0.007089		0.84	0.75	9.7		0.021		0.0042	0.0023	
S-4	6-Apr-90	2:38 PM	20	0.04	0.53	0.0389183		0.65	0.59	14		0.004		0.0061	0.0027	
S-4	6-Apr-90	2:38 PM														
S-4	6-Apr-90	2:38 PM														
S-4	6-Apr-90	2:38 PM														
S-4	25-May-90	12:35 PM	23	0.29	0.12	0.0056647		1.1	0.97	13		0.00005	*	0.0029	0.0008	,
S-4	25-May-90	12:35 PM														
S-4	26-Jun-90	4:48 PM	16	0.015	• 0.1	0.0110904		2.2	2.1	21		0.0007		0.0044	0.0006	i i
S-4	26-Jun-90	4:48 PM														
S-4	26-Jun-90	4:48 PM														
S-4	27-jul-90	12:55 PM	14	0.015	• 0.05	0.0063399		2.1	1.9	20		0.00005	*	0.0032	0.0089	<del>)</del>
Ś-4	27-Jul-90	12:55 PM						*								
S-4	27-Jul-90	12:55 PM														
S-4	19-Sep-90	7:20 PM	4.6	0.18	0.14	0.003653		2	2	22		0.00005	*	0.021	0.00005	<b>, •</b>
S-4	19-Sep-90	7:20 PM														
S-4	16-Nov-90	4:20 PM	9.8	0.066	0.13	0.004772		2.4	2.4	26		0.0022		0.0005 *	0.00005	; • ·
S-4	16-Nov-90	4:20 PM														
S-4	6-May-94		8	0.03	* 0.05 *			0.29	0.16		12	0.00025	۰.	0.0025	0.0025	j •
S-6t	5-Jul-89	11:40 AM		0.03	ND			1.2	0.88							
3-01 S-6	5-Jui-89 5-Jui-89	11:40 AM		0.03	NU			1.2	0.06							
5-6	18-Sep-89															
5-6 5-6	10-34p-04 5-Jul-89	11:15 AM 11:40 AM		0.03	ND			1.2	0.88							
5-6	18-Sep-89		14	0.05	0.78			2.2	1.5	12		ND		ND	0.002	
5-6 5-6	28-Nov-89		24	0.65	3.3	0.0042653		2.5	1.5	22		0.00005		0.004	0.00025*	-
5-6 S-6	28-Nov-89	1:15 PM 1:15 PM	24	0.05	3.3	0.0042000		2.9	1.7	44		0.00000		0.004	0.00023	
5-0 5-6	20-1404-08 8-Feb-90	2:12 PM	37	1.5	2.8	0.0087057		1.8	1.5	35		0.00005	*	0.0078	0.01200	
3-0 S-6	8-Feb-90	2:12 PM	51	1.5	2.0	0.0007007		1.0	1.0	35		0.00005		0.0078	0.01200	,
5-6 S-6	8-Feb-90	2:12 PM														
5-6 5-6	8-Feb-90	2:12 PM														
5-6	8-Feb-90	2:12 PM														
3-0 S-6	10-Mar-90		23	1.2	0.95	0.0059022		1.4	1.2	21		0.0005		0.0026	0.0056	
3-0 8-6	10-Mar-80	~1:00 PM	23	1.4	0.95	0.0009022		1.4	1.2	21		0.0005		0.0020	0.0000	,
S-6	6-Apr-90	7:00 AM	•													
5-6	6-Apr-90	2:00 PM	11	0.05	0.58	0.0190937		0.63	0.49	12		0.0027		0.0005	0.0029	
3-0 S-6			50	0.05		0.0314519									0.00005	
	6-Apr-90	2:00 PM 11:55 AM	50 28	0.015	• • • •	0.0314519		1.6 1.7	1.2	4.8		0.0003		0.0038		
5-6 5-6	25-May-90		20	0.015	• 0.06	0.0230008		1.7	1.4	14		0.00005	-	0.0029	0.0013	*
	25-May-90															
S-6	25-May-90			6 640		A 64444				~~				A AAA		
S-6	26-Jun-90	3:48 PM	17	0.015	* 0.08	0.028414		2.3	1.7	19		0.0006		0.002	0.0015	*
S-6	26-Jun-90			0.047	* **	4 0 4 40500		25	2.2	~				A 0004	A 0000	
S-6	26-Jun-90		2 '	0.015		1.2446506		2.5	3.2	20		0.00005		0.0021	0.00005	
S-6	27-Jul-90	12:25 PM	24	0.015	* 0.05	0.0170017		2.5	2.2	26		0.00005	-	0.0022	0.007	

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# Appendix WQ2. Water Quality in Estero de San Antonio and Stemple Creek

Station	Date	Time	Pb mg/l	Ag mg/t	Zn mg/l		dissCd mg/i	dissCr mg/l	dissCu mg/l	dissPb mg/l	diseAg mg/i	dissZn mg/l	
S-4	28-Nov-89	1:34 PM	•	•	-		-	. •	•	-	•	•	
S-4	28-Nov-89	1:34 PM											
S-4	8-Feb-90	2:50 PM	0.0005	0.000025 *	0.023		0.00005 *	0.0021	0.0066	0.00005 *	0.000025 *	0.011	
S-4	8-Feb-90	2:50 PM											
S-4	8-Feb-90	2:50 PM											
S-4	10-Mar-90	2:32 PM	0.00005 *	0.00005 *	0.007		0.002	0.0018	0.0044	0.00005 *	0.00005 *	0.0035	
S-4	10-Mar-90	2:32 PM	0.0006	0.00005 *	0.013		0.021	0.0029	0.0011	0.00005 *	0.00005 *	0.0063	
S-4	6-Apr-90	2:38 PM	0.0007	0.0001	0.0074		0.00005 *	0.0005 *	0.0017	0.00005 *	0.0001	0.0032	
S-4	6-Apr-90	2:38 PM											
S-4	6-Apr-90	2:38 PM											
S-4	6-Apr-90	2:38 PM											
S-4	25-May-90	12:35 PM	0.0008	0.000025 *	0.0005	٠							
S-4	25-May-90	12:35 PM											
S-4	26-Jun-90	4:48 PM	0.00005 *	0.000025 *	0.0005	*							
S-4	26-Jun-90	4:48 PM											
S-4	26-Jun-90	4:48 PM											
S-4	27-Jul-90	12:55 PM	0.00005 *	0.0001	0.011								
S-4	27-Jul-90	12:55 PM											
S-4	27-jul-90	12:55 PM											
S-4	19-Sep-90	7:20 PM	0.00005 *	0.000025 *	0.0005	٠							
S-4	19-Sep-90	7:20 PM											
S-4	16-Nov-90	4:20 PM	0.00005 *	0.0005 *	0.013								
S-4	16-Nov-90	4:20 PM											
S-4	6-May-94		0.001 *	0.0005 *	0.005	٠							
				-									
S-6t	5-Jul-89	11:40 AM											
S-6	5-Jul-89	11:40 AM											
S-6	18-Sep-89	11:15 AM											
S-6	5-Jul-89	11:40 AM											
S-6	18-Sep-89	11:15 AM	ND		ND		ND	ND	ND	ND		0.02	
S-6	28-Nov-89	1:15 PM	0.0005 *	0.002	0.0084		0.00005 *	0.004	0.002	0.0005 *	0.0019	0.004	
S-6	28-Nov-89	1:15 PM											
S-6	8-Feb-90	2:12 PM	0.00110	0.000025 *	0.024		0.00005 *	0.00180	0.00660	0.00005 *	0.000025 *	0.021000	
S-6	8-Feb-90	2:12 PM						•			•		
S-6	8-Feb-90	2:12 PM											
S-6	8-Feb-90	2:12 PM											
S-6	8-Feb-90	2:12 PM											
S-6	10-Mar-90	~1:00 PM	0.0006	0.00005 *	0.01		0.0005 *	0.001	0.0036	0.00005 *	0.00005 *	0.007	
S-6	10-Mar-90	~1:00 PM											
S-6	6-Apr-90	7:00 AM											
S-6	6-Apr-90	2:00 PM	0.00005 *		0.0003		0.00005 *	0.0005 *	0.0019	0.00005 *	0.000025 *	0.0000	*
S-6	6-Apr-90	2:00 PM	0.00005 *	0.0002	0.002		0.0003	0.0051	0.00005	0.00005 *	0.0001	0.0005	•
S-6	25-May-90	11:55 AM	8000.0	0.000025 *	0.0005	*							
S-6	25-May-90	11:55 AM											
S-6	25-May-90	11:55 AM			_								
S-6	26-Jun-90	3:48 PM	0.00005 *	0.000025 *	0.005								
S-6	26-Jun-90	3:48 PM											
S-6	26-Jun-90	3:48 PM		0.000025 *	0.0005								
<b>S-6</b>	27-Jul-90	12:25 PM	0.00005 *	0.000025 *	0.0005								

# Appendix WQ2. Water Quality in Estero de San Antonio and Stemple Creek

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			ND=	Non Deter		MLPL, HURHU	01 10 1011 10 U									
Station	Date	Time	ber open	depth	sample	secchi	Temp	Sel	Conduct.	DO	pН	Turbid	Chia	Flow	i <sup>F</sup> Coli	TDS
			or closed	cm	depth	cm	•C	ppt		рргп	•	FTU	µg/î	cís	MPN/100mi	
S-6	27-Jul-90	12:25 PM	C		100		18	12.7		0.9						
S-6	27-Jul-90	12:25 PM	C		200		18	12.8		0.8						
S-6	19-Sep-90	6:35 PM	0	170	0	22	15.2	13.5		3.2	8.5	17	163			
S-6	19-Sep-90	6:35 PM	C		170		15.2	14.2		0.6						
S-6	16-Nov-90	4:00 PM		162	0	40	12.3	16		>20	8.8		200.7			
S-6	16-Nov-90	4:00 PM		162	162		13	17.7		5.5						
S-8	28-Nov-89	5:15 PM	0		O		10.9		700	9.6	7.5	7.8	5.02	0.1		590
S-8	16-Jan-90	AM	0				11		307	8.7	7					330
S-8	8-Feb-90	3:20 PM	C		0		6.8		357	8.4	7.5	32	33.67		1600	380
S-8	10-Mar-90	3:40 PM	0		0		9.8		388	9.8	8	21	21.55	8		320
S-8	6-Apr-90	6:55 AM	0		0		14	•	550	1.1						
S-8	6-Apr-90	3:45 PM	0		0		14		500	9.5	8.2	6.3	27.71	5		370
S-8	25-May-90	1:45 PM	C		0		17	0.2	600	9.5	8.6				35000	390
S-8	26-Jun-90	6:05 PM	C		0		19.5	<1	770	14	8.9	19	144.46			550
<b>S-8</b>	26-Jul-90	12:00 PM	C	dry												
S-10	16-May-88	9:47 AM	?		0		15	0.5		2.5	7.95	38	967.4		220	730
S-10	15-Jun-88	9:15 AM	?		0		16	0	1020	5.1	7.6	35?	471.2	•		900
S-10	21-Jul-88	10:18 AM	?		0		21	0	1180	?	7.95	57	lost			970
S-10	29-Aug-88	6:00 PM	?		0		17.5	0.5	1280	2.05	8.57	47	887.65		>/=2400	1100
S-10	28-Sep-88	4:05 PM	?		0		23.5	0	1000	2.1	7.75	52	959.00			1300
S-10	22-Nov-88	9:45 AM	?		0		12.9		780	3.8	7.5	37	189.15		350	690
S-10	20-Dec-88	12:25 PM	?		0		8.5			5.7	7.6*	52	18.92			630
S-10	20-Jan-89	7:45 AM	0		0		7.5	0.2	810	2.3	7.5	23	10.88			870
S-10	17-Feb-89	7:38 AM	0		0		9.8	0	810	3.5	7.6	27	81.34		>2400	750
S-10	6-Mar-89	3:45 PM	0		0			0	462	1.15*	7.5	58	98.86			610
S-10	4-May-89	6:25 PM	0		0		21		980	9.2	8.7	33	200.13		3020	750
S-10	7-Jun-89	11:25 AM	0		0		14.8	0.7	990	5.8	7.9	35	301.40			780
S-10	5-Jui-89	7:40 AM	0		0		14.7	0.8	103	3.7	7.8	51	383.7 <del>5</del>			860
S-10	18-Sep-89	8:50 AM	0		0		13.5		1080	2.6	7.7	54	725		4600	970
S-10	23-Oct-89	5:52 PM	0		0		14.1		322	7.4	7.4					280
S-10	28-Nov-89	8:53 AM	0		0		8		680	1.6	7.3	260	41.14			900
S-10	16-Jan-90	AM	0				9.2		590	1.5	7.1					550
S-10	7-Feb-90	7:45 AM	C		0		3.8		570	4.6	7.1	31	14.20		16000	610
S-10	10-Mar-90	4:20 PM	•		0		12		900	4.4	8	23	38.18			700
S-10	6-Apr-90	4:05 PM	0		0		13		1000	2.8	7.9	20	23.4	0		750
S-10	25-May-90		C		0		12	0.8	1080		8.2	50			350	850
S-10	26-Jun-90	6:28 PM			0		14.1		970	7.3	8.3	38	492.43			830
S-10	26-Jul-90	10:55 AM			0		15.2		1080	8.3	8.1	37	403.72		540	910
S-10	6-May-94		?				17		550	4.7	8.2		0.029			400
S-10	6-May-94		?				17		550	4.7	8.2		0.029			400

#### \* indicates value below MDL, number to left is one half MDL

WQ2, Appendix Page 7

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#### Appendix WQ2. Water Quality in Estero de San Antonio and Stemple Creek

						un-ionized				a=acute o	-chronic violat	ions		
Station	Date	Time	TSS	NO3 mg-N/L	NH3 mg-N/L	NH3 mg-N/L	NO2 mg-N/L	Total P mg-P/L	Diss P mg-P/L	DOC mg/l	Tot. org. C	Cd mg/l	Cr mg/l	Cu mg/l
S-6	27-Jul-90	12:25 PM		•	•	•	•	•	•	-		•	•	•
S-6	27-Jul-90	12:25 PM												
S-6	19-Sep-90	6:35 PM	22	0.015 *	0.07	0.0041098		2.4	1.9	31		0.00005 *	0.0085	0.00005 *
S-6	19-Sep-90	6:35 PM												
S-6	16-Nov-90	4:00 PM	47	0.015 *	0.16	0.0143939		2.7	2.4	36		0.0022	0.0005 *	0.00005 *
S-6	16-Nov-90	4:00 PM												
S-8	28-Nov-89	5:15 PM	7.2	0.05	0.11	0.0006204		0.4	0.52					
S-8	16-Jan-90	AM	36	3	1.9	0.003515		2.4	1.6					0.014
S-8	8-Feb-90	3:20 PM	38	1.3	2.4	0.00912 c		1.9	1.4	32		0.0006	0.0058	0.011
S-8	10-Mar-90	3:40 PM	22	1.3	0.35	0.00588		1.3	0.97	22		0.0005	0.0026	0.0058
S-8	6-Apr-90	6:55 AM	~~		0.00	0.00089			0.07			0.0000	0.0020	
S-8	6-Apr-90	3:45 PM	13	0.1	0.025 *	0.00000		0.52	0.35	14		0.0005	0.0005	0.0045
S-8	25-May-90	1:45 PM	53	0.015 *	0.17	0.01717		1	0.57	16		0.0004	0.0055	0.0033
S-8	26-Jun-90	6:05 PM	42	0.015 *	0.1	0.03195		1.5	0.54	24		0.00005 *	0.0005	0.0028
S-8	26-Jul-90	12:00 PM												
S-10	16-May-88	9:47 AM		ND	1.8	0.03726 c	ND	3.5	1.3			ND	ND	ND
S-10	15-Jun-88	9:15 AM		ND	8.4	0.083328 c	ND	3.5	2.3					
S-10	21-Jul-88	10:18 AM		3.6*	ND *		ND	1.9	0.4					
S-10	29-Aug-88	6:00 PM		1.1	0.21	0.01911	ND	2	0.67			ND	ND	ND
S-10	28-Sep-88	4:05 PM			0.54	0.012582	ND		0.82					
S-10	22-Nov-88	9:45 AM	29	1.3	ND *		0.08	1.8	0.48			ND	0.04	0.006
S-10	20-Dec-88	12:25 PM		0.14	8.3	0.047393 c	ND	4.2	3.2					
S-10	20-Jan-89	7:45 AM		0.07	21	0.08799 a	ND	5.3	3.7					
S-10	17-Feb-89	7:38 AM		0.05	18	0.11538 a		4.7	3	9.2		ND	ND	0.01
S-10	6-Mar-89	3:45 PM		0.37	8.1			3.5	2.5	64		ND	ND	0.016
S-10	4-May-89	6:25 PM		1.7	2.7	0.4239 a		2.7	1.4	44		ND	ND	0.005
S-10	7-Jun-89	11:25 AM		3.1	3.3	0.06105 c				55		ND	ND	0.008
S-10	5-Jul-89	7:40 AM		0.67	3.1	0.04588 c		3.3	1.7	56		ND	ND	0.009
S-10	18-Sep-89	8:50 AM	98	1.2	0.39	0.004017		3.1	0.82	42		ND	ND	0.004
S-10	23-Oct-89	5:52 PM	22	2.5	0.025 *			0.9	0.63		24			0.009
S-10	28-Nov-89	8:53 AM	280	1.4	7.4	0.020054 c		4.2	3.6	59		0.0002	0.04	0.026
S-10	16-Jan-90	AM	43	0.68	8.1	0.015633 c		4.1	2.9					0.011
S-10	7-Feb-90	7:45 AM	18	2.6	4	0.00516 c		1.8	1.3	32		0.0002	0.0064	0.011
S-10	10-Mar-90	4:20 PM	26	0.89	9.7	0.18042 a		3.9	2.8	44		0.0005	0.0017	0.012
S-10	6-Apr-90	4:05 PM	21	0.09	3.8	0.0608 c		3.6	2.6	33		0.0004	0.0005	• 0.0029
S-10	25-May-90	2:30 PM	120	0.015 *	1.3	0.03783 c		3.3	1.2	37		0.0003	0.0079	0.0068
S-10	26-Jun-90	6:28 PM	130	0.32	1.2	0.05052 c		3.7	2	- 44		0.0003	0.0022	0.0056
S-10	26-Jul-90	10:55 AM	130 '	2.1	0.14			2.4	1	48		0.0003	0.005	0.009
S-10	6-May-94		20	0.04	0.24			2.2	1.8		28	0.00025 *	0.0025	• 0.006
S-10	6-May-94		20	0.04	0.24			2.2	1.8		28	0.00025 *	0.0025	* 0.006

#### WQ2. Appendix Page 8

.

# Appendix WQ2. Water Quality in Estero de San Antonio and Stemple Creek

Station	Date	Time	Pb mg/l	Ag	Zn		dissCd	dissCr	dissCu	dissPb	dissAg	dissZn
S-6	27-Jul-90	12:25 PM	mgvi	mg/l	mg/l		mg/t	ng/l	mg/l	mg/t	mg/l	mg/l
S-6	27-Jul-90	12:25 PM										
S-6	19-Sep-90	6:35 PM	0.00005 *	0.000025 *	0.0005							
S-6	19-Sep-90	6:35 PM	0.0000	0.000020	0.0000							
S-6	16-Nov-90	4:00 PM	0.00005 *	0.0005 *	0.000025							
S-6	16-Nov-90	4:00 PM	0.0000	0.0000	0.00020							
S-8	28-Nov-89	5:15 PM										
5-8	16-Jan-90	AM							0.0048			
S-8	8-Feb-90	3:20 PM	0.0011	0.0001	0.025		0.0001	0.0005 *	0.0048	0.0052	0.0004	
S-8	10-Mar-90	3:40 PM	0.001	0.0007	0.025		0.0001	0.0005 -	0.0038	0.0005 *	0.0001	0.013
S-8	6-Apr-90	6:55 AM	0.001	0.0007	0.025		0.0005 -	0.0006	0.0036	0.00005 -	0.00005 *	0.003
S-8	6-Apr-90	3:45 PM	0.0063	0.000025 *	0.013		0.0004	0.0005 *	0.002	0.0015	0.000025 *	
S-8	25-May-90	1:45 PM	0.0037	0.000025 *	0.005		0.0004	0.0005 -	0.002	0.0015	0.000025 -	0.01
S-8	26-Jun-90	6:05 PM	0.0073	0.000025 *	0.014							
S-8	26-Jui-90	12:00 PM	0.0070	0.000020	0.014							
S-10	16-May-88	9:47 AM	0.004		0.02							
S-10	15-Jun-88	9:15 AM										
S-10	21-Jul-88	10:18 AM										
S-10	29-Aug-88	6:00 PM	ND		ND							
S-10	28-Sep-88	4:05 PM										
S-10	22-Nov-88	9:45 AM	ND		ND							
S-10	20-Dec-88	12:25 PM										
S-10	20-Jan-89	7:45 AM										
S-10	17-Feb-89	7:38 AM	ND		0.07		ND	ND	0.003	ND		ND
S-10	6-Mar-89	3:45 PM	0.002		0.03		ND	ND	0.011			0.05
S-10	4-May-89	6:25 PM	ND		0.11		ND	ND	0.003	· ND		ND
S-10	7-Jun-89	11:25 AM	ND		0.021		ND	ND	0.002	ND		ND
S-10	5-Jul-89	7:40 AM	ND		0.02		ND	ND	ND	ND		ND
S-10	18-Sep-89	8:50 AM	ND		0.04		ND	ND	ND	ND		80.0
S-10	23-Oct-89	5:52 PM							0.004			
S-10 S-10	28-Nov-89 16-Jan-90	8:53 AM AM	0.0005 *	0.00005 *	0.055		0.00005 *	0.01	0.026	0.0005 *	0.00005 *	0.027
S-10	7-Feb-90	7:45 AM	0.001	0.0000	0.000		0.0004		0.0029			
S-10 S-10	10-Mar-90			0.0002	0.025		0.0001	0.0027	0.0048	0.0009	0.0002	0.015
S-10 S-10	10-Mar-90 6-Apr-90	4:20 PM 4:05 PM	0.0021	0.00005 *	0.037		0.0005 *	0.0009	0.0049	0.00005 *	0.00005 *	0.012
5-10 S-10	6-Apr-90 25-May-90	4:05 PM 2:30 PM	0.002	0.000025 *	0.012		0.0002	0.0005 *	0.0029	0.00005 *	0.000025 *	0.0013
5-10 S-10	25-May-90 26-Jun-90	2:30 PM 6:28 PM		0.000025 *	0.0018							
S-10 S-10	26-Jun-90 26-Jul-90		0.0047	0.000025 *	0.045							
5-10 5-10		10:55 AM	0.00005 *	0.000025 *	0.068							
5-10 5-10	6-May-94		0.001 *	0.0005 *	0.005							
3-10	6-May-94		0.001 *	0.0005 *	0.005	-						

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**ZOOPLANKTON AND FISH LARVAE APPENDIX** 

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					Statio	n E-1				
	14-Apr-88	15-Jun-88	30-Aug-88	26-Oct-88	21-Dec-88	17-Feb-89	6-Mar-89	4-May-89	8-Jun-89	5-Jul-89
Besteres										
Protozoa Tintionida										
Foraminifera							2.895	0.515		
Noctiluca				0.668		0.625				
Ctenophore						0.625				
Cnidaria	0.743			1.526	0.342		0.312			
Leptomedusa type	0.743		0.142	1.020	0.136	1,182	6.724			
Anthomedusa type other medusae	0.557									
Hydroid polyp								0.258		
Leptomedusa polyp					2.797					
Coral polyp						0.299				
Siphonophore		0.260				0.299				
Aschelminthes					0.682			0.139		
roundworm Unknown "worm"										
Rotifera								ł		
Brachionus										
Synchatea			ł							
Mollusca			l				0.268		0.332	0.148
Bivalves	0.186	0.520					0.200	1		
Monticutidae			ł					1		l
Modiolus sp(p). Gastropods	0.390	0.468	0.282	0,449	0.428	2.994	1.137	0.593	0.664	0.890
Gastropod eggs										
Nudibranchs	1		[			e .				l
Phoronida actinotroch		l	I							ł
Bryozoa larvae		•	1			-				
Bryozoan colony		ł		1				1	1	
Annelida							0.134			1
Hirudinea	Į –									
Nemertean Polychaetes						1	0.268		0.664	I
Polychaete larvae	0.371	0.338	1	0.228	0.136	0.892	l	0.694		1
Oligochaete		1				]	Į			}
Nemertea			1							l
Arthropoda	1						l			1
Crustacea	0.186		0.142			1	l			0.297
nauplii	0.100		0.142							
Ciadocera Evadoa			7.195	0.222				1	0.664	
Podon	0.168		4.797	0.238	0.682	}		1		
Copepoda			l		l					1
Corycaeus	1		I	1	l	0.299		ł		
Oithona		0.168	I	1	1	0.299		1		1
Oncaea			I		1		0.134	1		
unk. cyclopoid Cyclopoid copepodites			1	1				1		
Acartia clausi	0.278	1	14.954	42.917	4.940	36.662	2.368	0.515	0.332	0.445
Acartia danae			1				0.517	1		0.148
Calanus sp.			1			0.892	ľ			1
Metridia lucens	0.835	1	1	0.450		I				1
Epilabidocera longipedata	0.000	1	1	0.459	]	1		1		
Eucaianus Eucaianus	0.186		1	1	1	1		1		1
Eurytemora americana Pseudodiaptomus euryhalinus		1	· ·	1		1	1	I '		
Temorites so(D)			1	1		1				1
Rhincalanus nasutus		1	1	0,891						1
Tortanus discaudatus		1	1	0.484	0.682					1
Mostrillidae, unident.	1	1		1					1	1
unknown calanoid	0.700	0.520	0.142	1	1		1	0.139		
Calanoid copepodites	0.743	0.520	1	1	1	1	1	0,139		l
Cal. copepodites w/long rami Harpacticoid "A"	1	0.260	1	1	l l	1				1
Harpacticoid "A" Harpacticoid "B"	1		1	1	1	1	1	1	1	1
Harpacticoid "C"	1	1		1	1	I.	1	1		1
Schizopero knabeni	1	1	1	1		1	1		1	1
Caligus	1	0.260	1	I	1	1	1	1	}	1
other parasitic copepods	1	0.613		1		1	1	1		1
unknown copepodites	0.371		1			1.	0.414	0.139	1	1
	1 0 371	0.446	1	1	1	1	1 9.717	1	1	1
Ostracoda Podocopida	0.07				1	1	1	1	1	1

					Cleat	on E-1				
	14-Apr-88	15-Jun-88	30-Aug-88	26-Oct-88	21-Dec-88	17-Feb-89	6-Mar-89	4-May-89	8-Jun-89	5-Jul-89
Cirripedia		1			1	2,366				0,148
Barnacle nauplii Barnacle cypris	0.130	0.260		0.228	0.273	2.365				0.148
Isopoda	0.186	0.780		[	0.136	1	0.134			0.297
Sphaeromatidae				1						
Idoteidae										
Amphipoda Anisogammarus confervicolus	0.186		1	1						
Corophium	0.186			1			0.134		0.332	0.148
Caprellidae		1				0.892				
Grandidiella japonica				1						0.148
Ampithoidae Aoridae			1	1					0.332	0,140
Atylidae							7.348			
Hyalidae	1	1		1	1	1	0.134		0.332	
Ischyroceridae				1						
Photidae Pleustidae	1						0.414			0.148
Ampeliscidae		]		1						
Talitridae		[							1	
unk. amphipods	0.743	0.130		0.446	4.524	0.446	2.585	0.130		0.445
Cumacea Mysidacea			1			0.178	2.000			0.440
Neomysis mercedis				0.222	]		1.345			
Euphausiacea						0.535				
Decapoda										
Brachyura			0.282			1.464				
Cancer antennarius/gracilis(1) Cancer antennarius stg 2 zoea	1.114		0.202	1	ļ	1.404				
Cancer antennarius stg 3 zoea	0.371					·				
Cancer productus stg 1 zoea	0.371		ł			0.892				
Grapsidae zoea	0,186			0.238		0.892	0.517			0.297
Majidae zoea Pinnotheridae zoea	0.149	0.468	1.693	3.620	0.342	0.582	2.378	0.258	0.697	1.667
Xanthidae zoea										
Unknown brachyuran zoea				0.678		0.892				
Unic, Megalopa										
Megalopa A Megalopa B										
Megalopa C										
Megalopa D						0.892				
very young crab			0.142			0.268				
Hemigrapsis oregonensis Hemigrapsus nudus			1	<b>[</b>						
Pachygrapsus rugus Pachygrapsus crassipes										
Anomura										
Anomuran megalopa										
Porcellanidae zoea Hippidea zoea	0.334			0.178				0.515		
Emerita analoga zoea				0.220						
Paguridea zoea				0.222						
Paguridas megalopa										
Thalassinidea zoea Callianassidae	0.334			0.891		0.892				
Caridez						0.002				
Penasidae	1									
Crangonidae(zoea and older)			0.488						0.000	- 110
Caridean zoes and older	1			0.267		0.268	0.312		0.332	0.445
Hippolyticae zoea Crangon nigromaculata						0.200				
Heptacarpus pictus								•		
Heptacarpus taylori				0.891						
Unknown caridean type zoea	0.186	0.700				0.299 0.300				
Unknown zoea Arachnid	0.557	0.780				0.300				
Pyenogonid										0.148
Halacaridea									[	0.148
Insect larvae Echinodermata							0.268			
Echinodermata bioinnaria larvae										
pluteus larvae										
Chaetognatha	0.557							1		[
Urochordata			a (04	0.000	0.047	4 740				
Larvacea	J.,	0.140	0.423	0.222	0.247	1.746		]	I	
Number of Invertebrate taxa	30	16	12	23	14	26	22	12	10	16
Total Invertebrates per m3	12.066	6.407	30.682	56,413	16.348	57.969	30.737	4.034	4.678	5.967
Copepoda per m3	2.042	1.820	15.096	44.751	5.622	37.853	3.019	0.793	0.332	0.593
Decapoda per m3	4.882	1.247	2.605 0.000	7.213 0.222	0.342 0.000	7.960 0.000	3.207 1.345	0.773 0.000	1.028 0.000	2.408
Mycidacea per m3 Other per m3	0.000 5.142	0.000 3.340	12.981	4.227	10.384	12,156	23.166	2.468	3.318	2.966
Series her mo	J. 194	0.040	16.001			144 1444				

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	r				Station E-1				
	18-Sep-89	28-Nov-89	7-Feb-90	9-Mar-90	5-Apr-90	24-May-90	25-Jun-90	26-Jul-90	18-Sep-90
Protozoa Tintinnida									
Foraminifera						0.427	0.192	0.767	
Noctiluca Ctencohore									
Chidaria			•						
Leptomedusa type		0.625							
Anthomedusa type	0.187	0.375	0.176	1.730	2.246				
other medusae			_			0.641			
Hydroid polyp		Р	P			P	Р		
Leptomedusa polyp Coral polyp									
Siphonophore							1		
Ascheiminthes									
roundworm					0.287				
Unknown "worm"									
Rotifera				1					
Brachionus									
Synchetea Moliusca									
Bivalves				ł					
Monticutidae	1			0.192		0.150			
Modiolus sp(p).		0.125	0.423						0.194
Gastropods		0.125		0.192		0.214	0.768		0.136
Gastropod eggs				•		Р	Р		0,194
Nudibranchs				ł					V. 184
Phoronida actinotroch									
Bryozoa iarvae Bryozoan colony									
Annelida									
Hirudinea				0.192					
Nemertean									
Polychaetes							0.115		0.969
Polychaete larvae		0.375	0,176						
Oligochaete							0.192		
Nemertea Arthropoda							0.102		
Crustacea									
nauplii				14.993					
Ciadocera									
Evadne				1					0.213 0.194
Podon	0.187			1					0.194
Copepoda		0.250							
Corycaeus Oithona		0.250							0.194
Oncaea			{	Į					
unk, cyclopoid			l	l			l		
Cyclopoid copepodites			l	l					
Acartia clausi	4.785	16.624	1.234	66.559	7.862	1.624	l	0.153	0.426
Acartia danae				0.192				0.767	0.388
Calanus sp.		0.250	ł	0.769		0.855		9.797	0.000
Metridia lucens Epilabidocera longipedata	0.544		1			0.641			
Eucalanus	0.044			[			ł		
Eurytemora americana			l	l			[		
Pseudodiaptomus euryhalinus		1	1	l		l		•	
Temorites sp(p)		1		l			ł		
Rhincalanus nasutus				[	0.007		1		
Tortanus discaudatus	0,163	0.875	0.352		0.287	0.641	l		
Mostrillidae, unident. unknown calanoid		0.0/0	0.302	I		0.041	l		0.194
Unknown calanoid Calanoid copepodites		ľ	0.230			1	l		
Calanoid copepodites Cal. copepodites w/long rami	1					0.169	1		
Harpacticoid *A"							1		
Harpacticold "B"							l		
Harpacticoid "C"			l				ł		
Schizopero knabeni				l		0.214			
Caligue			ł						
other parasitic copepods		l	ł	l					
unknown copepodites Ostracoda	0.163		l	l					
Podocopida		1	0.176			1	•		
Leptostraca	1	ł	1	1		1	1		1

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					Station E-1				
	18-Sep-89	28-Nov-89	7-Feb-90	9-Mar-90	5-Apr-90		25-Jun-90	26-Jul-90	18-Sep-90
Cirripedia	- The second					0.214	,	0.232	
Bamacle naupili									
Barnacie cypris	0.217								
Isopoda Sohaeromatidae	0.4.17	0.125	0.749				0.384		0.969
Idoteidae						0.214			0,388
Amphipoda				0.192		0.214	0.192		0.300
Anisogammarus confervicolus				0.192		0.214			
Corophium Caprellidae				0.102		0.214			
Grandidiella japonica						0.214			
Ampithoidae									0.194
Aoridae						0.214	0.192		0.388
Atylidae	0.217	l		0,192			0.192		
Hyalidae Ischyroceridae		1	0.749	0.182			0.102		
Photidae					0.287		0.192		
Pleustidae							0.192		
Ampeliscidae						0.214			
Talitridae	0.217		0.529			0.192	0.192		
unk amphipods						0.102	0.102	]	
Cumacea Mysidacea			l			0.192	0.576		l I
Neomysis mercedis	1997 - 19	l	1					l	
Euphausiacea			0.352	1				1	· ·
Decapoda		1	l			1		[	l
Brachyura		1	l	1		1		0.153	l
Cancer antennarius/gracilis(1)				1.538	3,369	1	l		0.194
Cancer antennarius stg 2 2088 Cancer antennarius stg 3 2088				1		1			l
Cancer productus stg 1 zoea			[						1
Grapsidae zoea	0.163								
Majidae zoea		1	0.934	1.730	17.966	0.641			
Pinnotheridae zoea	6.253		0.176	0.577	298.687	0.214			0.194
Xanthidae zoea		8.499	0.546	0.5/7	290.001	0.214		0.767	
Unknown brachyuran zoea			0.123						
Unk, Megalopa Megalopa A		0.125	1			0.427	0.192	0.767	
Megalopa B									
Megalopa C									
Megalopa D	l			1					
very young crab	ļ.,						1		· ·
Hemigrapsis oregonensis	Į	1							
Hemigrapsus nudus Pachygrapsus crassipes			1		ľ				
Anomura		1				1			
Anomuran megalopa		1			ł				0.194
Porcellanidae zoea	1					1			0.104
Hippidea zoea				1			0.192		
Emerita analoga zoea Paguridea zoea									
Paguridae megalopa			0.176		8.150				
Thalassinidea zoea		1				1			
Callianassidae	1	1	I			1	1	1	1
Caridea		1			}	0.427		1	
Penaeidae Crangonidae(zoea and older)		1	1	1	1	0.534		1	1
Crangonidae(zoea and older) Caridean zoea and older	0.326	1			1				
Hippolytidae 2088		[	0.493	1	l	1		1	1
Crangon nigromaculata	1	1			1	1	0.192	· 0.767	1
Heptacarpus pictus	l	I		1		1	1	0.101	1
Heptacarpus taylori		1			1	1		1	
Unknown caridean type zoea Unknown zoea	1	1	0.123		1	1	1	1	1
Unknown zoes Vrachnid	1			1		I	1	1	1
yenogonid		1	1	1	I	1		1	1
lalacaridea	1	1	1	I.			1	1	1
Insect larvae	1	1	1	1		1	1	1	0.581
Ichinodermata	1	1	I	1	1	1	ł		1
bipinnarla larvae	1	1	1	1			1	1	
piuteus larvae Chaetognatha		1	1	1	1	1	1	1	1
Jnaetognatna Jrochordata		0.250	0.150	1	1				1
Larvacea	1			<u> </u>	<u> </u>	0.214	<u> </u>	<u> </u>	L
		Contraction of the local division of the loc							
					-			۵	40
lumber of invertebrate taxa	12	14	20	14 80 241	9 339 141	27 9.915	17 3.958	8 4.376	18 6.201
lumber of invertebrate taxa fotal invertebrates per m3	13.424	28.623	7.869	89.241	339,141	27 9.915 4.144	17 3.958 0.000	8 4.376 0.921	
lumber of Invertebrate taxa fotal Invertebrates per m3 Copepoda per m3	13.424 5.492		7.869 1.816	• •	-	9.915	3,958	4.376 0.921 2.455	6.201 1.201 0.581
lumber of invertebrate taxa fotal invertebrates per m3	13.424	28.623 17.998	7.869	89.241 67.520	339,141 8,149	9.915 4.144	3.958 0.000	4.376 0.921	6.201 1.201

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r	1				Qtatle	n E-2				1
	14-Apr-88	15-Jun-88	30-Aug-88	26-Oct-88	21-Dec-88	17-Feb-89	6-Mar-89	4-May-89	8-Jun-89	5-Jul-89
Protozoa										
Tintinnids										
Foraminifera									0.316	
Noctiluca				1.975	0.390	0.040				
Ctenophore Cnidaria	1		1			0.243				
Leptomedusa type	0.743	0.149		1.947	0.835	0.273				
Anthomedusa type	0.140	0.595	0.242		0.371	2.793	0.217	0.186	0.316	
other medusae				0.996						
Hydroid polyp			1							
Leptomedusa polyp										
Coral polyp Siphonophore					0.278	0,132				
Aschelminthes										
roundworm										
Unknown "worm"										
Rotifera										
Brachionus Synchatea										
Moliusca										
Bivalves	0.186			•						
Macoma sp.										
Modiolus sp. (p)	0.742	0.407		0.457	0.195	1.251	0.255	0,186		0.157
Gastropods Gastropod eggs	0.743	0.427		0,437	0.180	1.601	0.200	5.100		
Nudibranch										
Phoronida actinotroch										0.261
Bryozoa iarvae										
Bryozoan colony			0.242							
Annelida Hirudinea										
Nemerlean										
Polychaetes									0.316	0.261
Polychaete larvae	0.371	0.149		0.183	0.557	0.132				0.600
Oligochaete										0.522
Arthropoda Crustacea										
nauplii		0.149		0.183						0.261
Cladocera										
Evadne			3.268							
Podon	0.557		3.471							
Copepoda										
Corycaeus Oithona		0.297								
Oncaea										
unk. cyclopoid										
Cyclopoid copepodites					ممدرم	20.200	3 220		0.631	0.261
Acartia clausi Acartia danae	0.928		19.623	15.547	6.422	28.298	3.326 0.128		0.031	0.201
Calanus sp.				0.996		0.282	V. 120			
Metridia lucens	0.111						0.128			
Epilabidocera iongipedata			0.484	0.191	0.278					
Eucalanus		0.149	0.242			0.142				
Eurytemora affinis			0.242							
Eurytemora americana Pseudodiaptomus euryhalinus			V.242							
Temorites sp(p)										
Rhincalanus nasutus										
Tortanus discaudatus				0.183						
unknown calanoid				0.366						
Calanoid copepodites Cal. copepodites wilong rami	0.371			0.300						
Harpacticolda unident.										
Harpacticoid "A"										
Harpacticoid "8"										
Harpscticoid "C"	I	0.000		0.000						
Caligus other parasitic copepods		0.297		0.182						
unknown copepodites										
Ostracoda								0.615	0.316	
Podocopida				ا	L					]

11. A. B. A.

	14 407.99	15- hip-88	30-400-88	28-Oct-88	Static 21-Dec-88	on E-2 17-Feb-89	6-Mar-89	4-May-89	8-Jun-89	5-Jul-89
Leptostraca	14-40-00	10-0011-00	00-10-00	20 000 00						0.064
Cirripedia					0.278	9,187				0.261
Bamacle naupili	0.928				0.270	9,101				
Barnacie cypris Isopoda		0.297						[ [	0.316	
Idoteidae										
Amphipoda			1						0.126	0.261
Anisogammarus confervicolus			[						0.379	
Corophium Caprellidae			1				0.128			
Ampithoidae					[	1		[	0.126	0.261
Aoridae							0.400		0.316	
Atylidae	1.000						0.128 0.128			
Hyalidae Pleustidae	1.000					ļ	0.519			
Ampeliscidae				ļ	]		0,153		0.316	
unk. amphipods								1		
Talitridae		0.149		0,191	0.418			17.228		
unk. amphipods Cumacea		0, 149		V. 191	0.410			0.154	0.631	
Mysidacea				1			1.584			
Neomysis mercedis					0.278			1.182	0.126	
Euphausiacea	1		(	[		0.447	0.383			
Decapoda	1		l	l	ł					1
Brachyura Cancer antennarius/gracilis(1)	0.817			I		1				
Cancer antennarius stg 2 zoea	0.260	0.149	l							
Cancer antennarius stg 3 zoea										
Cancer productus stg 1 2088	0.186	0.149	[			0.142				0.261
Grapsidae zoea Majidae zoea	0.743	0,149		0,183		0.154				
Pinnotheridae 208a	0.613	0.470	0.484	1.284	0.111	2.664		0.461	0.600	0.289
Xanthidae zoea			ļ			0.527				
Unknown brachyuran zosa				0.183		0.928				
Unk. Megalopa Megalopa A			l I	Į	1	0.820				
Megalopa B										
Megalopa C				ł						
Megalopa D										
very young crab			0.242	1						
Hemigrapsis oregonensis Hemigrapsus nudus		Į								
Pachygrapsus crassipes										
Anomura										
Anomuran megalopa				0.996						
Porcellanidae 2008	0.130	0.149		0.366		1				
Hippidea zoea Emerita analoga zoea	0.100	0.145			1					
Paguridea zoea				0.271						[
Paguiridae megalopa			[		1					
Thalassinidea zoea	0.743	0.130		1						
Callianassidae Caridea	1	ł				1	ł			
Crangonidae(zoea and older)	1	l	0.371	]		]	·			I
Penaeidae		1			I .				0.126	1
Caridean zoea and older	1	]	0.484	0.182	1	0.928			0.120	
Hippolytidae zoea Crangon nigromaculata	1	l	1		1	1				
Heptacarpus pictus	1	ļ	1	1		I	l			
Heptacarpus taylori	]	ļ						0.000		
Unknown caridean type 208a	0.186		1	0.633		0.659		0.154		[
Unknown 2068	0.743	0.149				0.132	l			
Arachnid Pycnogonid	1			1	1	1				
Halacaridea	1		1		1	1	1	ł		
Insect larvae	1				1	1	0.519			
Echinodermata	1	[		[			0.518	1	l l	1
bipinnaria larvae pluteus larvae	1			1		1	l		1	
Chaetognatha	· ·	l								
Urochordata	1	l				0.004				
Larvacea	L	L	0.242	L	0.278	0.264	L	1	L	J
Number of Invertebrate taxa	20	17	13	21	13	20	13	8	15	11
Total # invertebrates per m3	10.541	3.999	29.637	27.494	10.691	49.577	7.595	20.167	4.955	3.057
Copepoda per m3	1.411	0.744	20.591	17.465	6.700	28.722	3.582	0.000	0.631	0.261
Decapoda per m3	4.604		1.581	4.097	0.111	6.133	0.000	0.615 1.182	0.726 0.126	0.550 0.000
Mycidacea per m3	0.000 4.527		0.000 7.465	0.000 5.931	0.278 3.601	0.000 14.721	1.584 2.429	1.182	3.472	2.246
Other per m3	4.027	1.714	1.400	0.001			a. 76¥			

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	T			Static	on E-2			1
	18-Sep-89	7-Feb-90	9-Mar-90	5-Apr-90	24-May-90	25-Jun-90	26-Jul-90	18-Sep-90
Protozoa								
Tintinnids								
Foraminifera						0.183		
Noctiluca								
Ctenophore	ļ.	0.129	]					
Cnidaria			1					
Leptomedusa type	1	0.485	1	0.468				0.189
Anthomedusa type	0.267	0.220		0.693	0.126	0.721		0.170
other medusae	1							р
Hydroid polyp	[	Р	]	I				r
Leptomedusa polyp	1							
Coral polyp	1		1	ł				
Siphonophore Aschelminthes	1		1					
roundworm	1		l					
Unknown "worm"			ł					
Rotifera	ł		1	· ·				
Brachionus	1		Į	]			1	
Synchatea			[	l				
Moliusca	· ·		[	[			ł	
Bivalves	0.345		1	1				
Macoma sp.	1	1	0.493	l		1		
Modioius sp. (p)	1	0.162	1				1	
Gastropods	0.267	0.162						
Gastropod eggs	1		[	0.937	P	Р		Р
Nudibranch	I						ľ	
Phoronida actinotroch	[							
Bryozos larvae	1							
Bryozoan colony	1	ļ						
Annelida	1		1		1			
Hirudinea								
Nemertean	1	ļ	1	0.234	ļ		0.713	
Polychaetes		].	1	0.234	1			
Polychaete larvae		ł	1		1	[		
Oligochaete		1	1			1		
Arthropoda Crustacea			1		[			
naupili			}		]			
Cladocera					1		ł	
Evadne	0.689	]					Į	0.159
Podon		ł						
Copepoda	1	1	-		1	l		
Corycaeus	1	0.162		1	]			
Oithona				l	1	0.183	0.713	0.755
Oncaea	1	1		1				
unk. cyclopoid		1				l	[	
Cyclopoid copepodites	I I	1	1		1		l.	
Acartia clausi	1.723	4.687	0.856	1,454	1	0.366	ł	0.264
Acartia danae	1	0.646			1	Į	1	
Calanus sp.	1	0.162		0.468	1	[	ł	
Metridia lucens	1	I			1		ł	
Epilabidocera longipedata	1	1				1		
Eucalanus					1	0.342		
Eurytemora affinis	1			l .	]	0.342		
Eurytemora americana	I	· ·	l			l ·		
Pseudodiaptomus euryhalinus	1		1			1	l ·	
Temorites sp(p)			0.164		1			
Rhincalanus nasutus Tortanus discaudatus	1	0.178	0.164		1	I	ŀ	
unknown calanoid	1	0.170	0.329			l		
Calanoid copepodites	1		0.040		I			
Cal. copepodites w/long rami	1			l				
Harpacticoida unident.	1			l		0.198		
Harpacticoid "A"		ł		1				
Harpacticoid "B"			I		1	1		
Harpacticoid "C"	1		1					
Caligus				I	1	0.183	0.713	
other parasitic copepods				I				
unknown copepodites	1		1		1		1	
Ostracoda					1	I		
Podocopida		I	<u> </u>	0.468	1	ļ		L

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r	T			Static	on E-2			
	18-Sep-89	7-Feb-90	9-Mar-90	5-Apr-90	24-May-90	25-Jun-90	26-Jul-90	18-Sep-90
Leptostraca								
Cimipedia Barnacie naupili								
Barnacie cypris								
isopoda							0.178	
Idoteidae Amphipoda							0.170	
Anisogammarus confervicolus		0.162		0.234				
Corophium			0.164					
Caprellidae		0.226						
Ampithoidae Aoridae					}			
Adridae								
Hyalidae	0.138		0.329					
Pleustidae	1							
Ampeliscidae unk. amphipods	1	0.162						
Talitridae	0.689	0.102		0.234	0.632	0.366		
unk, amphipods								
Cumacea	0.689		0.164	0.234				
Mysidaces Neomysis mercedis	0.276		0.104			0.183		
Euphausiacea	0.210							
Decapoda	1	l			Į			
Brachyura	1	ł		0.937	1			
Cancer antennarius/gracilis(1) Cancer antennarius stg 2 zoea	1	}		0.937	1			
Cancer antennarius stg 3 2008								
Cancer productus stg 1 zoea								0.189
Grapsidae zoea	0.689	0.299	0.822	0.345	0.253	0.721		0.169
Majidae zoea Pinnotheridae zoea	1.999	0.517	0.116	0.234	0.126	0.144	l	0.328
Xanthidae zoea	1.000	0.162	0.987					
Unknown brachyuran zoea								
Unic Megalopa	1							
Megalopa A	}				]			
Megalopa B Megalopa C								
Megalopa D	1				l			
very young crab		]			l			
Hemigrapsis oregonensis Hemigrapsus nuclus		]			ļ			
Pachygrapeus routus Pachygrapeus crassipes	1				Į			
Anomura	[	l						
Anomuran megalopa	1	5.	0.000			0.183		
Porcellanidae zoea	]	ļ	0.329					
Hippidea zoea Emerita analoga zoea			0,164					
Pagurides zoea				0.234	}	0.182		
Paguiridae megalopa	1				0.632			
Thalassinidea zoea			]					
Callianassidae Caridea	1				[			
Crangonidae(zoea and older)	1	0.162	0.362		ł	I		
Penasidae	ł				0.316	0.400		
Caridean zoea and older	1	0.646	ļ			0.183	I	
Hippolytidae zoea Crangon nigromaculata	1							[
Heptacarpus pictus	I	l						
Heptacarpus taylori	1	0.323	0.987		1		.	]
Unknown caridean type zoes Unknown zoes	1	0.323	0.90/		ļ	]		, I
Arachnid	ł	l	l		l		l	
Pycnogonid	1		ł		l	l		
Halacaridea Insect larvae	1.337	1					1	
Insect larvae Echinodermata	1.007	1			I	]	ļ	
bipinnaria larvae	1				ļ			
pluteus larvae	ł				ł			
Chaelognatha	1	0.162	0.164	0.234	ļ	1		
Urochordata Larvaces	1	0.162	ļ .		1	]		0.189
							_	40
Number of invertebrate taxa	12	22	16	15	7 2.085	15 4.136	4 2.318	10 2.242
Total # invertebrates per m3 Copepoda per m3	9.108 1.723	9.973 5.834	6.595 1.513	7.411 1.923	2.085	4.130	1.427	1.019
Decapoda per m3	2.688	2.109	3,768	1.751	1.327	1.412	0.000	0.516
Mycidacea per m3	0.276	0.000	0.164	0.000	0.000	0.183	0.000	0.000
Other per m3	4.422	2.030	1.151	3.738	0.758	1.270	0.892	0.707

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Image: Strugger 12 Cock 38 (1/Cock 38 (1/Co	r	τ				Station E-3				
Therminise Poramities         0.223         0.171         3.425         15.667         0.365         0.138           Notificate Consporter         1.289         1.389         0.142         0.184         0.183         0.459         0.138           Laptometuses type Antionectuse type Collaries         0.149         0.381         0.142         0.184         0.183         0.459         0.138           Antionectuse type Collaries solve Signonophone Rectements         0.164         0.184         0.142         0.184         0.183         0.459         0.139           Signonophone Rectements         0.164         0.164         0.170         0.142         0.184         0.466         0.152           Maintenent Rectements         0.164         0.171         0.342         0.426         0.466         0.152           Synchates         0.743         0.342         0.426         0.183         0.466         0.152           Rectements         Poyonalistic sines         0.171         0.171         0.223         0.459         0.183         0.466         0.152           Rectements         Poyonalistic sines         0.171         0.233         0.235         0.415         0.233           Propromatis sinene         0.171         0.256 </th <th></th> <th>30-Aug-88</th> <th>26-Oct-88</th> <th>21-Dec-88</th> <th>17-Feb-89</th> <th></th> <th></th> <th>8-Jun-89</th> <th>5-Jul-89</th> <th>18-Sep-89</th>		30-Aug-88	26-Oct-88	21-Dec-88	17-Feb-89			8-Jun-89	5-Jul-89	18-Sep-89
Therminise Poramities         0.223         0.171         3.425         15.667         0.365         0.138           Notificate Consporter         1.289         1.389         0.142         0.184         0.183         0.459         0.138           Laptometuses type Antionectuse type Collaries         0.149         0.381         0.142         0.184         0.183         0.459         0.138           Antionectuse type Collaries solve Signonophone Rectements         0.164         0.184         0.142         0.184         0.183         0.459         0.139           Signonophone Rectements         0.164         0.164         0.170         0.142         0.184         0.466         0.152           Maintenent Rectements         0.164         0.171         0.342         0.426         0.466         0.152           Synchates         0.743         0.342         0.426         0.183         0.466         0.152           Rectements         Poyonalistic sines         0.171         0.171         0.223         0.459         0.183         0.466         0.152           Rectements         Poyonalistic sines         0.171         0.233         0.235         0.415         0.233           Propromatis sinene         0.171         0.256 </td <td></td>										
Formatives Canaphore         0.223         0.171         3.425         15.567         0.355         0.138           Canaphore         Casistic         1.328         1.328         0.142         0.184         0.183         0.459           Laptomotives polype         0.149         0.251         0.142         0.184         0.183         0.459           Casistic         0.194         0.154         0.142         0.184         0.183         0.459           Casistic         0.196         0.194         0.194         0.112         0.184         0.183         0.459           Casistic         0.196         0.194         0.194         0.112         0.184         0.183         0.466           Synchetes         0.743         0.242         0.426         0.195         0.466         0.192           Brachenithithes         0.743         0.242         0.426         0.193         0.466         0.192           Brachenithithes         0.743         0.114         0.303         0.459         0.183         0.466         0.192           Casistic scienchooth         0.743         0.114         0.303         0.459         0.183         0.468         0.415           Readine <t< td=""><td></td><td></td><td></td><td>]</td><td></td><td> </td><td>Į .</td><td></td><td></td><td>   </td></t<>				]			Į .			
Incidition         Late         1.289         Late	1	0.223	0.171	3.425		15.567	1	0.365	0.138	
Carenoptore Cristatia Leptomotus type Attornaticus type differ medicase hybrid of pype Leptomotus pype Carenoptore Care polype Leptomotus public Carenoptore Synchiate Montexation Backhorus Synchiate Synchiate Backhorus Synchiate Synchiate Backhorus Synchiate Synchia							1			
Coldating Anthoneclus type Anthoneclus type Anthoneclus polyp Carel polyp Sprencybre Mainthown         0.146         0.182         0.142         0.184         0.183         0.459         1           Lystomedues polyp Carel polyp         0.194         0.184         0.184         0.183         0.459         1         1           Mainthown Nemetaes unklent.         0.184         0.184         0.184         0.183         0.459         1         1           Mainthown Nemetaes unklent.         0.184         0.184         0.710         1						[				
Informature type         0.149         0.891         0.142         0.184         0.183         0.459         1           Unitional poly         Coal poly         0.184         0.184         0.183         0.459         0.183         0.459         0.183         0.459         0.183         0.459         0.192         0.193         0.193         0.193         0.193         0.193         0.193         0.193         0.193         0.193         0.193<										1 1
Clier         Clier <th< td=""><td>Leptomedusa type</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>   </td></th<>	Leptomedusa type									
I-ydrofidi polyp Coral polyp Sighonophres Ascheminithes roundworm Unincom "worm" Nomardes unident. Rollines Bacchorus Synchates Montacts Bacchorus Bacchorus Synchates Motification Bacchorus Synchates Motification Bacchorus Synchates Motification Bacchorus Bacchorus Synchates Motification Bacchorus Bacc		0.149	0.891		0.142	0.184	0.183	0.459		
L'estomesteis acoby Grai poly Signonophore Aucheninithes roumborn Nemetes unident. Ratchen Ratchen Brachous Synchates Brachous										
Coral polyne Sighonophore Aschelinithes         0.194         0.194         0.710         Image: Sighonophore Sigho				[			1			
Signonoshere Ruchkown Unknown Yeard"         0.184         0.710         0.711		1				]				
Acchemistribue roundworm Workown Worm Routhwan Breachonus Synchatea Motiluces Bereihonus Synchatea Motiluces Bereihonus Synchatea Motiluces Bereihonus Synchatea Motiluces Bereihonus Synchatea Motiluces Bereihonus Synchatea Motiluces Bereihonus Synchatea Motiluces Bereihonus Synchatea Motiluces Bereihonus Synchatea Motiluces Bereihonus Synchatea Motiluces Bereihonus Synchatea Motiluces Bereihonus Synchatea Motiluces Brachonus Synchatea Motiluces Brachonus Synchatea Motiluces Brachonus Synchatea Motiluces Brachonus Synchatea Motiluces Brachonus Synchatea Brachonus Synchatea Brachonus Synchatea Brachonus Synchatea Brachonus Brachonus Synchatea Brachonus Synchatea Brachonus Brachen Brachonus Synchatea Brachonus Brachen Brachonus Synchatea Brachonus Brachen Synchatea Brachonus Brachen Brachen Subliman Brachen Synchatea Brachonus Brachen Synchatea Brachonus Brachen Synchatea Brachen Brachonus Brachen Bra			0,184			[	[			
Unificions "Serrer" Nemeries undert. Rotifica indert. Binachonus Synchates         0.132         0.426         0.426         0.132           Binachonus Synchates         0.743         0.342         0.426         0.466         0.132           Binachonus Synchates         0.743         0.342         0.426         0.468         0.132           Binachonus Synchates         0.743         0.114         0.367         0.163         0.468         0.132           Reinford         Brochonus Synchates         0.171         0.114         0.367         0.163         0.688         0.415           Reinford         Brochonus Synchates         0.446         0.176         0.114         0.367         0.163         0.688         0.415           Reinford         Rinerotas         0.446         0.171         0.323         0.688         0.415           Reinford         0.743         0.171         0.826         0.163         0.688         0.415           Colocora         0.743         0.171         0.826         0.459         0.138         1.355           Colocora         0.743         0.891         0.491         0.459         0.138         1.355           Colocora         0.743         0.891         0.161				ł			1			
Nemetrise unident. Brachinous Synchates Brachous Synchates Brachous Brachous Brachous Brachous Synchates Brachous Brachous Synchates Brachous Synchates Brachous Synchates Brachous Synchates	roundworm				0.710		f			
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unk cyclopoid Cyclopoid copepodites Acartia clausi5.95039,44214.51920.5910.4590.1381.355Acartia clausi Acartia clause Calanus sp. Metridia lucens Epilabidocera longipedata0.7430.8910.6910.2750.4590.1381.355Eurolanus Eurytemora affinis Eurolaptomus euryhalinus Temorites sp(p) Rhincalanus nasutus Tortanus discuidatus unknown calanoid Cat. copepodites0.7430.8910.1610.2750.4660.466Cat. copepodites Cat. copepodites0.7430.8910.1611.1180.4590.4590.466Cat. copepodites Unknown calanoid Cat. copepodites0.7430.8910.1610.1610.4590.459Cat. copepodites Unknown copepodites0.1490.8910.1610.1140.4590.4590.459Cat. copepodites Unknown copepodites0.5953.19724.6976.7122.5980.276										
Cyclopoid copepodites Acartia clausi5.95039.44214.51920.591a0.4590.1381.355Acartia danae Calanus sp. Metricia lucens0.7430.691aa <td></td> <td>   </td> <td></td> <td></td> <td></td> <td></td> <td> </td> <td></td> <td></td> <td></td>										
Acartia clausi5.95039.44214.51920.5910.4590.1381.355Acartia danaeCalanus sp. Metridia lucens0.7430.8910.8910.2750.9190.4660.466Eurytemora affinisEurytemora americana0.7430.8910.1610.2750.9190.4660.466Temorites sp(p) Rhincelanus discaudatus0.7430.7430.1610.1610.1610.1610.161Cal. copepodites w/long rami Harpacticoid *B* Harpacticoid *C* Caligus0.7950.8910.1610.1610.4590.459Other parasitic copepodites unknown copepodites0.5953.19724.6976.7122.5980.276										
Calanus sp. Metridia lucens0.7430.8910.275Eurytemora afinis0.7430.8910.275Eurytemora americana0.7430.8910.275Pseudodiaptomus euryhalinus0.2750.9190.468Tortanus discaudatus0.7430.1491.118Unknown calanoid0.7430.1610.161Calanoid copepodites0.1490.1610.161Calanoid copepodites0.1490.1610.149Calagus0.8910.1810.149Other parasitic copepods0.8910.181Other parasitic copepods0.5953.19724.697Ostracoda0.5953.19724.6976.7122.598		5.950	39.442	14,519	20.591			0.459	0.138	1.355
Metridia lucens0.7430.8910.8910.2750.275Eurytemora americans0.7430.8910.2750.919Eurytemora americans0.7430.9191.1180.466Pseudodiaptomus euryhalinus0.7430.7430.9191.118Tortanus discaudatus0.7430.1610.1610.466unknown calanoid0.7430.1610.1140.161Calanoid copepodites0.1490.1610.1140.114Harpacticoid *A*0.8910.1810.1490.459other parasitic copepods0.8910.31724.6976.7122.5980.276	Acartia danae									
Epilabidocera iongipedata Eucelanus0.7430.8910.2750.2750.919Eurytemora americana Pseudodiaptomus eurythalinus Temorites sp(s)0.7430.4660.466Rhincalanus nasutus Tortanus discaudatus unknown calanoid0.7430.1611.1180.466Cal. copepodites wlong rami Harpacticoid "A" Harpacticoid "S" Harpacticoid "S" Harpacticoid "C" Caligus other parasitic copepodites0.8910.1610.459Otracoda0.5953.19724.6976.7122.5980.276										
EucelanusEurytemora affinisEurytemora americanaPseudodiaptomus euryhalinusTemorites sp(p)Rhincelanus nasutusTortanus discaudatusunknown calanoid0.743Cal. copepodites0.149Cal. copepodites w/long ramiHarpacticoid *8*Harpacticoid *8*Harpacticoid *8*Harpacticoid *8*Unknown copepodites0.891Oter parasitic copepodsUnknown copepodites0.5953.19724.6976.7122.5980.276							1			
Eurytemora affinis Eurytemora americana Pseudodiaptomus euryhalinus Temorites sp(p) Rhincalanus nasutus Tortanus discaudatus unknown calanoid0.743 0.743 0.1490.161 0.161 0.1140.275 0.919 1.1180.466Cal. copepodites Cal. copepodites Cal. copepodites w/long rami Harpacticoid *8* Harpacticoid *8* Harpacticoid *8* Caligus other parasitic copepods unknown copepodites0.783 0.1490.161 0.1140.161 0.114Caligus Caligus Other parasitic copepods unknown copepodites0.8910.161 0.1140.459		0.743	0.891							
Eurytemora americana Pseudodiaptomus euryhalinus Temorites sp(p) Rhincalanus nasutus Tortanus disceudatus unknown calanold0.743 0.743 0.1490.161 0.161 0.1140.275 0.919 1.1180.468Cal. copepodites Cal. copepodites Cal. copepodites w/long rami Harpacticoid *8" Harpacticoid *8" Harpacticoid *6"0.743 0.1490.161 0.1140.161 0.1140.468Caligus Caligus other parasitic copepods unknown copepodites Ostracoda0.5953.19724.6976.7122.5980.276										
Pseudodiaptomus euryhalinus Temorites sp(p) Rhincalanus nasutus Tortanus discaudatus unknown calanoid 0.743 Cala copepodites 0.149 Cal. copepodites wiong rami Harpacticoid *A* Harpacticoid *B* Harpacticoid *B* Harpacticoid *C* Caligus other parasitic copepods unknown copepodites Ostracoda 0.595 3.197 24.697 6.712 2.598 0.276						0.276				
Temorites sp(p) Rhincalanus nasutus Tortanus discaudatus unknown calanoid0.743 0.7431.118Tortanus discaudatus unknown calanoid0.743 0.1490.161 0.1141.118Cal. copepodites0.149 0.1490.161 0.1141.118Harpacticoid "A" Harpacticoid "S" Harpacticoid "G" Caligus other parasitic copepodites unknown copepodites0.8910.161 0.114John parasitic copepods unknown copepodites Ostracoda0.5953.19724.6976.7122.5980.276									0,466	
Rhincisianus nasutus       0.743         Tortanus discaudatus       0.743         unknown calanoid       0.743         Cal. copepodites       0.149         Cal. copepodites w/long rami       0.161         Harpacticoid *A*       0.161         Harpacticoid *B*       0.891         Harpacticoid *C*       0.891         Caligus       0.459         other parasitic copepods       0.891         Unknown copepodites       0.595         3.197       24.697       6.712       2.598       0.276										
Tortanus discaudatus       0.743         unknown calanoid       0.743         Cal. copepodites       0.149         Cal. copepodites w/long rami       0.161         Harpacticoid *A**       0.161         Harpacticoid *B**       0.891         Harpacticoid *C*       0.891         Caligus       0.891         other parasitic copepodites       0.891         other parasitic copepodites       0.595         3.197       24.697       6.712       2.598       0.276	Rhincalanus nasutus									
Calanoid copepodites       0.149       0.161         Cal. copepodites w/long rami       0.161       0.161         Harpacticoid *A*       0.161       0.114         Harpacticoid *B*       0.891       0.891         Other parasitic copepodites       0.891       0.459         other parasitic copepodites       0.595       3.197       24.697       6.712       2.598       0.276										
Cal. copepdities w/ong rami       0.161         Harpacticoid *A*       0.114         Harpacticoid *G*       0.891         Harpacticoid *C*       0.891         Caligus       0.891         other parasitic copepods       0.891         unknown copepodites       0.595         Ostracoda       0.595										
Harpacticold "A" Harpacticold "S" Harpacticold "S" Harpacticold "C" Caligus other parasitic copepods unknown copepodites Ostracoda 0.595 3.197 24.697 6.712 2.598 0.276		0.149								
Harpecticold "B" Harpecticold "C" Caligus other parasitic copepods unknown copepodites Ostracoda 0.595 3.197 24.697 6.712 2.598 0.276										
Harpacticold "C" Caligus 0.891 other parasitic copepods unknown copepodites 0.595 3.197 24.697 6.712 2.598 0.276				0.114						
Caligus     0.691       other parasitic copepods     0.691       unknown copepodites     0.595       Ostracoda     0.595       3.197     24.697       6.712     2.598       0.276										
other parasitic copepods unknown copepodites     0.459       Ostracoda     0.595       3.197     24.697       6.712     2.598       0.276		1	0.804							
unknown copepodites Ostracoda 0.595 3.197 24.697 6.712 2.598 0.276		1	0.081					0.459		
Ostracoda 0.595 3.197 24.697 6.712 2.598 0.276										
		0.595		3.197		24.697	6.712	2.598	0.276	
	Podocopida			÷.,,,,,,						
Leptostraca										

				Station E-3		A 1: 44	<b>B</b> 1.1 00	18-Sep-8
30-Aug-88	26-Oct-88	21-Dec-88	17-Feb-89	6-Mar-89	4-May-89	8-JUN-69	2-701-09	10-Sep-0
0.743	0.171	0.114	0.142					
			0,142					
		0.928						
				0 184		0.162	1.290	0.132
				<b>U</b> , 10-1				
0.650				3.397		3.653	0.322	
						0.450	0.976	0.263
				2.754		0.439	0.070	
								1
				0.184			0.400	
0.000	0.949	4 977			1.628			
0.920	0.343		0.568	1.990	1.010		1	
								1
		1			0.600	0.244	1 7/4	
		0.353		0.828	0.529	0.244	1.740	
· ·								
0.223		0.161						
1	ľ							
ł							Į	
0.743						0.459	1.746	0.395
0.743								0.452
1.114	1.236				1.173	0.459	0.566	0.152
		0,114	0.009		· ·			
l	0.176							
ł	0.891							
								1
	1						1	
		0.114						
	0.000				0 183	ļ		0.132
07/3	0.343				0.100	ŀ		
0.140								0.132
	ł							
0.743	l		0.710					
						1		
0.176							0.466	0.263
1				ł	l	1		
1	1			l				1
1	1	0.928	0.009		1	1	1	1
1	1				ł	[		1
ł	0,176	0.928	0,142	ł	0.236	1	ŀ	1
1				l			1	1
1	1	1		1			1	1
	1	1		1			1	1
				1.118			1	1
l	1							1
ł	1	1					1	
	1					l		
	1	1		1			1	1
		1	l	ł			1	1
0.743	0.171	<u>l.</u>	l	L	L	L		
		40	13	16	8	12	16	9
23	20	18	13		-			
23 19.214	49.294	46.298	24.178	54.864	10.827	10.462	10.074	2.954
19.214 7.584	49.294 41,395	46.298 14.795	24.178 20.591	54.864 2.312	10.827 0.000	0.917	0.604	1.355
19.214	49.294	46.298	24.178	54.864	10.827			
	0.743 0.650 0.928 0.223 0.743 0.743 1.114	0.743 0.171 0.650 0.928 0.343 0.928 0.343 0.223 0.343 0.223 0.343 0.743 0.343 0.176 0.891 0.343 0.343 0.343 0.343 0.343 0.343 0.343	0.743 0.171 0.114 0.928 0.650 0.928 0.343 0.343 0.353 0.323 0.12 0.114 0.176 0.114 0	0.743       0.171       0.114       0.142         0.6500	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	30.2.4.00-2.80         21-Dec-380         17-Feb-39         6-Mar-390         4-May-390         6-Jun-390           0.743         0.171         0.114         0.142         0.184         0.184         0.162           0.6500	30.Aug-88         26-02-88         21-0e-88         17-Fe-369         6-Mar-89         4-Mar-89         8-Jun-89         6-Jun-89         6-Jun-89

Page 10

1 Second States in the second

	r			Static	n E-3			
	28-Nov-89	7-Feb-90	9-Mar-90		24-May-90	25-Jun-90	26-Jul-90	18-Sep-90
Protozoa								
Tintinnids				i i				
Foraminifera			0.144			0.815		1.527
Noctiluca								
Ctenophore	0.185							
Cnidaria				0.282				0.741
Leptomedusa type	0.370		0.144	0.282	0,189	0.815		3,185
Anthomedusa type other medusae	0.370		Q. 144	0.202	0.100	0.0.0		
Hydraid polyp	0,185				Р	Р		
Leptomedusa polyp								
Coral polyp								
Siphonophore								
Aschelminthes								
roundworm								
Unknown "worm" Nemertea unident.		0.147						
Rotifera		0.147						
Brachionus								
Svnchatea						1		
Mollusca					I	ł		
Bivalves			0.144		l			
Modicius sp. (p)	0.185	l		ł		1		0.436
Monticutidae		0.147						0.400
Gastropods Gastropod eggs		Ų, 147	р		P	ρ		
Nudibranch			'					
Phoronida actinotroch					1			1
Bryozoa larvae			[·				•	
Bryozoan colony					]			
Annelida								
Hirudinea								
Nemertean		0.736	0.528	0.313	{		0.859	
Polychaetes Polychaete larvae	0.185	0.130	0.520	0.313	1			
Oligochaete	0.100			0.313	ł		0.429	
Arthropoda			1					
Crustacea								
neuplii					1			
Cladocera								
Evadne			0.481		]			
Podon				ļ	1			
Copepoda Corvcaeus			[	1				
Oithona				l.				
Oncaea				1		1		
unk. cyclopoid			1		[	]	ł	
Cyclopold copepodites							1	
Acartia clausi	3.954	0.633	1	0.188		0.815	l	1.385
Acartia danse			1		l		l	I
Calanus sp.			I		l			
Metridia lucena Epilabidocera longipedata				I		}	· ·	
Eucalanus	1							
Eurytemora affinis		1			0.189			
Eurytemora americana	1	l		l	1		.	
Pseudodiaptomus euryhalinus	1	ł		[		0.122		
Temorites sp(p)	1	l		l	0.189		[	
Rhincelanus nesutus		0.477				l		j l
Tortanus discaudatus unknown calanoid	0.554	0.147 0.147		l		1	0.429	j
Calanoid copepodites	0.370	0.14/				1		1 I
Cal, copepodites w/ong rami		ł		l				
Harpacticoid "A"	I	Į						
Harpecticoid "B"			1					
Harpacticoid "C"	1	ļ		l	ł		0.000	
Caligue	l I	ļ		l	l		0.859	0.436 0.139
other parasitic copepods	1	1		l	1			V. 100
unknown copepodites		l					ł	1 I
Ostracoda Podocopida	[	l	0.481	0.313	0.378	0.326	0.344	0.353
Leptostraca	1	ł					I	

< 3% € 8% ≤</li>

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te A.A.P. and a star

	r			Static	n E-3			
	28-Nov-89	7-Feb-90	9-Mar-90	5-Apr-90	24-May-90	25-Jun-90	26-Jul-90	18-Sep-9
Cirripedia								
Barnacie naupili Barnacie cupile								
Barnacie cypris Isopoda		0.147				0.475		1
Amphipoda	<b>I</b>							
Anisogammarus confervicolus	0.185		0.526		0.378	0.285		
Corophium spinicome			0.481	0.157	0.568	0.122	0.859	
Corophium	0.924	1.155						
Caprellidae Ampithoidae								
Aoridae								
Atylidae		0.441						
Hyalidae	1	0.235						
Pleustidae								
Ampeliscidae			0.144					
Talitridae unk. amphipods			0.144					
Cumacea			0.481			0.575	0.215	0.219
Campylaspis sp(p).	0.777	1,559						
Cyclaspis sp(p).	Į							
Mysidacea							0.172	1.439
Neomysis mercedis	1.213	0.147	0.289			1.182	0.172	1.439
Acanthomysis sp(p) Euphausiacea	1	U. 147						
Decaboda								
Brachyura								
Cancer antennarius/gracilis(1)				0,940				0.139
Cancer antennarius stg 2 zoea								
Cancer antennarius stg 3 zoea								
Cancer productus stg 1 zoea Grapsidae zoea					0.114		0.429	0.139
Maiidae zoea	0.129				0,114		4	
Pinnotheridae zoea	0.352	0.883		1.659	0.378	0.245	0.429	0.219
Xanthidae zoea	1.127	0.162						0.872
Unknown brachyuran zoea								
Unk, Megalopa	0.185	0.130						
Megalopa A Megalopa B								
Megalopa C								
Megalopa D	1							
very young crab								
Hemigrapsis oregonensis								
Hemigrapsus nudus								
Pachygrapsus crassipes								
Anomura Anomuran megalopa								1
Porcellanidae zoea	0.185	0.588				0,475		0.219
Hippidea zoea								
Emerita analoga zoea	0.166					0.475		0.219
Paguridea zoea				0.344		0.122	0.129	
Thalassinidea zoea								
Californassidae								
Caridea Crangonidae(zoea and older)	1	0.839						
Caridean zoea and older		0.633						
Hippolytidae zoea								
Crangon nigromaculata								
Heptacarpus pictus								
Heptacarpus taylori		0.147					ļ	
Palaemon ritteri Unknown caridean type zosa		0.14/					•	
Unknown zosa								
achnid							ļ	
cnogonid							1	
alacaridea							1	
nsect larvae	0.185						1	
chinodermata Noinnaria larvae							1	
spinnana arvae siuteus larvae							1	
haetognatha	0.185	0.147					1	
				1		[	[	
ochordata		0.280				1		
	1	0.200						
ochordate arvacea	i		45	10	40	46	44	16
ochordata arvacea unber of Invertebrate taxa	20	21	12 3.848	10 4,791	10 , 2.384	16 6.851	11 5.153	16 11.666
ochoidata arvacea umber of Invertebrate taxa tal # Invertebrates per m3	20 11.599 4,878		12 3.848 0.000	10 4.791 0.188	10 , 2.384 0.378	16 6.851 0.938	11 5,153 1,288	11.666
ochordata arvacea unber of Invertebrate taxa	11.599	21 9.450	3.848 0.000 0.000	4.791 0.188 2.943	2.384 0.378 0.492	6.851 0.938 1.317	5,153 1,288 0,988	11.666 1.960 1.806
ochoidata .arvacea .imber of invertebrate taxa .tal # invertebrates per m3 opepoda per m3	11.599 4.878	21 9.450 0.927	3.848 0.000	4.791 0.188	2.384 0.378	6.851 0.938	5,153 1,288	11.666 1.960

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					Static	<u> </u>				
	14-Apr-88	15-Jun-88	30-Aug-88	26-Oct-88	21-Dec-88	17-Feb-89	6-Mar-89	4-May-89	8-Jun-89	5-Jui-89
	1									
Protozoa										
Tintinnide Foraminifera			0.175				0.913			
Poraminilera Noctiluca			0.110		0.458					[
Ctenophore					0.100					
Cnidaria										
Leptomedusa type	0.371							·		
Anthomedusa type			0.354							
other medusae										
Hydroid polyp										
Leptomedusa polyp	1									
Coral polyp										
Siphonophore										
Ascheiminthes roundworm		0.241								
I'ounaworm Unknown "worm"		9.2.41								
Rotifera										
Brachionus										
Synchatea										
Mollusca	1									
Bivalves		0.965						0.000		
Gastropods	0.186			0.897		0.427		0.179		
Nudibranch			l						1	
Phoronida actinotroch					1					
Bryozos isrvae										
Bryozoan colony										
Annelida Hirudinea										
Nemertean										
Polychaetes	1								1.187	
Polychaete larvae	0,186	0.965			0.119	0.186		[		
Oligochaete							3.660		0.494	0.264
Arthropoda										
Crustacea										
nauplii										
Ciadocera	1						22.279			
Evadne							22.219			
Podon	1									
Copepoda					Į .					
Corycaeus Oithona										
Oncaes										
unk. cyclopoid							1.552			
Cyclopoid copepodites										
Acartia ciausi		0.145	0.385	2.592		1.538			0.247	
Acartia danae										
Calanus sp.										
Metridia lucens					1					
Epilabidocera longipedata										
Eucaianus										
Eurytemora affinis	1						0.456			
Eurytemora americana Pseudodiaptomus euryhailinus				0.179				1		
Temorites sp(p)					ł		1.917			
c.f. Temorites					1	1		1		
Rhincalanus nasutus					]					
Tortanus discaudatus	1			0.897	[					
unknown calanoid	1				1					
Calanoid copepodites			0.175	0.179	3.652					
Cal. copepodites w/long rami				ł	0.458	I				
Harpacticoida				(	1					
Harpacticoid "A"	0.074	0.965								
Harpacticoid "B"	0.371 0.186	0.900		ł	1					
Harpacticoid "C" Caligus	0.100	0.897	0.875	0.188		l				
other parasitic copepods	1	0.557			l				1	
unknown copepodites					1					
Ostracoda	1	0.194		1	1	0.137	0.821	0.179	0.594	
Podocopida					1					
Leptostraca		l	L	L	L	L	L	I	L	لسمسط

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					Ca-il-	m E-4				
	14-Apr-88	15-Jun-88	30-Aug-88	26-Oct-88	Static 21-Dec-88	17-Feb-89	6-Mar-89	4-May-89	8-Jun-89	5-Jul-89
Cirripedia				0.897						
Barnacie nauplii	1	0.928		0.097						
Barnacie cypris Isopoda		0.483								0.632
Amphipoda									0.615	0.796
Anisogammarus confervicolus		0.173					0.183		0.815	0.218
Corophium	0.743	0.965					0.100			
Corophium spinicorne Grandidieralia japonica										
Caprellidae										
Ampithoidae										
Aoridae						l				
Atyüdae						1				
Hyalidae Pleustidae										
Ampeliscidae										
Ampithoidae										
Talitridae					0.371		1			
unk amphipods					0.571	0.854				
Cumacea Campytaspis sp (p).										
Mysidacea										0.527
Neomysis mercedis		1.351		0.897	0.244			0.985	0.963	0.527
Euphausiacea										
Decapoda	1									
Brachyura Cancer antennarius/gracilis(1)					0.458					
Cancer antennarius stg 2 zoea										
Cancer antennarius stg 3 zoea						1				
Cancer productus stg 1 zoea							0.913		0.494	0.264
Grapsidae zoea	1	1.689		0.897	0.135		0.913		0,434	0.201
Majidae zoea	0.371		0.567	0.413	0.183		0.274	1	0.164	
Pinnotheridae zoea Xanthidae zoea	0.3/1		0.007	0.410				1		
Unknown brachyuran zoea				[	0.458					
Unk. Megalopa			0.560							
Megalopa A				0.179	0.135	0.928				
Megalopa B				0.897						
Megalopa C			ł	0.081	0.458					
Megalopa D very young crab				1		1				
Hemigrapsis oregonensis					].					
Hemigrapsus nudus	1	0.278							1	
Pachygrapsus crassipes		0.928					1			
Anomura										
Anomuran megalopa		1	l		0.458		1			
Porcellanidae 2068 Hippidea 2068			0.354	0.897			1		1	
Emerita analoga zoea					1		I		1	
Paguridea zoea				0.897					1	
Thalassinidea zoea		0.483		0.179		0.854				
Cailianassidae			1						1	
Caridea							1			
Crangonidae(zosa and older) Caridean zosa and older			0.928	1		1	1	1	]	
Hippolytidae zoea				1		1	1		1	
Crangon nigromaculata	1	l		1			1		1	1
Heptacarpus pictus	1	I					1			ł
Heptacarpus taylori	1	1		0.448		1	ł		I	1
Unknown carklean type zoea Unknown zoea		[				1	1	· ·		
Arachnid	1	1	1	1	1	1	0.913		1	0.264
Pycnogonid	1	1	1		1	1	1	1		1
Halacaridea	1	1	1	1	1	1	2.647	0.179		0.264
Insect larvae	1	1	1	1	1		2.04/		1	
Corbidae, unident.	1	1	ł		1	1				
Echinodermata bipinnaria larvee	1	1	I	1				1		
piuteus larvae	1		I							1
Chaetognatha	1		1		1	1		1		
Urochordata	1	1	I	1	1	1	1	1	1	1
Larvacea		<u></u>	1	1	1	1		J		J
Number of Invertebrate taxa	7	17	9	16	13	7	12	4	9	8
Total invertebrates per m3	2.413	12.207	4.374	11.532	7.589	4.924	38.527	1.523	5.125	3.228
Copepoda per m3	0.557	2.564	1,436	4.035	4.110	1.538	3.925	0.000	0.247	0.000 0.264
Decapoda per m3	0.371	3.378	2.409	4.807	2.286	1.782	1.187 0.000	0.000 0.985	0.658 0.963	0.264
Mycidacea per m3	0.000	1.351	0.000 0.529	0.897 1.794	0.244 0.949	0.000 1.604	31.415	0.538	3.258	2.437
Other per m3	1.485	4.914	0.329	1.134	0.040	1.004	01.410			

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					Station E-4				
	18-Sep-89	28-Nov-89	7-Feb-90	9-Mar-90	5-Apr-90	24-May-90	25-Jun-90	26-Jul-90	18-Sep-90
Protozoa Tintinnids									
Foraminifera									
Noctiluca									
Ctenophore									
Cnidaria									
Leptomedusa type									0.219
Anthomedusa type						0.177			
other medusae									
Hydroid polyp									
Leptomedusa polyp									
Coral polyp									
Siphonophore Aschelminthes									
roundworm						1			
Unknown "worm"	1					1			
Rotifera									
Brachionus									
Synchates									
Mollusca		ł				1			
Bivalves	1								
Gastropods	1	1			1		1		
Nudibranch					[	Į	ł		
Phoronida actinotroch	1					ļ		1	
Bryozoa larvae						[			
Bryozoan colony Annelida					1				
Anneika Hirudinea	1								
Nemertean						1			
Polychaetes	0.168	0.339	0.349				0.674		
Polychaete larvae					. ·			Į.	
Oligochaete									
Arthropoda		1							
Crustacea	1	1						1	
nauplii									
Cladocera									
Evadne			0.376	0.134					
Podon	0.168						[		
Copepoda		1				1	1		
Corycaeus				0.425	0.194		[		
Oithona			0,152	0.420	0.104				
Oncasa unk. cyclopoid			0.102						
Cyclopoid copepodites		1 :							
Acartia clausi	1.294	22.615		0.224		1	0.518		0.654
Acartia danae	1						1		
Calanus sp.	1					1			
Metridia lucens		1					1		
Epilabidocera longipedata	1	<b>[</b> '				Į			
Eucalanus							0.518		
Eurytemora affinis				1.588		]	0.510		
Eurytemora americana	1	1	0.349				44.617	1.322	
Pseudodiaptomus euryhalinus		1						1,044	
Temorites sp(p)	1	ł		0.693			1		
c.f. Temorites Rhincalanus nasutus	1							1.	
Tortanus discaudatus			0.152			I	1		ł
unknown calanoid			0.457		1	1	1	1	
Calanoid copepodites		1		1		1	1	1	l
Cal. copepodites w/long rami								1	
Harpecticoida	1					1	0.518	l	
Harpacticoid "A"	1			1 ·		1		1	
Harpacticoid "B"				l		1			1
Harpacticoid *C*	1			1				0.449	
Callgus	1				1			0.630	0.872
other parasitic copepods	1	1		l	1	1			0.654
unknown copepodites		1		ŧ				1	
unknown copepodites Ostracoda Podocopida				0.678		0.778			

					Station E-4			<u></u>	
	18-Sep-89	28-Nov-89	7-Feb-90	9-Mar-90	5-Apr-90	24-May-90	25-Jun-90	26-Jul-90	18-Sep-90
Cimpedia									
Barnacle nauplii									
Barnacie cypris Isopoda	0.168		0.152					0.126	0.219
Amphipoda	0.100		<b>V</b> . 142						
Anisogammarus confervicolus		0.339	0.152	0.224			0.136	0.126	
Corophium			0.751				0.000	3,715	
Corophium spinicome	1			0.224		0.177	0.622 0.518	0.630	
Grandidierella japonica Caprellidae						Į	0.010	0.000	
Ampithoidae									
Aoridae									
Atylidae									
Hyalidae									
Pleustidae Ampeliscidae	1	0.677		·					
Ampeliscicae	1						0.155	0.126	
Talitridae	1								
unk. amphipods				[		[		0.630	
Cumacea		[	a	[	1		0.518	0.630	
Campylaspis sp (p).			0,183			1			
Mysidacea Neomysis mercedis		0.226			0.368	1.221	1.882	0.882	0.219
Euphausiacea	1		1	1				I	
Decapoda	1		l		1			l	
Brachyura	1			ł					
Cancer antennarius/gracilis(1)									
Cancer antennarius stg 2 2008 Cancer antennarius stg 3 2008				ļ					
Cancer productus stg 1 zoea	[								
Grapsidae zoea	0.168								
Majidae 2068				l					
Pinnotheridae zoea	0.555	0.135	0.150			0.177		0.567	0.219
Xanthidae zoea			0.152						
Unknown brachyuran zoea Unic Megalopa		1.354		l		0.177	0.518	0.630	0.872
Megalopa A				{					
Megalopa B									
Megalopa C		ſ		ſ		1			
Megaiopa D									
very young crab									
Hemigrapsis oregonensis Hemigrapsus nudus	1								
Pachygrapsus crassipes	1					1			
Anomura									
Anomuran megalopa	0.543	[						1	
Porcellanidae zoea			0.152						
Hippides zoea Emerita analoga zoea	0.845	<b>(</b>				1			
Paguridea 20ea	0.040								
Thalassinidea zoea									
Callianassidae	l	]				1			
Carides	1		0.000			ł		1	
Crangonidae(zoea and older)	0,168		0.698		1	ł		1	
Caridean zoea and older Hippolytidae zoea	0.100	l			ŀ				
Crangon nigromaculata	]		ł	l	l	J			1
Heptacarpus pictus	1					l			[
Heptacarpus taylori	1			l		l			
Unknown caridean type zoea		1	0.349					ŀ	
Unknown zoea Arachnid	1			l	l	1		l	
Pycnogonid	1					]			
ialacaridea	1			0.224		1		l	
Insect larvae				0.179	0.317	l		ł	
Corbidae, unident.	ļ	J	0.183	I		l		ł	
Echinodermata bipinnaria larvae	1				ļ				
pluteus iarvae		0.169		l	l	1		ł	
Chaetognatha	1								
Jrochordata	1			1	l	ĺ			
Larvacea	<u> </u>	L	I	L	Ł			L	L
lumber of invertebrate taxa	9	8	15	10	3	6	12	12	8
iotal Invertebrates per m3	4.079	25.854	4.610	4.592	0.900	2.707	51.196	9.832	3.929
Copepoda per m3	1.294	22.615	1.111	2.929	0.194	0.000	46.172	2.401	2.181
Decapoda per m3	2.280	1,490	1.352	0.000	0.000	0.354	0.518	1.196	1.091
lycidacea per m3	0.000	0.226	0.000	0.000	0.388	1.221	1.882	0.882	0.219 0.438
Other per m3	0.504	1,524	2.147	1.662	0.317	1.132	2.624	5.353	0.430

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				Static	on E-5			
	15-Jun-88	26-Oct-88	21-Dec-88	17-Feb-89	6-Mar-89	4-May-89	8-Jun-89	5-Jul-89
Protozoa		1	1	ļ	}	]		
Tintinnida								1
Foraminifera					0.179		ł	1
Noctiluca				1	ł	ļ	1	
Ctenophore			ļ		}			
Cnidaria				ł			1	l
Leptomedusa type					1			
Anthomedusa type		0.132		1	1			
other medusae				1				
Hydroid polyp			(	{	1		(	1
Leptomedusa polyp			1	1				
Coral polyp Siphonophore				l				1
Aschelminthes	I		ļ					
roundworm			1	1			1	ł
Unknown "worm"	0.876							
Rotifera								
Brachionus								
Synchatea			1				<u> </u> -	
Mollusca			1				1	
Bivalves Continuedo			l			1		
Gastropods Nudibranch			l		l		I	1
Phoronida actinotroch	1					1		
Bryozoa larvae						ſ	ĺ	ĺ
Bryozoan colony	1							
Annelida	1					1		
Hirudinea			Į.			ļ		
Nemertean			l i		0.179			
Polychaetes					0.359			0.466
Polychaete larvae			0,186	0.371 0.215	12.378	0.832	6.486	5.895
Oligochaete				0,215	12.3/0	0.052	0.400	0.000
Arthropoda Crustacea	1 1							
nauolii	1							[
Ciadocera	1							]
Evadne	1. 1				25.114			
Podon	1				0.897	]		
Copepoda								[
Corycaeus	[							
Oithona								
Oncaea								
unic cyclopoid	1 1				1.794			
Cyclopoid copepodites Acartia ciausi		5,850	0.477	0.775	0.179			
Acartia ciausi Acartia danae		<b>0.00</b> 0	0.4//	0.775	0.178			
Calanua sp.								
Metridia lucens								
Epilabidocera longipedata								
Eucalenus	Į							ł
Eurytemora affinis	j l							
Eurytemora americana	}			1.472	0.179			
Pseudodiaptomus euryhalinus	]	1.687	0.159		2152		0.463	
Temorites sp(p)					2.153	1		l
c.f. Temorites sp. Rhincalanus nasutus							•	
Tortanus discaudatus	j l					<b> </b>		1
unknown calanoid						( i		ſ
Calancid copepodites	1 I							
Cal. copepodites w/long rami				0.141				
Harpacticoida unident.								
Harpacticoid "A"	( I							1
Harpacticoid "B"								
Harpacticoid "C"								
Caligus								
other parasitic copepods								
unknown copepodites				0		040.040	48 400	2.643
Ostracoda	0.876			0.775	0.179	243.948	15.165	2.043
Podocopida Leptostraca								

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r	T			Stati	on E-5			
	15-Jun-88	26-Oct-88	21-Dec-88	17-Feb-89		4-May-89	8-Jun-89	5-Jul-89
Cimpedia							[	
Barnacie nauplii Barnacie cypris		J			1			
Isopoda			Į.		1	98.617		0.116
Amphipoda					Ī	l		
Anisogammarus confervicolus	7.885		[	[	Į		0.463	0.233
Corophium spinicome Corophium	6,133		1	0.173			13.312	0.915
Grandidierella japonica		{						
Caprellidae		1						0.233
Amplithoidae Aoridae	ſ		ſ		1	ľ		0.235
Atvidae				1				
Hyalidae								
Pleustidae								
Ampeliscidae Talitridae			1					
unk, amphipods	0.876		0.371	0.775				
Cumacea			0.794	5.454				
Mysidacea				·		457 700	0.040	4.778
Neomysis mercedis	26.775	0.112	1.569			457.792	8.618	4,//0
Euphausiacea Decepoda			1					
Brachyura								
Cancer antennarius/gracilis(1)	1							
Cancer antennarius stg 2 zoea								
Cancer antennarius stg 3 zoea Cancer productus stg 1 zoea								
Grapsidae zosa								0.466
Majidae zoea								
Pinnotheridae zoea		0.225						
Xanthidae zoea Unknown brachyuran zoea								
Unk. Megalopa								
Megalopa A		5.175	0.752					
Megalopa B	] ]							
Megalopa C Megalopa D								
very young crab								
Hemigrapsis oregonensis								
Hemigrapsus nudus								
Pachygrapsus crassipes Anomura	[ [							
Anomuran megalopa								
Porcellanidae zoea								
Hippidea zoea								
Emerita analoga zoea	1							
Paguridea zoea Thalassinidea zoea								
Callianassidae								
Caridea								
Crangonidae(zoea and older)								
Caridean zoea and older Hippolytidae zoea	[ ]							
Crangon nigromaculata			0.186					
Heptacarpus pictus								
Heptacarpus taylori								
Unknown caridean type zoea Unknown zoea								
Arachnid					0.359			
Pycnogonid								
Halacaridea Insect larvae					2.511	162.978		
Corbidae, unident.					2.911	102.910	]	
Echinodermata								
bipinnaria larvae							1	
pluteus larvae								
Chaetognatha Urochordata	[						1	
Larvacea								
Number of Invertebrate taxa	6	6	8	9	13	5	6	9
Total Invertebrates per m3 Copepoda per m3	43.422 0.000	13, 180 7,537	4.493 0.635	10.150 2.388	46.462 4.305	964.168 0.000	44.507 0.463	15.744 0.000
Copepoda per m3 Decapoda per m3	0.000	5.400	0.035	0.000	0.000	0.000	0.000	0.466
Mycidacea per m3	26.775	0,112	1.569	0.000	0.000	457.792	8.618	4.778
Other per m3	16.647	0.132	1.351	7.762	42.156	506.376	35.426	10.500

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	1				Station E-5				
	18-Sep-89	28-Nov-89	7-Feb-90	9-Mar-90	5-Apr-90	24-May-90	25-Jun-90	26-Jul-90	18-Sep-90
Protozoa Tintinnids									
Foraminifera									
Noctiluca	1								
Ctenophore	1								
Cnidaria		1							
Leptomedusa type									
Anthomedusa type		0.189							
other medusae		Р							0.227
Hydroid polyp									
Leptomedusa polyp	1							1	
Coral polyp Siphonophore	1	1							1
Aschelminthes							1		
roundworm									
Unknown "worm"									
Rotifera						•			
Brachionus			1						
Synchatea		1			· ·		1		
Mollusca		1		l			1	1	
Bivalves	0.294	1	1. A.	0.244		l			
Gastropods Nudibranch	0.234	1			1	l	1		
Phoronida actinotroch									
Bryozoa larvae		1							
Bryozoan colony									
Annelida		1							
Hirudinea									
Nemertean			0.000	Į	0.399	0.482	0.977		
Polychaetes		0.378	0.333	[	0.399	0,402	0.377		
Polychaete larvae	0.698		0.367			1		0.650	
Oligochaete	0.090		0.007	ł					
Arthropoda				1					
Crustacea nauplii		1		0.976				1	
Cladocera	1								
Evadne	1		0.833	0.785		1			0.819
Podon									
Copepoda					1		1	1	
Corycaeus				2.925					
Oithona			1	2.825			1		
Oncaea			0.167						
unk. cyclopoid Cyclopoid copepodites			0.101						
Acartia clausi	0.279	2.152		0.195			0.752		0.227
Acartia danae							1	ļ	
Calanus sp.	1	1	1		1	1	1	1	
Metridia lucens	1	1	1		1	1	1	1	
Epilabidocera iongipedata	1	1			1	1	1	1	
Eucalanus	1	1	1	4	1	1	0.752	1	
Eurytemora affinis		1		1.584	I	1	0.702		
Eurytemora americana	0.000	0.132	0.333		1	0.482	64.724	0.519	0.162
Pseudodiaptomus euryhalinus	0.698	0.132	0.335	1	1				
Temorites sp(p) c.f. Temorites sp.	1	1	1	3.315	1	1			
C.T. Lemonus sp. Rhincatanus nasutus	1			1	1		1	ŀ	1
Tortanus discaudatus		0.378		1	1		1	1	1
unknown calanoid	1	1	1	1	1	1		1	
Calanoid copepodites	1	1	1	1	1	1		1	
Cal. copepodites wlong rami	1	1	1	1	1		0.752	1	
Harpacticoida unident.	1	1	1	1	1		0.104	1	1
Harpacticoid "A"	1	1		1	ł	1	1	1	1
Harpacticold "B"	1	1	1	1		1	1	1	
Harpecticoid "C"	1		1		1		1	0.584	0.227
Caligus other parasitic copepods	0.698		1	1			1	0.650	0.227
unknown copepodites	1	1	1				1	1	
Ostracoda	0.698	1	1	1	1		1		
Podocopida	1	1	1	0.317	0.160	0.843	1	0.130	1
Leptostraca		1	1	1	1	<u> </u>			<u> </u>

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					Station E-5				
	18-Sep-89	28-Nov-89	7-Feb-90	9-Mar-90	5-Apr-90	24-May-90	25-Jun-90	26-Jul-90	18-Sep-90
Cirripedia									
Barnacie nauplii Barnacie cypris									
Isopoda	0.294							0.650	0.682
Amphipoda							0.460	0.650	
Anisogammarus confervicolus		0.189		0.976	0.997	0.248 0.248	0.153 0.926	0.650	
Corophium spinicome Corophium	0,140	0.378	0.846	0.310	0.100	0.240	0.020	0,000	
Grandidierella japonica							0.752		
Caprellidae							0.226		
Ampithoidae Aoridae							0.220		
Atylidae									
Hyalidae									
Pleustidae Ampeliscidae									
Talitridae				0.244					
unic amphipods		0.189							
Cumacea				0.244			0.752		
Mysidacea Neomysis mercedis	0.140	0.812				0.193	1.579	0.584	0.760
Euphausiacea									
Decapoda	1								
Brachyura Cancer antennarius/gracilis(1)				0.244					
Cancer antennarius stg 2 zoea									
Cancer antennarius stg 3 zoea	1								
Cancer productus stg 1 zoea	0.698								0.455
Grapsidae 2008 Majidae 2008	0.080								•
Pinnotheridae zoea	0.140								
Xanthidae zoea									
Unknown brachyuran zoea Unk, Megalopa		1.529				0.248	0.752		0.114
Megalopa A									
Megalopa B									
Megalopa C Megalopa D									
very young crab									
Hemigrapsis oregonensis		0.378			0.399				
Hemigrapsus nudus									
Pachygrapsus crassipes Anomura									
Anomuran megalopa	0.294								
Porcellanidae zoea									
Hippides zoea									
Emerita analoga zoea Paguridea zoea									
Thalassinidea 20ea									
Callianassidae									
Caridea Crangonidae(zoea and older)									
Caridean zoea and older									
Hippolytidae zoea									
Crangon nigromaculata Heptacarpus pictus									
Heptacarpus taylori									
Unknown caridean type zoea									
Unknown zosa Arachnid			•						
Pycnogonid									
Halacaridea					0.199				0.007
Insect larvae		0,189	0.333 0.833	0.146	0.439	0.248			0.227
Cortxidae, unident. Echinodermata		0.109	0,000						
bipinnaria larvae									
pluteus larvae									
Chaetognatha Urochordata									
Larvacea									
	·							9	11
Number of Invertebrate taxa	12 5.068	13 6,892	8 4.046	13 12.195	7 2.792	8 2.989	12 73,096	9 5,066	4.128
Total invertebrates per m3 Copepoda per m3	1.675	2,662	0.500	8.020	0.000	0.482	66.979	1.753	0.844
Decapoda per m3	1.131	1.907	0.000	0.244	0.399	0.248	0.752	0.000	0.568
Mycidacea per m3	0.140	0.812	0.000 3.546	0.000 3.931	0.000 2.393	0.193 2.067	1.579 3.786	0.584 2.729	0.760 1.956
Other per m3	2.122	1.511	3.340	9.901	*.393	¥.001	0.100	a	

Appendix P2. Larval and Juvenile Fish (Numbers per cubic meter) Collected in Half-meter Nets of 505-Micron Mesh in Estero Americano, April 1988 - September 1990.

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	Station E-1 14-Apr-88 15-Jun-88 30-Aug-88 26-Oct-88 21-Dec-88 17-Feb-89 6-Mar-89 4-May-89 8-Jun-89 5-Jul-89									
	14-Apr-88	15-Jun-88	30-Aug-88	26-Oct-88	21-Dec-88	17-Feb-89	6-Mar-89	4-May-89	8-Jun-89	5-Jul-89
Bay pipefish Bay pipefish larvae Gobiidae larvae Arrow Goby Bay, arrow or yellowfin goby	0.186	0.520				0.535		0.466		
Tidewater goby Clevlandia/Ilypnus/Quietula * Longjaw mudsucker									0.332	0.297
Topsmelt Jack- or topsmelt larvae Northern anchovy larvae Pacific herring	0.186 0.130	0.520			0.247	0.268 0.714				0.148
short belied rock fish 3-Spine Stickleback 3-Spine Stickleback larvae		0.835							1	
Shiner Surfperch Osmeridae (yolksac larvae) Staghorn sculpin Surfsmelt larvae								0.895	0.995	0.148
Plainfin midshipman unknown fish larvae fish eggs	0.334	1,318	2.963	0.668	0.760	0.178 0.299		0.139	0.332	
Number of vertebrate taxa Total larval and juvenile fish per m3	4 0.501	4 1.875	1 0.000	1 0.000	2 0.247	5 1.696	0 0.000	3 1.361	3 1.327	3 0.593

Appendix P2. Larval and Juvenile Fish (Numbers per cubic meter) Collected in Half-meter Nets of 505-Micron Mesh in Estero Americano, April 1988 - September 1990.

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	Station E-1										
	18-Sep-89	28-Nov-89	7-Feb-90	9-Mar-90	5-Apr-90	24-May-90	25-Jun-90	26-Jul-90	18-Sep-90		
Bay pipefish Bay pipefish larvae Gobiidae iarvae Arrow Goby Bay, arrow or yellowfin goby Tidewater goby Clevlandia/liypnus/Quietula * Longjaw mudsucker Topsmelt Jack- or topsmelt larvae Northern anchovy larvae Pacific herring short bellied rock fish 3-Spine Stickleback 3-Spine Stickleback larvae Shiner Surfperch Osmeridae (yolksac larvae) Staghorn sculpin Surfsmelt larvae Plainfin midshipman	0.187	0.875	0.176 0.150 0.352 0.150	0.769	1.965	0.641	0.999	0.767	1.425		
unknown fish larvae fish eggs	0.544		L					28.790	L		
Number of vertebrate taxa Total larval and juvenile fish per m3	2 0.187	1 1.125	4 0.828	1 0.769	1 1.965	2 1.496	1 0.999	2 0.767	1 1.425		

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	T	Station E-2									
	14-Apr-88	15-Jun-88	30-Aug-88	26-Oct-88	21-Dec-88	17-Feb-89	6-Mar-89	4-May-89	8-Jun-89	5-Jul-89	
Bay pipefish Bay pipefish larvae Gobiidae larvae Arrow Goby Bay, arrow or yellowfin goby	0.557	0.297	0.242	0.118		0. 186		0.186			
Tidewater goby Clevlandia/Ilypnus/Quietula * Longjaw mudsucker							0.383		0.947	0.522	
Topsmelt Jack- or topsmelt larvae Northern anchovy larvae Pacific herring Pacific Herring larvae short bellied rock fish 3-Spine Stickleback	0.557				0.278	0.160 1.318		•			
3-Spine Stückleback larvae Shiner Surfperch Osmeridae (yolksac larvae) Staghorn sculpin Surfsmett larvae Plainfin midshipman						0.264	0.255		0.631		
inknown fish larvae fish eggs	0.557	0.689	4.958	0.183	0.278 0.644	0.395			0.631		
Number of vertebrate taxa Total larval and juvenile fish per m3	3 1.671	2 0.986	2 5.200	2 0.301	3 1.201	5 2.322	2 0.639	1 0.186	3 2.209	1 0.522	

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Appendix P2. Larval and Juvenile Fish (Numbers per cubic meter) Collected in Half-meter Nets of 505-Micron Mesh in Estero Americano, April 1988 - September 1990.

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	Station E-2										
	18-Sep-89	7-Feb-90	9-Mar-90	5-Apr-90	24-May-90	25-Jun-90	26-Jul-90	18-Sep-90			
Bay pipefish Bay pipefish larvae Gobiidae larvae Arrow Goby Bay, arrow or yellowfin goby Tidewater goby			0.329		0.541	0.252	0.713				
Clevlandia/litypnus/Quietula * Longjaw mudsucker Topsmelt Jack- or topsmelt larvae Northern anchovy larvae Pacific herring Pacific herring larvae short bellied rock fish 3-Spine Stickleback	0.689		0.164								
3-Spine Stickleback larvae Shiner Sunfperch Osmeridae (yolksac larvae) Staghorn sculpin Sunfsmett larvae Plainfin midshipman unknown fish larvae								0.189			
fish eggs	0.276	1.816	0.658	0.468	0.632	0.913	23.611	0.658			
Number of vertebrate taxa Total larval and juvenile fish per m3	2 0.965	1 1.816	3 1,151	1 0.468	2 1.173	2 1.165	2 24.325	2 0.847			

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	Г <sup></sup>				Station E-3				
	30-Aug-88	26-Oct-88	21-Dec-88	17-Feb-89	6-Mar-89	4-May-89	8-Jun-89	5-Jul-89	18-Sep-89
Bay pipefish Bay pipefish larvae Gobiidae larvae Arrow Goby Bay, arrow or yellowfin goby	0.074	0.027	0.019			1.372			0.013
Tidewater goby Clevlandia/Ilypnus/Cluietula * Longjaw mudsucker							3.612	5.112	
Jack- or topsmelt larvae Northern anchovy larvae Pacific herring short bellied rock fish 3-Spine Stickleback			0.009	0.001 0.003		0.156 0.110	0.041		
3-Spine Stickleback larvae Shiner Surfperch Osmeridae (yolksac larvae) Staghorn sculpin Cottidae larvae, unident. Surfsmett larvae Plainfin midshipman			0.056		0.241				0.013
unknown fish larvae fish eggs	4.010	0.171	0.571	0.003			0.041	0.046	0.079
Number of vertebrate taxa Total larval and juvenile fish per m3	2 0.074251	2 0.198	4 0.654	3 0.007	1 0.241	3 1.637	3 3.693	2 5.158	3 0.105

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	Station E-3										
	28-Nov-89	7-Feb-90	9-Mar-90	5-Apr-90	24-May-90	25-Jun-90	26-Jul-90	18-Sep-90			
Bay pipelish					0.189						
Bay pipefish larvae				0.344	1,760	4.564	0.730	0.436			
Gobiidae larvae				0.344	0.189	4.004	0.750	0.436			
Arrow Goby			0.481		0.189	0.475		0.400			
Bay, arrow or yellowfin goby			0.401		0.105	0.470					
Tidewater goby Clevlandia/ltypnus/Quietula *	ł										
Longjaw mudsucker											
Topsmelt		0.147						0.194			
Jack- or topsmelt larvae	1	0.147			0.189	0.164					
Northern anchovy larvae	0.924	0.441									
Pacific herring		0.260									
short bellied rock fish											
3-Spine Stickleback											
3-Spine Stickleback larvae											
Shiner Surfperch											
Osmeridae (yolksac larvae)	[ ]				<b>i</b> i						
Staghorn sculpin	1										
Cottidae larvae, unident.		0.147									
Surfsmelt larvae			1.776	2.972	0.189			0.436			
Plainfin midshipman											
unknown fish larvae	0.185							0.474			
fish eggs	0.554			0.313	0.189		6.527	0.174			
Number of vertebrate taxa	3	5	2	3	7	3	2	5			
Total larval and juvenile fish per m3	1.663	1.142	2.258	3.630	2.895	5.203	7.257	1.677			
roten ien reit ente ja ronne non por mo		** * **									

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	14-Apr-88	15-Jun-88	30-Aug-88	26-Oct-88	21-Dec-88	17-Feb-89	6-Mar-89	4-May-89	8-Jun-89	5-Jul-89
Bay pipelish		0.028								0.026
Bay pipefish larvae Gobiidae larvae		1.025		0.161	0.805 0.009	0.084		7.905		
Arrow Goby Bay, arrow or yellowfin goby			1.714							
Tidewater goby Cleviandia/Ilypnus/Quietula			0.044						9.743	3.742
Longjaw mudsucker Topsmelt		0.019	0.009					0.575	2.006	2.240
Jack- or topsmelt larvae Northern anchovy larvae		0.019			0.019	0.046 2.090		1.805	0.061	
Pacific herring short bellied rock fish										
3-Spine Stickleback 3-Spine Stickleback larvae										0.026
Shiner Surfperch Osmeridae (yolksac larvae)						0.019				
Staghorn sculpin Cottidae larvae						0.070				
Surfsmelt larvae Plainfin midshipman										
unknown fish larvae fish eggs		0.009								
Number of vertebrate taxa Total larval and juvenile fish per m3	0	4	3 1.767	1 0.161	3 0.833	4 2.239	0 0.000	3 10.284	3 11.811	4 6.035

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	Station E-4										
	18-Sep-89	28-Nov-89	7-Feb-90	9-Mar-90	5-Apr-90	24-May-90	25-Jun-90	26-Jul-90	18-Sep-90		
Bay pipefish							0.518	0.157			
Bay pipefish larvae Gobiidae larvae Arrow Goby		4.643	0.349			0.319 0.778	8.839 1.943	23.363	8.484 0.436		
Bay, arrow or yellowfin goby Tidewater goby					0,194				0.153		
Clevlandia/Ilypnus/Quietula * Longjaw mudsucker Topsmelt	2.118					0.539	0.959	0.189	0.139		
Jack- or topsmelt larvae Northern anchovy larvae Pacific herring	0.034	0.474 0.254				0.142	0.777				
short bellied rock fish 3-Spine Stickleback 3-Spine Stickleback larvae Shiner Surfperch											
Osmeridae (yolksac larvae) Staghorn sculpin	0.017	0.135									
Cottidae larvae Surfsmelt iarvae Plainfin midshipman unknown fish larvae		0.135			0.738				0.219		
fish eggs Number of vertebrate taxa Total larval and juvenile fish per m3	3 2.169	4 5.506	1 0.349	0.000	2 0.932	4 1.777	5 13.037	3 23.709	5 9.430		

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	Station E-5										
	15-Jun-88	26-Oct-88	21-Dec-88	17-Feb-89	6-Mar-89	4-May-89	8-Jun-89	5-Jul-89			
Bay pipefish Bay pipefish larvae								0.051			
Gobiidae larvae		1.216	1.008	0.074							
Arrow Goby	0.019										
Bay, arrow or yellowfin goby											
Tidewater goby											
Clevlandia/Ilypnus/Quietula *							2.316	7.623			
Fopsmelt								0.229			
Jack- or topsmelt larvae							0.463	0.305			
Northern anchovy larvae											
Pacific herring				0.780							
hort bellied rock fish								0.102			
Spine Stickleback								0.102			
I-Spine Stickleback larvae Shiner Surfperch											
Dsmeridae (yolksac larvae)											
Staghorn sculpin				0.074							
Surfsmelt larvae			0.019								
Plainfin midshipman											
inknown fish larvae											
ish eggs	L										
Number of vertebrate taxa			2	3	0	0	2	5			
	0.019	1.216	1.027	0.928	0.000	0.000	2,780	8.309			
Total larval and juvenile fish per m3	0.019	1.216	1.027	0.928	0.000	0.000	2.780	1			

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	18-Sep-89	28-Nov-89	7-Feb-90	9-Mar-90	5-Apr-90	24-May-90	25-Jun-90	26-Jul-90	18-Sep-90			
Bay pipefish Bay pipefish larvae							0.752	0.974				
Gobiidae larvae		0.736				0.964	11.727	0.987	1.278			
Arrow Goby					0.140	0.248	2.819	0.650	0.682			
Bay, arrow or yellowfin goby Tidewater goby								5.627	1.723			
Clevlandia/Ilypnus/Quietula *	65.457											
Longjaw mudsucker Topsmelt	1.745	0,189				0.722	1.397	3.959	0.455			
Jack- or topsmelt larvae Northern anchovy larvae	0.209	0.945				0.124	0.113	0.130				
Pacific herring short bellied rock fish												
3-Spine Stickleback 3-Spine Stickleback larvae								0.650				
Shiner Surfperch												
Osmeridae (yolksac larvae) Staghorn sculpin Surfsmelt larvae									0.227			
Plainfin midshipman unknown fish larvae	0.070											
fish eggs						L						
Number of vertebrate taxa	4	3	0	0	1	4	5	7	5			
Total larval and juvenile fish per m3	67.481	1.870	0.000	0.000	0.140	2.058	16.807	12.976	4.365			

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Objectwate       0.102       0.102       0.102         Nementaan       Antmopoda       0.129       8.049       0.001         Crustacea       0.129       8.049       0.0031       0.001         Podon       Corycaeus       0.022       0.033       0.817       0.0081         Otiona       0.022       0.033       0.817       0.041       1.454         Corycaeus       0.022       0.033       0.817       0.081       1.454         Corycaeus       0.022       0.033       0.817       0.012       1.454         Corycaeus       0.022       0.033       0.817       0.012       1.454         Corycaeus       0.022       0.033       0.817       0.012       1.454         Corycaeus       0.022       0.033       0.817       0.021       1.454         Calanus sp.       Eurytemora affinis       2.544       0.039       1.33.724       0.012       0.012         Temorites sp(p)       0.410       0.099       0.012       0.012       0.012       0.012         Calanus discaudatus       0.022       0.410       0.099       0.819       0.012       0.012         Calanustic copepodites       0.410       0.		1				[			
Cupochester       0.129       8.049       0.081         Crustaces       0.129       8.049       0.081         Cadocera       Evadre       0.129       8.049       0.081         Podon       Copepoda       0.022       0.033       0.817       0.081         Othora       0.022       0.033       0.817       0.081       1.454         Copepoda       0.022       0.033       0.817       1.454         Oncase       0.022       0.033       0.817       1.454         Cyclopoid copepodites       0.022       0.033       0.817       1.454         Corperosities       0.022       0.033       0.817       1.454         Eurytemora sp.       Copepodites       0.033       0.817       1.454         Eurytemora affinis       2.544       0.033       1.3.724       1.454         Eurytemora sp.       Copepodites       0.022       0.099       1.454       1.454         Eurytemora sp.       Copepodites       0.022       0.033       1.454       1.454         Eurytemora sp.       Copepodites       0.022       0.039       1.454       1.454         Eurytemora sp.       Copepodites       0.022       0.012					0.100				
Arthropoda       Crustacea       0.129       8.049       0.081         Cadaccera       0.129       8.049       0.081       0.081         Podon       Copycadus       0.022       0.033       0.817       0.081         Othona       0.022       0.033       0.817       1.454         Ocyclopoid copepodies       0.022       0.033       0.817       1.454         Corycasus       0.022       0.033       0.817       1.454         Copicopoid copepodies       0.033       0.317       1.454         Copicopoid copepodies       0.033       0.317       1.454         Copicopoid copepodies       0.033       0.317       1.454         Calanus sp.       Eurytemora afmis       2.544       1.33.724       1.454         Eurytemora afmis       2.544       0.099       133.724       1.454         Feadoclaptoms euryhaituus       0.022       0.099       0.099       0.012       0.012         Temorites sp(p)       0.410       0.099       0.819       0.012       0.012         Calancid copepodites       0.410       0.099       0.204       0.12       0.012         Calancid copepodites       0.410       0.204       0.819					0.102				
Crusiacea       nauplii       0.129       8.049       0.081         Cadocera       Evadne       0.003       0.817       0.081         Podon       Copepoda       0.022       0.033       0.817       0.081         Chrona       0.022       0.033       0.817       1.454         Cyclopoid copepodites       0.033       0.033       0.817       1.454         Eurytemora americana       2.544       0.033       1.3.724       1.454         Eurytemora americana       0.410       0.099       1.33.724       1.454         Catanus so/copepodites       0.012       0.012       0.012       0.012         Temorites so/po       1.410       0.099       0.819       0.012       0.012         Catanoid copepodites       0.012       0.819 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td>							1		
nauDili Cladocera Evadne Podon     0.129     8.049     0.081       Cadocora Copepoda Corycaeus     0.022     0.033     0.817       Othona Oricaea Unk. cyclopoid Opolopoid copepodites     0.022     0.033     0.817       Acartia clauel Acartia clauel Acartia clauel Acartia clauel Acartia clauel     0.033     0.817       Eurotenors ep. Metricia lucens Epilabidocera americana Eurotenous epicopepodites     0.022     0.033       Eurotenors ep. Metricialaue anericana Eurotenous epicopepodites     2.544     133.724       Eurotenors ep. Metricialaue anericana Eurotenous extrus Centropage of. abdominalis Tortanus discaudatus Monetificae, unident. unknown calancid Catanoid copepodites     0.012       Monetificae, unident. unknown calancid Catarodi 7s <sup>n</sup> Harpacticoid 7s <sup>n</sup> Harpactic									
Cladocera       0.129       8.049       0.081         Evadre       Padon       0.033       0.817         Coryczeus       0.002       0.033       0.817         Othona       0.022       0.033       0.817         Onczea       0.022       0.033       0.817         Acartia clausi       0.033       0.817       1.454         Acartia clausi       0.033       0.817       1.454         Euroteons sp.       0.033       0.817       1.454         Euroteons sp.       0.033       0.033       0.817         Euroteons sp.       0.002       0.033       0.033         Euroteons americana       21.695       133.724       1.454         Euroteons as "cooppodites"       0.022       0.099       0.99         Rhincialnus asstuts       0.022       0.099       0.012         Calanoid copepodites whong rami       0.022       0.99       0.819       0.012         Parathidestic californica       0.819       0.819       0.012       0.012         Calanoid copepodites       0.819       0.204       0.819       0.012         Calanoid copepodite       0.819       0.204       0.819       0.012         Ca	1								
Evadne     0.123     0.001       Podon     0.002     0.033     0.817       Othona     0.022     0.033     0.817       Oncease     0.022     0.033     0.817       Unk cyclopold     0.002     0.033     0.817       Orcoseas     0.022     0.033     0.817       Unk cyclopold     0.022     0.033     0.817       Cyclopold copepodites     0.033     0.317       Acartia clausi     0.033     0.337       Acartia clausi     0.033     0.317       Metricia lucens     1.454       Eurytemora affinis     2.544       Eurytemora affinis     0.022       Eurytemora affinis     0.022       Centropages of. abornialis     0.022       Toranus discaudatus     0.022       Monstrillides, unident.     0.410       Unknown calanoid     0.410       Calaropedites whong rami     0.410       Pasadocioid "A"     0.819       Harpacticoid "A"     0.819       Harpacticoid "A"     0.819       Harpacticoid "A"     0.204       Unknown copepodites     0.204				1					
Copepoda Corycaeus Othona Onceasa unk. cyclopold Cyclopold copepodites Acartia clausi Acartia clausi Eurytemora americana Eurytemora americana Eurytemora americana Eurytemora americana Eurytemora septon Rhincalanus nasutus Centropagodites Monstrillides, unkient. Unknown calanoid Calanoid copepodites Cal. copepodites (Al copepodites Cal. copepodites			0.129	8.049				0.081	
Corycaeus Othona Crocesa unk. cyclopold Cyclopold copepodites Acartia clausi Acartia clausi Acartia A	Podon								
Olihona       0.033       0.817       1.454         Orcaea       0.022       0.033       0.817       1.454         Unk cyclopoid copepodites       0.033       0.033       0.817       1.454         Cyclopoid copepodites       0.033       0.033       0.817       1.454         Acaria clausi       0.033       0.033       0.033       0.012         Metridia lucens       Epilabicocara longipedata       21.695       133.724       1.454         Eurytemora affinis       2.544       0.039       133.724       1.454         Eurytemora affinis       2.544       0.039       0.099       133.724         Pacudodiaptomus euryhalinus       0.022       0.099       0.099       0.012         Rhincelanus nasutus       0.022       0.099       0.012       0.012         Calanoid copepodites       0.410       0.099       0.819       0.012         Calancid copepodites       0.012       0.819       0.012       0.012         Calancid copepodites       0.024       0.204       0.819       0.012         Calanus raselicoid "A"       0.204       0.204       0.819       0.012				1				[	
Unitorial Onceas unk. syclopoid Cyclopoid copepodites Acartia clausi     0.022     0.033     1.454       Unk. syclopoid Cyclopoid copepodites Acartia clausi     0.033     0.033     1.454       Acartia clausi     0.033     0.033     1.454       Acartia clausi     0.022     0.033     1.454       Acartia clausi     0.022     0.033     1.454       Metridia lucens     21.695     133.724     1.454       Eurytemora affinis     2.544     0.099     133.724       Eurytemora affinis     0.022     0.099     0.012       Rhincatanus nasutus     0.022     0.099     0.012       Centropages c.f. abdominalis     0.012     0.012       Totanus discaudatus     0.012     0.819     0.012       Monstrillidae, unident.     0.819     0.819     0.012       Catanoid copepodites w/fong rami     0.204     0.819     0.012       Schizopero knabeni     0.204     0.204     0.012       Zaus spp.     Harpacticoid "A"     0.204     0.204       Harpacticoid "C"     0.204     0.204     0.012				0.000	0.817				
Oncode       Ink. cyclopoid       1.454         Cyclopoid copepodites       Acartia clausi       0.033         Acartia clausi       Acartia clausi       0.033         Acartia clausi       21.695       133.724         Eurotemora affinis       2.544       1.454         Eurotemora affinis       2.544       0.099         Peeudodisptomus europhalinus       0.022       0.410       0.099         Rhincalanus nasutus       0.022       0.410       0.099         Centropages C.f. abdominalis       0.012       0.012         Tortanus discaudatus       Monstrillidae, unident.       0.012         Metridis estris californica       0.819       0.819         Zause spp.       0.819       0.204         Harpacticoid "A"       0.204       0.204			0.022	0.055	0.017		1		
Cyclopoid copepodites Acartia clausi Acartia clausi Acartia clausi Calanus sp. Metridia lucens Epilabidocera longipedata Eurytemora americana Eurytemora sp. "copepodites" Peeudodisptomus euryhalinus Centropages c.f. abdominalis Tortanus discaudatus Monstrillides, unident. Unknown calanoid Cala copepodites w/ong rami Parathalestris californica Schizopero knabeni Zaus sp. Harpacticoid "G" Harpacticoid "G" Caligus other parasilic copepods Uniknown copepodites Cala copepods Uniknown copepodites Caligus Other parasilic copepods Uniknown copepodites Calagus Cotracoda Calanoid "G" Caligus Charter acartis californica Calanoid copepodites Caligus Charter acartis californica Calanoid copepodites Caligus Charter acartis californica Calanoid copepodites Caligus Charter acartis californica Caligus Charter acartis Caligus Charter acartis Caligus Charter acartis Caligus Charter acartis Caligus			0.022						1.454
Acartia clausi       0.033         Acartia danse       0.033         Calanus sp.       Metridia lucens         Epilabidocera longipedala       21.695         Eucalanus       21.695         Eurytemora affinis       2.544         Eurytemora affinis       0.022         Eurytemora sp. "coppodites"       0.022         Pseudodiaptomus euryhalinus       0.022         Rhincelanus nasutus       0.022         Centropages c.f. abdominalis       0.410         Tortanus discaudatus       0.410         Monstrillidae, unident.       0.410         unknown calanoid       0.819         Calanoid copepodites       0.819         O.819       0.819         Jaus epp.       0.204         Harpacticoid "C"       0.204         Caligus       0.204									
Acartia danse       21.695       133.724         Metridis lucens       21.695       133.724         Eurytemora americana       2.544       133.724         Eurytemora americana       2.544       133.724         Eurytemora servicana       0.022       0.099         Rhincalanus nasutus       0.022       0.099         Centropages c.f. abdominalis       0.410       0.099         Catanoid discundatus       0.410       0.099         Montrillidae, unident.       0.410       0.099         Unknown calanoid       0.012         Calanoid copepodites       0.012         Calanoid copepodites       0.819         Calanoid copepodites       0.819         Calanoid copepodites       0.204         Calagus esp.       0.819         Harpacticoid "A"       0.819         Harpacticoid "C"       0.204         Other parasitic copepods       0.204         Unknown copepodites       0.204				0.033	1			1	
Metridia lucens       21.695       133.724         Eurytemora affinis       2.544       133.724         Eurytemora affinis       2.544       133.724         Eurytemora americana       2.544       0.022         Pesudociaptomus euryhalinus       0.022       0.099         Rhincalanus nasutus       0.022       0.099         Centropages 0.f. abdominalis       0.022       0.099         Totranus discaudatus       Monstrillidae, unident.       0.012         Mannown calanoid       0.012       0.012         Calanoid coopeodites       0.012       0.819         Zaus spp.       0.819       0.819         Harpacticoid "A"       0.204       0.204         Harpacticoid "C"       0.204       0.204					1				
Epilabidocera longipedata         Eucatanus         Eucytemora américana         Eurytemora américana         Eurytemora sp. "copepodites"         Pesudodiaptomus euryhalinus         Temorites sp(p)         Rhincalanus nasutus         Centropages c.f. abdominalis         Tortanus discaudatus         Monstrillidae, unident.         unknown calanoid         Calanoid copepodites         Cal, copepodites w/long rami         Parathalestris californica         Schizopero knabeni         Zaus spp.         Harpacticoid "B"         Harpacticoid "C"         Caligue         Other parasitic copepodites         Oetracoda         Other parasitic copepodites         Oetracoda         Pedocopida	Calanus sp.								
Eucalanus         Eurytemora afinis         Eurytemora americana         Eurytemora americana         Eurytemora sp. "copepodites"         Pseudodiaptomus euryhalinus         Temorites sp(p)         Rhincalanus nasutus         Centropages c.f. abdominalis         Tortanus discaudatus         Monstrillidae, unident.         unknown calanoid         Calanoid copepodites         Cal. copepodites         Caligus									
Eurytemora affinis       21.695       133.724         Eurytemora smericana       2.544       0.022         Eurytemora sp. "copepodites"       0.022       0.099         Paeudodiaptomus euryhalinus       0.022       0.099         Rhincelanus nasutus       0.410       0.099         Centropages c.f. abdominalis       0.410       0.099         Tortanus discaudatus       0.012         Monstrillidae, unident.       0.012         Unknown calanoid       0.012         Cal. copepodites wilong rami       0.819         Parsthalestris californica       0.819         Schizopero knabeni       0.819         Zaus spp.       0.819         Harpacticoid "B"       0.204         Harpacticoid "C"       0.204         Caligus       0.204		1							
Eurytemors americana       2.544         Eurytemors americana       0.022         Eurytemors americana       0.022         Pseudodiaptomus euryhalinus       0.022         Temorites sp(p)       0.410       0.099         Rhincalanus nasutus       0.410       0.099         Centropages c.f. abdominalis       0.410       0.099         Tortanus discaudatus       Monstrillidae, unident.       0.012         Monstrillidae, unident.       0.012       0.012         Unknown calanoid       0.819       0.819         Zaus spp.       1       0.819         Harpacticoid "A"       1       0.204         Harpacticoid "C"       0.204       0.204				21.695	133.724				1
Eurytemora sp. "copepodites"       0.022         Pseudodiaptomus eurythalinus       0.022         Temorites sp(p)       0.410         Rhincalanus nasutus       0.099         Centropages c.f. abdominalis       0.012         Tortanus discaudatus       0.022         Monstrillidae, unident.       0.022         unknown calanoid       0.021         Calanoid copepodites       0.012         Zaus spp.       0.819         Harpacticoid "A"       0.819         Harpacticoid "B"       0.204         Harpacticoid "C"       0.204         Caligus       0.204		1 .	2.544			I	1	1	1
Pseudodiaptomus euryhalinus     0.022 0.410     0.099       Rhincalanus nasutus Centropages c.f. abdominalis Tortanus discaudatus Monstrillidae, unident. unknown calanoid Calanoid copepodites Cal. copepodites w/long rami Parathalestris californica Schizopero knabeni Zaus spp. Harpacticoid unident. Harpacticoid "A" Harpacticoid "A" Harpacticoid "C" Caligus other parasitic copepods unknown copepodites Ostracoda Podocopida Leptostraca     0.012	Eurytemora sp. "copepodites"	1		1	1			1	1
Temorites sp(p)       0.410       0.099         Rhincalanus nasutus       0.012         Centropages c.f. abdominalis       0.012         Tortanus discaudatus       0.012         Monstrillidae, unident.       0.012         Unknown calanoid       0.012         Calanoid copepodites       0.012         Cal. copepodites w/long rami       0.819         Parathalestris californica       0.819         Schizopero knabeni       0.819         Zaus spp.       1         Harpacticoid "A"       0.819         Harpacticoid "A"       0.204         Harpacticoid "C"       0.204         Caligus       0.204	Pseudodiaptomus euryhalinus	1			1		1	1	1
Centropages c.f. abdominalis       0.012         Tortanus discaudatus       0.012         Monstrillidae, unident.       0.012         unknown calanoid       0.012         Calanoid copepodites       0.819         Zaus spp.       0.819         Harpacticoid a unident.       0.819         Harpacticoid "B"       0.204         Harpacticoid "C"       0.204         Caligus       0.204	Temorites sp(p)	1	0.410	0.099	<b>I</b> .	1	1	· ·	1
Tortanus discaudatus       0.012         Monstrillidae, unident.       0.012         Unknown calanoid       0.012         Calanoid copepodites       0.819         Cal. copepodites w/long rami       0.819         Parathalestris californica       0.819         Schizopero knabeni       0.819         Zaus spp.       0.819         Harpacticoid "A"       0.819         Harpacticoid "B"       0.204         Harpacticoid "C"       0.204         Caligus       0.204		1	1	1		1		1	1
Monstrillidae, unident.       0.012         unknown calanoid       0.012         Calanoid copepodites       0.012         Cal. copepodites w/long rami       0.819         Parathalestris californica       0.819         Schizopero knabeni       0.819         Zaus spp.       Harpacticoid unident.         Harpacticoid "A"       Harpacticoid "B"         Harpacticoid "C"       Caligus         other parasitic copepods       0.204         Unknown copepodites       Oztracoda         Podocopida       Leptostraca	Centropages c.f. abdominalis		1		1	1	1		1
unknown catanoid       0.012         Catanoid copepodites       0.012         Cat. copepodites w/long rami       0.819         Parathalestris californica       0.819         Schizopero knabeni       0.819         Zaus spp.       Harpacticoid "A"         Harpacticoid "A"       1         Harpacticoid "B"       1         Harpacticoid "C"       0.204         Caligus       0.204         other parasitic copepodites       0.204         Ostracoda       1         Podocopida       1         Leptostraca       1		1		1	1	1	1	1.	1
Catanoid copepodites         Cat. copepodites w/long rami         Parathalestris californica         Schizopero knabeni         Zaus spp.         Harpacticoid unident.         Harpacticoid "A"         Harpacticoid "B"         Harpacticoid "C"         Caligus         other parasitic copepods         unknown copepodites         Ostracoda         Podocopida         Leptostraca		1	1	1	1	1	1	0.012	1
Parathalestris californica       0.819         Schizopero knabeni       0.819         Zaus spp.       0.819         Harpacticoid a unident.       1         Harpacticoid "A"       1         Harpacticoid "B"       1         Harpacticoid "C"       0.204         Caligus       0.204         other parasitic copepods       0.204         Unknown copepodites       0.204         Ostracoda       1         Podocopida       1         Leptostraca       1	Calanoid copepodites	1	1		1	1	1	1	1
Schizopero knabeni       0.819         Zaus spp.       Harpacticoid unident.         Harpacticoid "A"       Harpacticoid "B"         Harpacticoid "C"       Caligus         other parasitic copepods       0.204         unknown copepodites       0.204         Ostracoda       Podocopida         Leptostraca       Image: Caligue state st	Cal. copepodites w/long rami	1	1		1	1			1
Zaus sp. Harpacticoids unident. Harpacticoid "A" Harpacticoid "B" Harpacticoid "C" Caligus other parasitic copepods unknown copepodites Ostracoda Podocopida Leptostraca		1	1		1	0.819		1	1
Harpacticoids unident. Harpacticoid "A" Harpacticoid "B" Harpacticoid "C" Caligus other parasitic copepods unknown copepodites Ostracoda Podocopida Leptostraca		1	1	1	1			1	1
Harpacticoid "A" Harpacticoid "B" Harpacticoid "C" Caligus other parasitic copepods unknown copepodites Ostracoda Podocopida Leptostraca		1	1	1	1	ł	1	1	1
Harpacticoid "B" Harpacticoid "C" Caligus other parasitic copepods unknown copepodites Ostracoda Podocopida Leptostraca			1		1	1			
Harpacticoid "C" Caligus other parasitic copepods unknown copepodites Ostracoda Podocopida Leptostraca	Haroacticoid "B"	1	1	1	1	1	1		
Caligus other parasitic copepods unknown copepodites Ostracoda Podocopida Leptostraca	Harpacticoid "C"	1	1	1	1	1	1		1
other parasitic copepods     0.204       unknown copepodites     0       Ostracoda     0       Podocopida     0       Lentostraca     0			1	1			1		
Ostracoda Podocopida Leptostraca	other parasitic copepods	1	1	1	0.204				
Podocopida Leptostraca		1	1	1			1	1	
Leptostraca		1	1	1			1		
Nebalia gundtensis	Podocopida			1					
	Nebalia pugettensis	1				1	1		1

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	I			Statio	on S-2	<u>-</u>		
	5-Jul-89	8-Feb-90	10-Mar-90	6-Apr-90	25-May-90	26-Jun-90	27-Jul-90	19-Sep-9
Cirripedia								
Barnacie nauplii								
Barnacle cypris								
Isopoda Sohaeromatidae				0.204	0.071	0.023	0.093	
Idoteidae								
Amphipoda								
Anisogammarus confervicolus		0.280	0.017	0.204	0.107			0.018
Corophium					0.659			0.036
Grandidriella japonica								
Caprellidae								
Ampeliscidae								
Ampithoidae								
Aoridae								
Atylidae								
Hyalidae Ischyroceridae								
Photidae								
Pieustidae								
Talifridae					1			
unk. amphipods								
Cumacea								
Mysidacea								
Neomysis mercedis	۱ I							
Euphausiacea								
Decapoda	[							
Brachyura Cancer antennarius/gracilis(1)								
Cancer antennarius/gracilis(1) Cancer antennarius stg 2 zoea								
Cancer antennarius stg 3 zoea								
Cancer productus stg 1 zoea								
Grapsidae zoea								
Majidae zoea								
Pinnotheridae zoea				1.328				
Xanthidae zoea								
Unknown brachyuran zoea	1							
Megalopa	1							
Megalopa A								
Megalopa B								ļ
Megalopa C	<b> </b>							
Megalopa D								
very young crab Hemigrapsis oregonensis								
Hemigrapsus nudus								
Pachygrapsus crassipes								
Anomura								
Anomuran megalopa								
Emerita analoga zoea								
Porcellanidae zoea								
Hippidea zoea								
Paguridea zoea								
Thalassinidea zoea								
Callianassidae								
Caridea								
Crangonidae(zoea and older)	i l							
Hippolytidae zoea Caridean zoea and older								
Crangon nigromaculata								
Heptacarpus pictus								
Heptacarpus taylori								
Unknown caridean type zoea		0.022						
Unknown zoea								
achnid								
cnogonid								
alacaridea hsect, unident.		0.022						
isect, unident. Isect larvae	0.044	0.043			r I		0.012	
isect larvae ionixidae, unident.		V					-	
chinodermata		0.129						
pipinnaria larvae								
bluteus larvae								
haetognatha								
rochordata	. 1							
rochordata .arvacea	ليستعمدهم							
arvacea	م م	10	R	10	5	1	4	3
arvacea	1 0.044	10 3.623	6 29.926	10 137.300	5 2.029	1 0.023	4 0.197	3 1.507
arvacea umber of invertebrate taxa stal invertebrates per m3	0.044	3.623	6 29.926 21.861	10 137,300 134,746	5 2.029 0.819		-	1.507 1.454
arvacea umber of invertebrate taxa stal invertebrates per m3 opepoda per m3			29.926	137,300	2.029 0.819 0.000	0.023 0.000 0.000	0.197 0.012 0.000	1.507 1.454 0.000
arvacea umber of invertebrate taxa stal invertebrates per m3	0.044 0.000	3.623 2.997	29.926 21.861	137,300 134,746	2.029 0.819	0.023 0.000	0.197 0.012	1.507 1.454

Page 2

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		والمحاوي والمراجع			Oheline O				
	5. Jul 80	20. Nov-80	R.Feb.QO	10-Mar-90	Station S-	1 25. May 90	26-Jun-90	27-101-90	19-Sep-90
Protozoa	J-JU1-05	40-1107-03		10 1101-00					
Tintinnids			[						
Foraminitera		0.016			J			ļ	
Noctiluca									
Ctenophore									
Cnidaria					1				
Leptomedusa type		0.143						0.443	100.597
Anthomedusa type other medusae		0.413					1	0.775	100.001
Hydroid polyp	Р			1				1	
Leptomedusa polyp							[		
Coral polyp									
Siphonophore (gonophore)									
Ascheiminthes							•		
roundworm									
Unknown "worm"									
Rotifera									
Brachionus									
Synchatea Mollusca									
Bivalves									
Montacutidae									
Gastropods				0.017					
Gastropoda eggs					·				
Opisthobranchia									
Nudibranchs									
Phoronida actinotroch									
Bryozoa larvae	_								
Bryozoan colony	Р								
Annelida									
Hirudinea Polychaetes		0.032							
Polychaete larvae		0.005				•			
Oligochaete									
Nemertean									
Arthropoda									
Crustacea									
nauplii									
Cladocera	:								
Evadne			2.189						
Podon					·				
Copepoda									
Corycaeus Oithona					58.552				
Oncaea					00.002				
unk. cyclopoid									
Cyclopoid copepodites									0.963
Acartia clausi		0.032	0.075	0.033					
Acartia danae									
Calanus sp.									
Metridia lucens									
Epilabidocera longipedata									
Eucalanus									
Eurytemora affinis		0.000	8.076	1.838	6475.214				
Eurytemora americana		0.064	0.076		123.993				
Eurytemora sp. "copepodites" Pseudodiaptomus euryhalinus					123.993				
Temorites sp(p)		,	1.962						
Rhincalanus nasutus									
Centropages c.f. abdominalis				0.066					
Tortanus discaudatus						i			
Monstrillidae, unident.									
unknown catanoid									0.004
Calanoid copepodites									0.321
Cal. copepodites w/long rami									
Parathalestris californica	l			1					
Schizopero knabeni Zaus spp.									
Harpacticoida unident.									
Harpacticoid "A"									
Harpacticoid "B"									
Harpacticoid "C"				1	ł			1	
Caligus			1		l				
other parasitic copepods									
unknown copepodites									
Ostracoda	0.063							1	
Podocopida	0.000	l			1	1	1	1	1

ſ <u></u>					Station S-	4			
	5-Jui-89	29-Nov-89	8-Feb-90	10-Mar-90	6-Apr-90	25-May-90	26-Jun-90	27-Jul-90	19-Sep-90
Leptostraca			1						
Nebalia pugettensis Cirripedia			1		1				
Barnacle nauplii	[	Į	ĺ	[		1			1
Barnacle cypris				1					1
Isopoda	0.041	0.191			4 700		0.012	0.043	0.481
Sphaeromatidae	[	(	[	1	1.722	1	0.012	0.045	0,401
Idoteidae Amphipoda		1							
Anisogammarus confervicolus	0.096	2.735	0.019	0.017					
Corophium	0.399	0.254	1						
Grandidriella japonica		l	1						
Caprellidae	1								
Ampeliscidae Ampithoidae			[	[	[				
Aoridae									
Atylidae				0.017					
Hyalidae	1		1						
Ischyroceridae									
Photidae Pleustidae									
Talitridae									
unk. amphipods					· ·				
Cumacea							0.012		
Mysidacea									
Neomysis mercèdis									
Euphausiacea Decapoda									
Brachyura							1		[
Cancer antennarius/gracilis(1)									
Cancer antennarius stg 2 zoea									
Cancer antennarius stg 3 zoea			· ·						
Cancer productus stg 1 zoea		0.016		0.116					
Grapsidae zoea Maiidae zoea		0.010		0.110					
Pinnotheridae zoea									
Xanthidae zoea									
Unknown brachyuran zoea									
Megalopa									
Megalopa A Megalopa B									
Megalopa C									
Megalopa D									
very young crab									
Hemigrapsis oregonensis									
Hemigrapsus nudus									
Pachygrapsus crassipes Anomura									
Anomuran megalopa									
Emerita analoga zoea									
Porcellanidae zoea									
Hippidea zoea									
Paguridea zoea Thalassinidea zoea									
Callianassidae									
Caridea									
Crangonidae(zoea and older)									
Hippolytidae zoea									
Caridean zoea and older									
Crangon nigromaculata Heptacarpus pictus									
Heptacarpus taylori									
Unknown caridean type zoea									
Unknown zosa									
Arachnid			0.151						
Pycnogonid Halacaridea									
Insecta, unident.			0.755						
Insect larvae			0.094				0.048	0.757	0.160
Echinodermata									
bipinnaria larvae									
pluteus larvae						1			
Chaelognatha Urochordata									
Larvacea	(						I		
1									
Number of Invertebrate taxa	6	10	8	7	4	0	3	3	5
total # invertebrates per m3	0.619	3.895	13.321	2,103	6659.482 6657.760	0.000 0.000	0.072 0.000	1.242	102.522 1.284
Copepoda per m3 Decanoda per m3	0.000 0.000	0.095 0.016	10.113 0.000	1.938 0.116	0.000	0.000	0.000	0.000	0.000
Decapoda per m3 Mycidacea per m3	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Other per m3	0.619	3.784	3.208	0.050	1.722	0.000	0.072	1.242	101.239

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Trictionides Postinulées Conceptore Canderies Laptomaticas bype chartenides other modules other modules produces produces produces advertenides produces pro					<b>Ot</b> atio	- 0.0			
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Trictionides Postinulées Conceptore Canderies Laptomaticas bype chartenides other modules other modules produces produces produces advertenides produces pro									
Froeminies Creations Checkbore Creations Checkbore Creations Unicount Synchics	Protozoa		ſ						
Nocisica Cinceptore Chiedrafs Anthonoclas type Anthonoclas type Anthonoclas type Anthonoclas type Anthonoclas type Anthonoclas type Conta Doby Selecomphone (conceptore) Acceleminations Selecomphone (conceptore) Acceleminations Second Doby Selecomphone (conceptore) Acceleminations Second Doby Selecomphone (conceptore) Acceleminations Second Doby Selecomphone (conceptore) Acceleminations Second Doby Selecomphone (conceptore) Acceleminations Second Doby Selecomphone (conceptore) Acceleminations Second Doby Selecomphone (conceptore) Acceleminations Second Doby Second		8							
Clencybore Consister Antonecies type Antonecies type Antonecies type Antonecies type Control bype Spherosphere (poncyhore) Spherosphere (poncyhore			[						·
Cristeries type Anthomotous type Characteries type Anthomotous type Characteries type									
Legionadus type Attornatives (ppe other matubase Hydrad poly) Legionadus poly Septoneptions (complore) Automatives Septoneptions (complore) Management Septoneptions (complore) Septoneptions									
Arithmaticus type Hydraid polyp Caral polyp Caral polyp Caral polyp Spinoncybres (poncybron) Spinoncybres (poncybres) Spinoncybres (poncybres									
hiydschoophore olype Caral polype Spinonophore (ponophore) Ascharinithes roundworm Northanithes Synchitae Bivabas Synchitae Synchit					1.521				
Lastimestres polyp Coral polyp Siphonophare (gonophare) Academinities roundworm Unincom "vorm" Retifiera Breachanuties Breachanuties Breachanuties Breachanuties Breachanuties Breachanuties Breachanuties Breachanuties Breachanuties Broacea									
Cora polyp Schorophore (component) Ascharinstributes roundworm Norma'' Brachionus Synchates Brachionus Synchates Brachionus Synchates Brachionus Synchates Brachionus Synchates Brachionus Synchates Brachionus Synchates Brachionus Synchates Brachionus Synchates Brachionus Synchates Brachionus Synchates Brachionus Synchates Brachionus Synchates Brachionus Synchates Brachionus Synchates Brachionus Synchates Brachionus Synchates Brachionus Synchates Brachionus Brachionus Synchates Brachionus Synchates Brachionus		P							
Sightonophane (gonophane) Activitation Numkrown "vorm" Rotifere Brachonus Synchistes Montacutide Gestropode Gestropode Gestropode sogs Opisthohranchia Nutificandhe Braves Braves Braves Gestropode sogs Opisthohranchia Nutificandhe Braves Braves Braves Gestropode southoff Photostes Braves B			1						
Aachaministres roundworm Rotifices Brechonus Synchates Montacutide Gastropode Gastropode Gastropode Gastropode Gastropode Gastropode Gastropode Gastropode Gastropode Synchates Polychates Corpeodia Corycesus Chinona Corpeodia Corycesus Chinona Corpeodia Corycesus Corpeodia Corycesus Control Corpeodia Corycesus Control Corpeodia Corycesus Control Corpeodia Corycesus Control Corpeodia Corycesus Control Corpeodia Corycesus Control Corpeodia Corycesus Control Corpeodia Corycesus Control Corpeodias Corpeodi									
reundhoom Rottere Brechonus Synchistes Brakes Motasca Brakes Br									
Rottere Synchites Synchite			1						
Brechonue Synchates Moliscea Bivaves Motisca Gistropode Gastropode Gastropode Gastropode Gastropode Gastropode Gastropode Gastropode Gastropode Gastropode Gastropode Synchates Phoronida actinotroch Bryczena colony Bryczena colony Caladocera Ewdne Chatocera Bryczena colony Copepoda Corpecalus Chrona Corpecalus Chrona stinis Eurytemora strinis Eurytemora strinis Eu	Unknown "worm"								
Synchrates Bivakes Bivakes Bivakes Gastropode Gastropode Gastropode Gastropode Gastropode Gastropode Gastropode Service laves Promise actinotroch Brycene laves Brycene laves Brycene laves Brycene laves Brycene laves Brycene laves Brycene laves Brycene laves Brycene laves Charace Charace Corpspoda Corpspod									
Molikusca Bivaves Montsculidae Gastropode Gastropode Gastropode Gastropode Gastropode Gastropode Gastropode Bryccene aditoritoch Bryccene aditoritoch Controped Contrope			1						
Bivalves Montaculidae Gastropoda Gastropoda eggs Ogistropoda eggs Ogistropoda eggs Diverse Satropoda eggs Diverse Bryceane Colory Annelida Hivulines Bryceane Colory Annelida Hivulines Polychaetes Polychaetes Polychaetes Polychaetes Polychaetes Polychaetes Polychaetes Polychaetes Catacoera Evidence Corpeopida Corpeopida Corpeopida Corpeopida Corpeopida Corpeopida Corpeopida Corpeopida Concess unk. cyclopolida Cyclopoli corpeopidites Contrastens sp. Composition Euritemona stinis Epitebidopera longipedata Euritemona stinis Entrebidopera longipedata Euritemona stinis Catanoera of abdominatis Tortenus diseaucidus Monaritiliseu, unidem. Unicore catalondi Colascies of Labdominatis Tortenus diseaucidus Monaritiliseu, unidem. Unicore catalondi Colascies cataloninatis Tortenus diseaucidus Monaritiliseu, unidem. Unicore catalondi Colascies cataloninatis Tortenus diseaucidus Monaritiliseu, cataloninatis Tortenus diseaucidus Monaritiliseu, cataloninatis Tortenus diseaucidus Monaritiliseu catalonia Schicopero kmaberti Zaus sp. Harpacticoid V^C Catigue Colascies (Dopeodites Colascies (Dopeodites Colascies (Dopeodites Catalondo V/* Harpacticoid V/* Harpacticoid V/* Harpacticoid V/* Harpacticoid V/* Harpacticoid V/*									
Montaculidae Gastropoda Gastropoda Gastropoda Gastropoda Gastropoda Gastropoda Gastropoda Gastropoda Distrobranchia Nuclimanchia Promotida aditiototoch Bryccana colony Amelida Bryccana colony Amelida Bryccana colony Amelida Bryccana colony Parallelia Calacoca Consecoda Corpepoda Copepoda Corpegoda Copepoda Corpegodites Acartía danae Calanus se, Copepodites Acartía danae Calanus se, Cabdomnais Totenus discudatus Montrillices es. Rhincasanus nasulus Calanodes es. Rhincasanus nasulus Calanodes col, fabdomnais Totenus discudatus Montrillices col, Cabdomnais Totenus discudatus Colaroid Copepodites Calanos es. Calanos es. Calanos es. Calanos es. Calanos (acopedites Calanos fabdomnais Totenus discudatus Colaroid Copepodites Calanos (acopendites Calanos (acopendites Calanos (acopendites Calanos (acopendites Calanos for Calanos (acopendites Calanos (acop		•							
Gastropoda eggs Gastropoda eggs Opishobranchia Hutilizancha Photosia actinotroch Bryczel lance Bryczel lance Spyczel lance Polychaetes Pol			[						
Gastroponchia Nuclitrancha Nuclitrancha Phoronida actitoritorich Bryczose lavnee Bryczen colony Amelica Ninucisane Potychaete iarvee Odjącohaete Nemerisan Anthropoda Crustacea naupili Cladocera Ewalene Ewalene Copepoda Corpopa					0.072				
Opishiboranchia       P         Nuclificanchia       P         Phoronida actinolnoch       Brycose larve         Brycose larves       P         Annelida       P         Annelida       P         Annelida       P         Polychaeles       P         Polychaeles       P         Romentean       Attropoda         Chustacea       Cascorera         Evadne       5.019       4.141       0.579         Podon       Copepoda       0.012         Corpeaus       Othona       3.187       0.442         Corpeaus       Othona       3.187       0.442         Corposetus       Othona       3.187       0.442         Corposetus       Othona       3.187       0.442         Corposetus       Othona       3.187       0.442         Corposetus       Othona       168.320       0.442         Corposetus       Onocata       0.164       0.024         Eurytemora servicana       Eurytemora servicana       0.024       0.024         Calacorpopodites       Acaria classinkd       0.024       0.024         Calacorpopodites vologrami       P       P       P<			l						
Prioronida actinotroch Bryczos ianochow Bryczos anolony Amelića Hirudines Połychastele Połychastele larvee Oligochaste Nemerkean Arthropoda Crustacea naupili Cladocera Evadne Podon Corustacea Capepoda Corycaeus Otioona Oncea Unik cyclopid Cyclopid copepodites Acartia clausi Acartia clausi Acartia clausi Acartia clausi Acartia clausi Eurytemora sinkis Eurytemora sinkis Centrocolites (2007) Caligua Other parasitic copepodites Colita coda Eurytemora sinkis Eurytemora sinkis Eurytemora sinkis Eurytemora sinkis Eurytemora sinkis Eurytemora sinkis Eurytemora sinkis Eurytemora sinkis Centrocolites (2007) Caligua Eurytemora sinkis Eurytemora	Opisthobranchia								
Bryczoan colony Amelida Mendica Hrudines Połychastel surve Odigochaste Odigochaste Nemerisan Arthropoda Chusiacea Anthropoda Chusiacea Podon Copepoda Corycaped Cadocera Evafne Podon Copepoda Copepoda Corycaped Concaes unk. cyclopold Cyclopold copepodites Acartia clausi Acartia clausi Concaes Unixer Paudodiaptomus euryhalinus C. 1. Bedominalis Tortanus discutatus Monstillida, unident. Harpaeticold "of" Harpaeticold "of" Harpaeticol "of" Harpaeticold "of" Harpaeticol "o									
Bigecon colony P Annelida Hirudines Polychaetes Polychaetes Polychaetes Nemerkean Athropoda Constacea naupili Citadocera Evadne Dodon Copepoda Corposa Corpeoda Corposa Corpeoda Corposa Corpo									
Anelida Anelida Mendicas Polychastel sirvae Oligochaste Polychastel sirvae Oligochaste Remetsan Arthropoda Chusiacea naupili Cladocera Evadne Podon Copepoda Coryclopol copepodites Acarita clausi Acarita clausi Acarita clausi Acarita clausi Acarita clausi Acarita clausi Acarita clausi Acarita clausi Acarita clausi Colopepodites Cyclopol copepodites Acarita clausi Acarita clausi Conces Eurytemora americana Eurytemora sincis Eurytemora sincis Eurytemora sincis Eurytemora sincis Eurytemora sincis Castropages C. sbdominalis Tortanus discutatius Monstillidae, unident. Harpaeticold "A" Harpaeticold "C' Casigus Schitopero Instanti Zaus spp. Harpaeticold "C' Casigus Cother paralities copepodites Cother paralities compared the comparative comparative compared the comparative compared the comparative comparative compared the comparative compared the comparative comparative compared the comparative comparative comparative comparative comparative compared the c			l						
Hirutines Polychaets Polychaets Polychaets Polychaets Polychaets Polychaets Polychaets Nemertesn Arthropods Crustacea aupUli Cladcoera Evadue Source Sourceus Copepoda Coproceus Copepoda Coproceus Copepoda Coproceus Cotinona Cocaes Unic cyclopoid Cocopepodites Acartia danae Calanus sp. Metridia lucens Eurytemora stinis Calacopepodites Contractes s1. Shotoping Contactus Shotopepodites Calacopepodites Colopepodites Contractes s1. Shotoping Contactus Shotopepodites Calacopepodites Colopepodites Contracts Colopepodites Contracts Colopepodites Contracts Colopepodites Colopepodites Contracts Colopepodites Colopepodites Contracts Colopepodites Colopepodites Colopepodites Colopepodites Contracts Colopepodites Colopepodites Colopepodites Colopepodites Colopepodites Contracts Colopepodites Colope		۲							
Porticipaetes Polychaetes Nemeriean Arthropoda Crustaceas naupili Cladoceras Evalue Podon Copepoda Copepoda Copepoda Copepoda Copepoda Copepodites Copcaes Unik cyclopoid Copepodites Acartia clausia Acartia									
Polychaele larvae Oligochaele Nemerican Arthropode Crustacee naupli Cladocera Evadue Podon Copepoda Corpecta Co									
Oligocheele     0.012       Nemertaan     Arktropode       Crustacee     0.012       Crustacee     0.012       Castacee     0.012       Castacee     0.012       Podon     0.012       Copceeus     0.012       Ottooe     0.012       Copceeus     0.0442       Ottooe     0.0442       Eurytemora affinis     0.064       Eurytemora approximume urytainus     0.164       Ottooe     0.024       Ottooe     0.024       Ottooe     0.024       Ottooe     0.012       Ottooe     0.012									
Arthropode Crustacea naupii Cladocera Evadne Podon Copepoda Corycaeus Oncae Corycaeus Oncae Unk cyclopoid Cyclopoid Cyclopoid Corycaeus Oncae Unk cyclopoid Cyc									
Consisces       0.012         naupili       0.012         Citadocera       0.012         Evadne       0.012         Podon       0.0012         Copepoda       0.012         Corroceus       0.012         Othona       0.012         Onceses       0.4141         Unic cyclopoid       0.442         Cyclopoid copepodites       3.187         Acartia dense       0.442         Catanus sp.       Metridia lucens         Eurytemora americana       168.320         Eurytemora americana       0.164         Eurytemora americana       0.164         Pareudodiaptomus euryhalinus       0.164         Catanos sp.       0.024         Catanos sp.       0.024         Catanos sp.       0.024         Eurytemora americana       0.164         Eurytemora sitinis       0.024         Catanos coppodites       0.024         Catanos coppodites       0.024         Catanos coppodites       0.012         Catanos coppodites       0.012         Catanos coppodites       0.012         Catanos coppodites       0.012         Catanos coppodites       0.012<	Nemertean								
nauplii     0.012       Cladocera     Evadre       Podon     5.019       Copepoda     0.579       Corycaus     0.4141       Othona     0.442       Eurytemora spinopidata     168.320       Eurytemora simila     0.164       Rhinostanus nesutus     0.164       Centropages of. abdominalis     0.164       Tortarus discaudatus     0.024       Monstrillidae, unident.     0.024       Paratinalestris californica     0.012       Calicopepodite w/ong remi     0.012       Calicopepodite w/ong remi     0.012       Othor parasitic copepods     0.516									
Rational     5.019     4.141     0.579       Codecora     5.019     4.141     0.579       Podon     Copepoda     0.442       Copecola     Copecola     0.442       Oncaes     unk cyclopoid     3.187     0.442       Oncaes     unk cyclopoid     3.187     0.442       Cyclopoid copepodites     Acartia clausi     Acartia clausi     Acartia clausi       Acartia clausi     Acartia clausi     Acartia clausi     Acartia clausi       Acartia clause sp.     Euclanuse     168.320     Image: Clausi clausi       Eurytemora americana     University     0.164     Image: Clausi clausi       Cartorages c.f. abdominalis     0.164     Image: Clausi clausi     0.024       Calanok copepodites     Image: Clausi clausi     0.024     Image: Clausi clausi       Monstrillidae, unident.     Image: Clausi clausi     Image: Clausi clausi     Image: Clausi clausi       Monstrillidae, unident.     Image: Clausi clausi     Image: Clausi clausi     Image: Clausi clausi     Image: Clausi clausi       Yearthalestris californica     Schappero Image: Clausi clausi     Image: Clausi clausi     Image: Clausi clausi     Image: Clausi clausi       Yearthalestris californica     Schappero Image: Clausi clausi     Image: Clausi clausi     Image: Clausi clausi     Image: Clausi clau								0.012	
Evadre       5.019       4.141       0.579         Podon       Copepoda       0.442         Othona       0.5019       3.187       0.442         Othona       0.copepodite       3.187       0.442         Othona       0.copepodite       3.187       0.442         Othona       0.copepodites       4.141       0.579       0.442         Othona       0.copepodites       3.187       0.442       0.442         Othona       Copepodites       4.141       0.579       0.442         Othona       Oncaea       168.320       0.442         Eurytemora americana       0.164       168.320       0.024         Eurytemora son-ricona       0.164       0.024       0.024         Catanus eurytemora son-ricona       0.164       0.024       0.024         Catanota copepodites       0.064       0.024       0.024         Catanota copepodites wong rani       0.012       0.012       0.012         Cataropacities son       0.516       0.012       0.012								0.012	
Evolution     0.442       Podon     0.442       Corycaeus     0.164       Oncaea     0.442       Unk. cyclopoid     0.200       Cyclopoid copepodites     0.442       Acartia clausi     0.442       Acartia clausi     0.442       Acartia clausi     0.442       Metridia lucens     0.164       Eurytemora afinis     0.164       Eurytemora americana     0.164       Cartropadites     0.164       Cartoraus discaudatus     0.164       Monstillidae, unident.     0.024       Cal. copedites     0.024       Cal. copedites     0.012       Calicolo "A"     0.012       Harpacticoid "C"     0.012       other parasitic copepods     0.516			5 0 19	4.141	0.579			1	
Copepoda       0.442         Corycaeus       0.442         Othona       0.2000         Oncaes       0.184         Unic. cyclopoid       0.442         Cyclopoid copepodites       0.184         Acartia clausi       0.184         Eurytemora sh."coopepodites"       0.184         Eurytemora sh."coopepodites"       0.184         Eurytemora sh."coopepodites"       0.184         Calanus soutus       0.184         Eurytemora sh."coopepodites"       0.024         Calanus soutus       0.024         Eurytemora sh."coopepodites       0.024         Calanus soutus       0.024         Calanus copepodites       0.024         Calanus nasutus       0.024         Calanus copepodites       0.024         Calanus copepodites       0.012         Calanud copepodites       0.012         Calanud copepodites       0.012         Calanud copepodites       0.012         Caligue copepodites       0.012         Caligue copepodites       0.012			0.010						
Corycaeus       0.442         Othona       3.167         Othona       3.167<								1	
Othona       3.187         Oncasea       unk. cyclopoid         Cyclopoid copepodites       Acartia danae         Catanus sp.       Acartia clausi         Acartia danae       Catanus sp.         Catanus sp.       Metridia lucens         Epitablocera longipedata       Eucatanus         Eurytemora affinis       168.320         Eurytemora affinis       0.164         Rhincalanus euryhalinus       0.164         Catanot dicaudatus       0.164         Mostrillidae, unident.       0.024         Calando copepodites       0.024         Calanold copepodites       0.024         Calanot copepodites       0.012         Onstrillidae, unident.       0.012         Harpacticoid %*       0.516								0.442	
unk. cyclopoid Cyclopoid copepodites Acartia clausi Acartia clausi Bellytemora affinis Eurytemora affinis Eurytemora americana Eurytemora ameri					3.187				
Cyclopoid copepodites Acartia clausi Acartia danae Calanus sp. Metridia lucens Epiabidocera longipedata Eurytemora aminicana Eurytemora aminicana Eurytemora aminicana Eurytemora sp. "copepodites" Peeudodiaptomus euryhalinus c.f. Temorites sp. Rhincalanus nasutus Centropages c.f. abdominalis Tortanus discaudatus Monstrillidae, unident. unknown calanoid Calanoid copepodites Cal. copapodites wilong rami Parathalestris californica Schizopero knabeni Zaus spp. Harpacticoid "A" Harpacticoid "C" Caligus other parasitic copepods unknown copepodites Outracoda 0.516									
Acartia clausi Acartia danae Calanus sp. Metridia lucens Epitabidocera longipedata Eurytemora afinis Eurytemora afinis Eurytemora americana Eurytemora americana Costracoda Eurytemora americana Eurytemora americana O.164 168.320 0.164 0.012 0.012									
Acartia danae         Calanus sp.         Metridia lucens         Episbidocera longipedata         Eucatanus         Eurytemora affinis         Eurytemora affinis         Eurytemora sp. "copepodites"         Pseudodiaptomus euryhalinus         c.f. Temorites sp.         Centropages c.f. abdominalis         Tortanus discaudatus         Monstrilidae, unident.         unknown calanold         Cal. copepodites         Cal. copepodites wlong rami         Parathalestris californica         Schizopero knabeni         Zaus spp.         Harpacticold "A"         Harpacticold "C"         Caligus       0.516         Ostracoda       0.516	Cyclopoid copepodites	[		ł					
Calanus sp. Metridia lucens Epilabidocera longipedata Euclaanus Eurytemora affinis Eurytemora affinis Eurytemora americana Eurytemora americana Eurytemora sp. "copepodites" Pseudodiaptomus euryhalinus of. Temorites sp. Rhincalarius nasutus Centropages of. abdominalis Tortenus discaudatus Monstrillidae, unident. unknown calanoid Calanoid copepodites Cal. copepodites wilong rami Parathalestris californica Schizopero knabeni Zaus sp. Harpacticold "A" Harpacticold "C" Caligus other parasitic copepods unknown copepodites O.516		1							
Metridia lucens         Epitabilicoera longipedata         Eucalanus         Eurytemora afinis         Eurytemora americana         Eurytemora sp. "copepodites"         Peeudodiaptomus euryhalinus         c.f. Temorites sp.         Centropages c.f. abdominalis         Tortenus discaudatus         Monstrillidae, unident.         unknown calanold         Calanoid copepodites         Cal, copepodites wilong rami         Parathalestris californica         Schizopero knabeni         Zaus spp.         Harpacticoid "A"         Harpacticoid "C"         Caligus         other parasitic copepods         unknown copepodites         Ostracoids         0.516		1		]				ł	
Epilabidocera longipedata         Eucalanus         Eurytemora affinis         Eurytemora americana         Eurytemora sp. "copepodites"         Pseudodiaptomus euryhalinus         c.f. Temorites sp.         Rhincelarus nasutus         Centropages c.f. abdominalis         Tortanus discaudatus         Monstrillidae, unident.         unknown calanold         Calanold copepodites         Cal, copepodites wilong rami         Parathalestris californica         Schizopero knabeni         Zaus spp.         Harpacticoid "C"         Caligus         other parasitic copepods         unknown copepodites         Ostracoda									
Eurytemora affinis       168.320         Eurytemora americana       0.164         Eurytemora sp. "copepodites"       0.164         Pesudodiaptomus euryhalinus       0.164         C.f. Temorites sp.       0.164         Rhincalarius nasutus       0.164         Centropages c.f. abdominalis       0.024         Tortanus discaudatus       0.024         Monstrillidae, unident.       0.024         Unknown calanold       0.024         Calanold copepodites       0.024         Calanold copepodites       0.024         Calanold copepodites       0.024         Variational copepodites       0.024         Variational copepodites       0.024         Calanoid copepodites       0.024         Calanoid copepodites       0.024         Variational copepodites       0.024         Variation copepodites       0.012         Other parasitic copepods       0.012         Other parasitic copepods       0.516									
Eurytemora americana         Eurytemora anericana         Eurytemora sp. "copepodites"         Pseudodiaptomus euryhalinus         c.f. Temorites sp.         Centropages c.f. abdominalis         Tortanus discaudatus         Monstrillidae, unident.         unknown calanold         Cal. copepodites w/long rami         Parathalestris californica         Schizopero knabeni         Zaus spp.         Harpacticoid "A"         Harpacticoid "S"         Harpacticoid "C"         Caligus         other parasitic copepods         unknown copepods         unknown copepods         unknown copepods         unknown copepods         unknown copepods         unknown copepods         calanol copepods         obstracoda         0.012	Eucalanus								
Eurytemora sp. "copepodites"         Pseudodiaptomus euryhalinus         c.f. Temorites sp.         Rhincalarius nasutus         Centropages c.f. abdominalis         Tortanus discaudatus         Monstrillidae, unident.         unknown calanoid         Cal. copepodites w/long rami         Parathalestris californica         Schizopero knabeni         Zaus spp.         Harpacticoid "A"         Harpacticoid "B"         Harpacticoid "C"         Caigus         other parasitic copepods         unknown copepods         unknown copepods         unknown copepods         unknown copepods         unknown copepods         unknown copepods         calagus         0.516					168.320				
Pseudodiaptomus euryhalinus c.f. Temorites sp.       0.164         Rhincatarus nasutus Centropages c.f. abdominalis Tortanus discaudatus Monstrillidae, unident. unknown calanoid Calanoid copepodites Cal. copepodites wilong rami Parathalestris californica Schizopero knabeni Zaus spp. Harpacticoid "A" Harpacticoid "A" Harpacticoid "B" Harpacticoid "C" Caligus other parasitic copepods unknown copepodites       0.024         0.012       0.012									
c.f. Temorites sp.       0.164         Rhincalarius nasutus       0.012         Centropages c.f. abdominalis       0.014         Tortanus discaudatus       0.024         Monstrillidae, unident.       0.024         Calanold copepodites       0.024         Cal. copepodites wilong rami       0.024         Parathalestris californica       0.024         Schizopero knabeni       2aus spp.         Harpacticoida unident.       Harpacticoida "A"         Harpacticoida "B"       0.012         Other parasitic copepodites       0.012         Ostracoda       0.516									
Ch. Testevice ep.         Rhincalarus nasutus         Centropages c.f. abdominalis         Tortanus discaudatus         Monstrillidae, unident.         unknown calanoid         Calanoid copepodites         Cal. copepodites w/long rami         Parathalestris californica         Schizopero knabeni         Zaus spp.         Harpacticoid "A"         Harpacticoid "B"         Harpacticoid "C"         Caligus         other parasitic copepods         unknown copepodites         Ostracoda         0.516			1	0,164				I .	1 I
Centropages c.f. abdominalis Tortanus discaudatus Monstrillidae, unident. unknown calanoid Calanoid copepodites Cal. copepodites w/long rami Parathalestris californica Schizopero knabeni Zaus spp. Harpacticoida unident. Harpacticoid "A" Harpacticoid "B" Harpacticoid "C" Caligus other parasitic copepods unknown copepodites Ostracoda 0.516					1			· ·	
Tortanus discaudatus       0.024         Monstrillidae, unident.       0.024         Calanoid copepodites       0.024         Calanoid copepodites wilong rami       0.024         Parathalestris californica       0.024         Schizopero knabeni       0.024         Zaus spp.       0.012         Harpacticoid "A"       0.012         Harpacticoid "C"       0.012         Caligus       0.012         other parasitic copepods       0.016         Unknown copepodites       0.0516		l			]				. I
unknown calanold       0.024         Calanold copepodites       0.024         Cal. copepodites wilong rami       2000         Parathalestris californica       2000         Schizopero knabeni       2000         Zaus spp.       1000         Harpacticoid unident.       1000         Harpacticoid "A"       1000         Harpacticoid "B"       1000         Harpacticoid "C"       1000         Caligus       0.012         other parasitic copepodites       0.516	Tortanus discaudatus				1	· ·		]	
Unknown calanoid         Calanoid copepodites         Cal. copepodites w/long rami         Parathalestris californica         Schizopero knabeni         Zaus spp.         Harpacticoida unident.         Harpacticoid "A"         Harpacticoid "B"         Harpacticoid "C"         Caligus         other parasitic copepodites         Ostracoda       0.516			1				l	0.024	
Cal. copepodites w/long rami Parathalestris californica Schizopero knabeni Zaus spp. Harpacticolda unident. Harpacticold "A" Harpacticold "B" Harpacticold "B" Harpacticold "C" Caligus other parasitic copepods unknown copepodites Ostracoda 0.516			1	1				0.024	
Parathalestris californica Schizopero knabeni Zaus spp. Harpacticolda unident. Harpacticold "A" Harpacticold "C" Caligus other parasitic copepods unknown copepodites Ostracoda 0.516			1			ļ			j
Schizopero knabeni         Zaus spp.         Harpacticoida unident.         Harpacticoid "A"         Harpacticoid "B"         Harpacticoid "C"         Caligus         other parasitic copepods         unknown copepodites         Ostracoda         0.516			1			l	1		1 I
Zaus spp. Harpacticoida unident. Harpacticoid "A" Harpacticoid "C" Caligus other parasitic copepods unknown copepodites Ostracoda 0.516			1					[	I
Harpacticolda unident. Harpacticold "A" Harpacticold "B" Harpacticold "C" Caligus other parasitic copepods unknown copepodites Ostracoda 0.516		1	1			l		[	
Harpacticoid "A" Harpacticoid "B" Harpacticoid "C" Caligus other parasitic copepods unknown copepodites Ostracoda 0.516	Harpacticoida unident.		1			I			. I
Harpacticoid "B" Harpacticoid "C" Caligus other parasitic copepods unknown copepodites Ostracoda 0.516			1		l				
Caligus other parasitic copepods unknown copepodites Ostracoda 0.516		1	1				l		
Caligue       other parasitic copepods       unknown copepodites       Ostracoda     0.516			1		l			0.012	
unknown copepodites Ostracoda 0.516			1				l		
Ostracoda 0.516		1	1		[		l		
		0.516	1			l		l	[
	Podocopida		1		0.217	0.021	<u> </u>	L	

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	Sinaded (	Hales, Dar Ch	osed; Unsha		on S-6			
	5-Jul-89	8-Feb-90	10-Mar-90	6-Apr-90	25-May-90	26-Jun-90	27-Jul-90	19-Sep-90
Leptostraca				<u> </u>				
Nebalia pugettensis					1			
Cirripedia					1			
Barnacle nauplil	1	ļ		]	]			
Barnacle cypris Isopoda	0.227							
Sphaeromatidae			0.018	0.217		0.040	0.048	0.018
Idoteidae								
Amphipoda					1	0.000	0.012	0.018
Anisogammarus confervicolus	0.00		0.018	0.072		0,066	0.012	0.010
Corophium Grandidriella japonica	0.547			0.072				
Caprellidae								
Ampeliscidae								
Ampithoidae		1						
Aoridae					]	1		
Atylidae	1					ł		
Hyalidae		1						
Ischyroceridae Photidae		1						
Pleustidae								
Talitridae		[			[		0.012	
unk amphipods		Į			ļ		}	
Cumacea	0.040	l			l			
Mysidacea	0.010	l		0.217		1		0.018
Neomysis mercedis Euphausiacea	1				I	l	l	
Decapoda	1		[		I			
Brachyura								
Cancer antennarius/gracilis(1)	[				l	ſ		
Cancer antennarius stg 2 zoea								
Cancer antennarius stg 3 zoea								•
Cancer productus stg 1 zoea Grapsidae zoea		ļ						
Majidae zoea								
Pinnotheridae zoea								
Xanthidae zoea		]						
Unknown brachyuran zoea	1	1						
Megalopa		1						
Megalopa A Megalopa B		1			[			
Megalopa C					ļ			
Megaiopa D								
very young crab								
Hemigrapsis oregonensis		1						
Hemigrapsus nudus	ł	l			1	ľ		
Pachygrapsus crassipes								
Anomura Anomuran megalopa		}						
Emerita analoga zoea								
Porcellanidae zoea								
Hippidea zoea								
Paguridea zoea					1			
Thalassinidea zoea	1	1						
Callianassidae Caridea								
Crangonidae(zoes and older)					l			
Hippolytidae zoea	1					l		
Caridean zoes and older		1			[	[		
Crangon nigromaculata								
Heptacarpus pictus Heptacarpus taylori	1					l		
Unknown caridean type zoea	1				1	.		
Unknown zoea		l						
Arachnid	0.021							
Pycnogonid								
Halacaridea	0.004		0.036	0.072	0.084	4.294	2.855	
Insect larvae Echinodermata	0.021	1	0.000	0.072	0.004	4.4.04	2.000	
bioinnaria larvae		l						
pluteus larvae	1	1						
Chaetognatha	l	ĺ						
Urochordata	1	1						
Larvacea	1	L	L		L	L	L	
Number of invertebrate taxa	8	1	5	10	2	3	8	3
Total invertebrates per m3	1,342	5.019	4.378	174.476	0,106	4.400	3.416	0.053
Copepoda per m3	0.000	0.000	0.164	171.507	0.000	0.000	0.478	0.000
Decapoda per m3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mycidacea per m3	0.010	0.000	0.000	0.217	0.000	0.000	0.000 2,938	0.018 0.035
Other per m3	1.331	5.019	4.214	2.752	0.106	4.400	4,300	4.444

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Appendix P4. Larval and Juvenile Fish (Numbers per cubic meter) Collected in Half-meter Nets of 505-Micron Mesh in Estero de San Antonio, July 1989 - September 1990. Shaded dates: bar closed; unshaded dates: bar open.

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				Static	on S-2			
····	5-Jui-89	8-Feb-90	10-Mar-90	6-Apr-90	25-May-90	26-Jun-90	27-Jul-90	19-Sep-90
Bay pipefish		ţ						
Bay pipefish larvae								
Gobiidae larvae		]			]			
Arrow Goby		l						
Bay, arrow or yellowfin goby	1							
Tidewater goby								
Topsmelt								
Jack- or topsmelt larvae	1				[ ]			
Northern anchovy larvae								
Pacific Herring larvae					(			
short bellied rock fish	1							
3-Spine Stickleback	1							
3-Spine Stickleback larvae								•
Shiner Surfperch	1	[						
Staghorn sculpin	1							
Surfsmelt larvae	1		0.050	1			·	
Cyprinidae larvae	1							
unknown fish larvae			0.232					
ish eggs								
Clevlandia/Ilypnus/Quietula	(		' l			1		
Osmeridae(yoiksac larvae)	<u> </u>		1					
Number of Vertebrate taxa	0	a	2	0	0	0	0	0
fotal larval and juvenile fish per m3	0.000	0.000	0.282	0.000	0.000	0.000	0.000	0.000

Appendix P4. Larval and Juvenile Fish (Numbers per cubic meter) Collected in Half-meter Nets of 505-Micron Mesh in Estero de San Antonio, July 1989 - September 1990. Shaded dates: bar closed; Unshaded dates: bar open.

					Station S-				
	5-Jul-89	29-Nov-89	8-Feb-90	10-Mar-90	6-Apr-90	25-May-90	26-Jun-90	27-Jul-90	19-Sep-9
Bay pipefish									
Bay pipelish iarvae									
Gobiidae larvae									
Arrow Goby									
Bay, arrow or yellowfin goby									
Tidewater goby									
Topsmelt									
Jack- or topsmelt larvae	0.013761					1			
Northern anchovy larvae							•		
Pacific Herring larvae									
short bellied rock fish									
3-Spine Stickleback									
3-Spine Stickleback larvae									
Shiner Surfperch									
Staghorn sculpin									
Surfsmelt larvae				0.149		1			
Cyprinidae larvae									
unknown fish larvae			0.019				0.012		
fish eggs		0.111							
Cleviandia/Ilypnus/Quietuia						1			
Osmeridae(yolksac iarvae)									
Number of vertebrate taxa	1	1	1	1	0	0	1	0	0
Total larval and juvenile fish per m3	0.014	0.111	0.019	0.149	0.000	0.000	0.012	0.000	0.000

Appendix P4. Larval and Juvenile Fish (Numbers per cubic meter) Collected in Half-meter Nets of 505-Micron Mesh in Estero de San Antonio, July 1989 - September 1990. Shaded dates: bar closed; unshaded dates: bar open.

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	T T				on S-6			
	5-Jui-89	8-Feb-90	10-Mar-90	6-Apr-90	25-May-90	26-JUN-90	27-Jul-90	19-Sep-90
Bay pipelish	0.01032							
Bay pipelish larvae	8							
Gobildae larvae	1			0.145		0.199	0.048	
Arrow Goby	1							i i
Bay, arrow or yellowfin goby	1			0.435	1			
Tidewater goby	1							1.256
Topsmelt	1				1			
Jack- or topsmeit larvae	1		[				1 1	1
Northern anchovy larvae	1							
Pacific Herring larvae								
short bellied rock fish					0.021			
3-Spine Stickleback	0.01032				0.021			
3-Spine Stickleback larvae	]				1			
Shiner Surfperch								
Staghorn sculpin			0.055					
Surfsmelt larvae	0.02064		0.000		1			
Cyprinidae larvae unknown fish larvae	0.02004							
fish eggs	p							
Cleviandia/Ilypnus/Quietula								
Osmeridae(yolksac larvae)								
Number of vertebrate taxa	4	0	1	2	1	1	1	1
Total larval and juvenile fish per m3	0.041	0.000	0.055	0.579	0.021	0.199	0.048	1.256

# NEKTON/EPIBENTHIC INVERTEBRATE APPENDIX

### Appendix E1. Epibenthic and nektonic invertebrates collected in Estero Americano otter trawls, 1988-90 (numbers per tow).

DATE		3	0-Mar-	88			1	3-Apr-l	88			1	6-Jun-6	38		1	2	9-Aug-	88		1	2	5-Oct-8	8	
STATION NUMBER	E-1			E-4	E-5	E-1	E-2	E-3	E-4	E-5	E-1	E-2	E-3	E-4	E-5	E-1	E-2	E-3	E-4	E-5	E-1		E-3		E-5
NUMBER OF TOWS	1	1	0	1	0	2	2	1	1	0	2	1	0	1	0	1	1	1	1	2	1	1	1	1	1
															L						<u> </u>	البحي مناسبته البر			
Mysidacea (mysids)																[									
Archeomysis grebnilskii						1										l					2				
Holmesimysis costata						]																			-
Neomysis mercedis	1	3000		8500		11	xxx	xxx	XXXX				xxdo	24	xxxx			1			l		24		
Neomysis rayi											1														
Caridia (shrimps)											1														1
Crangon alaskensis elongala	1					1					1					5	1				10				
Crangon franciscorum		7		4			27	4			2	1										1	87	6	
Crangon nigricauda*	6	22		•		11	45	•			12					1	4	29	18	2	4	23	86	2	ł
Heptacarpus brevirostris*						1															2				
Heptacarpus carinalus*+											1					1									
Heptacarpus palpator*+											1										1				
Heptacarpus paludicola*+						1					1					1					1				
Heptacarpus pictus*	1																11				1	27	5		
Hippolyte californiensis*																1	3					1	•		
Brachyura (crabs)	1										1						-				1	•			
Cancer antennarias+											1										1				
Cancer anthonyi											1					1									
Cancer gracilis	1								•			2				ł					15			1b	1b
Cancer jordani						1						2									1	4			
Cancer magister (megalopae)												~									1 '	•			
Cancer magister											3	2				5					1 1	4	2	2	1
						1 '					1 "	1				1 ~					1 '	2	-	-	•
Cancer productus	1										1	•										-			
Cancer spp. megalopae (not C. magister)	1																				1				
Carcinus maenas	2	2		6		1		9	76		2	12	xxxx		xxto	1	45	13	92	70	1	20	6	11	7
Hemigrapsis oregonensis	1 4	2		0		1 '	11	э	10		1 4	12				1 '	1	10	1b	10	1	20	•		'
Pugeltia producta* •																1	1		10						
Pugettia richii*	1																				I I				
Megalopae (not Cancer)+	1					1					1					1									
Anomura (hermit crabs)	1															1					1				
Isocheles pilosus						1.					1					1									
Pagurus spp.						1					1					1									
Amphipoda (amphipods)											1					1					1				
Achelia sp.*+						1					1					1					1				
Allorchestes angusta*+						1	-										3				2	14	3		
Ampithoe lacertosa*		. 1				1	20 ∡	1			1			1			3	1			4	14	3		
Anisogammarus confervicolus*				1			4				1														
Atytus tridens*+	1																								
Caprella californica*											1														
Corophium spinicorne, incl. juv.											1										1				
Grandidierella japonica	1																								
isopoda (isopods)	1					1					1					1					1				
Cirolana hartfordi	1					1					1					1					1				
Excirclana sp.+	1					1										1					1	-			
kiotea fewkesi**	1			1		1					3					1					1	1			
Idotea montereyensis**+	1					1					1										1				
idolea resecala**											1														
Pycnogonida (sea spiders)	1										1					1					1				
Pycnogonum stearnsi	I					1					1										1				
Mollusca (molluscs)	1										1					1					1				
Hermissenda crassicornis	1					1					1					1					1				
Lacuna sp. **	1					1					1					1					1				
Nudibranch sp. (?Fiona)	1					1					1					1					1				

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# Appendix E1. Epibenthic and nektonic invertebrates collected in Estero Americano otter trawls, 1988-90 (numbers per tow).

DATE	<b></b>	3	0-Dec-	88			4	7-Feb-	89		· · · · ·		3-Mar-8	9	· · ·	<b></b>		9-Apr-8	89		1		-May-E		
STATION NUMBER	E-1			E-4	E-5	F-1	E-2	E.3	E-4	E-5	E-1				E-5	E-1	E-2	E-3	E-4	4 E-5	E-1	E-2	E-3	E-4	E-5
	1	1	1	$+\frac{1}{1}$	1	1	1	1	1	1	1	1	1	1	11	2	1	1			1	1	1	1	1
NUMBER OF TOWS			<u> </u>	1.1	<u> </u>			· · · ·	L. · · ·		<u> </u>		L	<b>1</b>						_					
	1															1									
Mysidacea (mysids)						2										8									
Archeomysis grebnitskii	8										7					<sup>-</sup>									
Holmesimysis costata		-			•	1			005	43	1 '	11	116				120						4	8500	350
Neomysis mercedis	2	6	35	8000	2			77	925	43	3	1	110				120								•••
Neomysis rayi	1										3	1													
Caridia (shrimps)	1					1					1										45				
Crangon alaskensis elongata	14					1										3					15		40	2	
Crangon franciscorum	1			39	39	1			53			2					1					1	12	2	
Crangon nigricauda*	38	40	2	62		9	23	8	1		2	2	1			2					4			1	
Heptacarpus brevirostris*	1					1 1					1					1									
Heptacarpus carinatus*+						1																			
Heptacarpus palpalor*+						1																			
Heptacarpus paludicola*+	1										1														
		465	10	3		20	42	8			20	1													
Heptacarpus pictus*	1 7	400	10				-747	· ·								1									
Hippolyte californiensis*	1					1					1					1									
Brachyura (crabs)																									
Cancer antennarias+	1										11					1									
Cancer anthonyi	1					1					1.										1				
Cancer gracilis											1														
Cancer jordani		3				1																			
Cancer magister (megalopae)	1																				2	10			
Cancer magister	1	1									1.										1 4	.0			
Cancer productus	1 1										1					1									
Cancer spp. megalopae (not C. magister)						1					1														
Carcinus maenas	1					1																•	40	9	2
Hemigrapsis oregonensis	1 1	32	3	5	7	1 1	8	1	3		1	13		1		3	11				9	3	10	Э	2
Pugettia producta*	2	19									1														
Pugettia richii*	1 1					1 1																			
Megalopae (not Cancer)+											1					1									
Anomura (hermit crabs)																									
Isocheles pilosus						1					1 1														
Pagurus spp.		12				1	5				1										1				
		••				1	-																		
Amphipoda (amphipods)	1										1														
Achelia sp.*+	1					1					1					1									
Allorchestes angusta*+	2	75	10	4			43	7				5	1			1	6				1 1				
Ampithoe lacertosa*	1 4	15	10				-0	•	1	3		•	•			6	11				1 1		1	1	
Anisogammarus confervicolus*									•		1														
Atylus tridens*+																									
Caprella californica*																									
Corophium spinicome, incl. juv.	1					1					1														
Grandidierella japonica	1										1														
isopoda (isopods)	1.																								
Cirolana hartfordi				1																					
Excirolana sp.+																1.					3				
Idotea fewkesi**	3	3									1					1					3				
Idotea monterevensis**+	1																								
idotea resecata**						I	1	1																	
Pycnogonida (sea spiders)						1										1									
Pycnogonum stearnsi											1					I					1				
Mollusca (molluscs)						1					1					1									
											1														
Hermissenda crassicomis		300	m l																						
Lacuna sp.**		300				1					1					1					1				
Nudibranch sp. (?Fiona)																									

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#### Appendix E1. Epibenthic and nektonic invertebrates collected in Estero Americano otter trawls, 1988-90 (numbers per tow).

and the second secon

DATE			8-Jun-	89			1	6-Jul-8	9			19	-Sep-E	9		[	21	B-Nov-E	9			7	-Feb-90	)	
STATION NUMBER	E-1			E-4	E-5	E-1	E-2	E-3	E-4	E-5	E-1	E-2		E-4	E-5	E-1			E-4	E-5	E-1	E-2		E-4	E-5
NUMBER OF TOWS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mysidacea (mysids) Archeomysis grebnitskii Holmesimysis costata Neomysis mercedis				900	19			200	1700	700				800	8		3	16	1760	2825	2 3	13	214	1	1
Neomysis rayi						ŀ															5		3		
Caridia (shrimps)	l										1														
Crangon alaskensis elongata	12					1					9					18		••			1				
Crangon franciscorum			10						4			•	~	1		3	1	80	14	5			9		
Crangon nigricauda*	11					1					23 8	8	2		2	70 31	27 5	124	11		57 1	192	2		
Heptacarpus brevirostris* Heptacarpus carinatus*+											l °	2				31	Э								
Heptacarpus cannatus + Heptacarpus palpator*+											1														
Heptacarpus paludicola*+	1					1																			
Heptacarpus pictus*	1										8	15					16				1	217			
Hippolyte californiensis*	1					1					ľ						1				·				
Brachyura (crabs)																[	•								
Cancer antennarias+											1					1b					1				
Cancer anthonyi																									
Cancer gracilis						1										[	1,1b				1				
Cancer jordani	1					11					2					1					1				
Cancer magister (megalopae)		~					-				Ι.					Ι.					Ι.				
Cancer magister	7	3				5	6				4					4		2b	1,1b		1	1		1	
Cancer productus						1					3					1									
Cancer spp. megalopae (not C. magister) Carcinus maenas		1b																							
Hemigrapsis oregonensis	1	1	62	7	10	6	31	107	229	101	11	78	274	188	27	3	10	5	11	5		7		9	
Pugettia producta*	3	•	~~	•		l i	•••		~~~		10	1		100		Ĩ		Ŭ	••	•		•		•	
Pugettia richii*	<b>1</b>			1		1					2	i				1					1				
Megalopae (not Cancer)+											1							1			1	1	1		
Anomura (hermit crabs)	1										1										1				
isocheles pilosus											1					l									
Pagurus spp.											2										1	6			
Amphipoda (amphipods)											1					[									
Achelia sp.*+											l														
Allorchestes angusta*+											[	•				1	40				1				
Ampithoe lacertosa* Anisogammarus confervicolus*			.1			1	20 100		1		3	8				1	12		3		1	23 17	15	35	3
Ansoganmarus comervicorus Atylus tridens*+	1		. 1				100		1		3					1			3		4	17	15	30	3
Caprella californica*						1					2										1				
Corophium spinicome, incl. juv.						1					1 1					1					1	1	5	1	
Grandidierella japonica																					1	•	1	•	
Isopoda (isopods)						1																	•		
Cirolana hartfordi	1 .										1	2		1											
Excirolana sp.+						1					1														
ldotea fewkesi**	1					1					1					1	1				2	1			1
Idolea montereyensis**+	1					1					1					1			1		1				
idolea resecala**	1					1					3	7		1		1	1				1				
Pycnogonida (sea spiders)	1					1					1					1					1				
Pycnogonum stearnsi	1					1					1					1					1				
Mollusca (molluscs)						1																			
Hermissenda crassicornis	1					1					1					1					1				
Lacuna sp.**	1.					1					1						•				1				
Nudibranch sp. (?Fiona)	11					11						1				1	8				1				

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## Appendix E1. Epibenthic and nektonic invertebrates collected in Estero Americano otter trawis, 1988-90 (numbers per tow).

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DATE	T		9-Mar-	0		<b></b>		5-Apr-1	<u> </u>				4-May-	<u>an</u>		<b>-</b>	2	5-Jun-	<u>an</u>		1		6-Jul-9	<u> </u>	
STATION NUMBER	F.1			ĨE-4	E-5	F.1			ĨE4	ES	E.1			E-4	E.S	E.1				E-5	E-1 1		E-3		E.5
NUMBER OF TOWS	1	1	17	1	1	1	1	1		1	1	1	1	1	1	1		1	1	$\frac{1}{1}$		1	1	1	
HUMBER OF TOWS	+	1		1 1		<u> </u>	L	L		<u> </u>			1	1	<u> </u>	<u> '</u>			<u> </u>	<u> </u>	<u> </u>				<u> </u>
Mysidacea (mysids)	1																				1				
Archeomysis grebnitskii	1															1					1				
Holmesimysis costata	1					ł															1				
Neomysis mercedis	1	91	1550	32	1		183	170	144	1270	i	7	1	825	4				125			5	225	2	120
Neomysis nerceuis Neomysis rayi	1	31	1550	JL	•	1	100		144	1210			•	025	-				12.5		1	5	223	4	120
Caridia (shrimps)	1															1					1				
	1					1										1					4				
Crangon alaskensis elongala	1		23			1					1			9		1'			4		1 7	1		7	
Crangon franciscorum	24	95	23			31	31				18	1		9		9	-		-		12	2		4	
Crangon nigricauda*	24	90				5	31				10					1					2	4			
Heptacarpus brevirostris*						5					1					1 '									
Heptacarpus carinatus*+	1					1															יו				
Heplacarpus palpator*+																1									
Heptacarpus paludicola*+	1											-				1						•			
Heptacarpus pictus*	14	17	1			83	44			1	2	5				1	1				2	3	1		
Hippolyte californiensis*	1					1										1									
Brachyura (crabs)	1										l														
Cancer antennarias+	1										15					1					1				
Cancer anthonyi											1											-			
Cancer gracilis						1										1						2			
Cancer jordani	1					3					1										2				
Cancer magister (megalopae)	1																				1				
Cancer magister	36	1b				2					1	2b				1	1,2b								
Cancer productus	1	2b				1	4				1					1,13	10b				3,15	3b			
Cancer spp. megalopae (not C. magister)	1										1														
Carcinus maenas	1										1										1				
Hemigrapsis oregonensis	1	9	1	14	2	1	43		1	3		16	26,20	23,2b	55	1	- 4	38	58	7	3	40	202,5	94	- 33
Pugettia producta*	1					7					3					27	1			1	5	2			
Pugettia richii*						1 1					1 1					3								1	
Megalopae (not Cancer)+						1					1														
Anomura (hermit crabs)	1					1					1														
Isocheles pilosus	1															1									
Pagurus spp.	1					2										1									
Amphipoda (amphipods)						1																			
Achelia sp.*+																1									
Allorchestes angusta*+											1					1					1				
Ampilhoe lacertosa*	1	1				1	2					1				1 1							1		
Anisogammarus confervicolus*	1	1	1	2	5	1	37			1	1	1				1									
Atylus tridens*+						1 1	3				1					1					1				
Caprella californica*											1					1					1				
Corophium spinicorne, incl. juv.	1			5	8	1				1		1	2		1				>20	0					
Grandidierella japonica		1					2																		
isopoda (isopods)											1														
Cirolana hartfordi						1					1														
Excirolana sp.+	· ·					1							1		1	1									
idotea fewkesi**						1					1 1		-		-	1 1					1				1
Idotea montereyensis**+						1					1					1									•
klotee resecata**						1					1					1					1				1
Pycnogonida (sea spiders)	1					1															1.				•
											1					1									
Pycnogonum steamsi	1					1					1					1									
Mollusca (molluscs)						1					1														
Hermissenda crassicornis						1					1					8					1				
Lacuna sp.**	1					1					1														
Nudibranch sp. (?Fiona)						1					1					11					<u> </u>				

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Appendix E1. Epibenthic and nektonic invertebrates collected in Estero Americano otter trawls, 1968-90 (numbers per tow).

STATION NUMBER	E-1	E-2	8-Sep-9	E-4	E-5	
NUMBER OF TOWS	1	1	1	1	1	
Musidaeaa (musida)						*ofte
Mysidacea (mysids)						**pr
Archeomysis grebnitskii						8 8
Holmesimysis costata			~	600		b a
Neomysis mercedis	1		60	500	85	
Neomysis rayi						
Caridia (shrimps)						
Crangon alaskensis elongata	1					
Crangon franciscorum		•		1	4	
Crangon nigricauda*	28	9	18	4	7	
Heptacarpus brevirostris*	13					
Heptacarpus carinatus*+	6					
Heptacarpus palpator*+	2	-				
Heptacarpus paludicola*+		2				
Heptacarpus pictus*	5	54			1	
Hippolyte californiensis*						
Brachyura (crabs)						
Cancer antennarias+	1					
Cancer anthonyi						
Cancer gracilis		4,1b				
Cancer jordani	4	2				
Cancer magister (megalopae)						
Cancer magister		1				
Cancer productus	1	5,13b				
Cancer spp. megalopae (not C. magister)						
Carcinus maenas						
Hamigrapsis oregonensis			17,25	37	30	
Pugettia producta*	27,26					
Pugettia richii*	2					
Megalopae (not Cancer)+						
Anomura (hermit crabs)						
Isocheles pilosus						
Pagurus spp.						
Amphipoda (amphipods)						
Achelia sp.*+						
Allorchestes angusta*+						
Ampithoe lacertosa*	6	50		4		
Anisogammarus confervicolus*	1		•			
Atylus tridens*+						l
Caprella californica*	4	1	_		1	Į
Corophium spinicorne, incl. juv.	1	1	3			l
Grandidierella japonica	1					1
isopoda (isopods)	1					
Cirolana hartfordi	1					1
Excirclana sp.+	1		3	1		
Idolea fewkesi**	1					I
Idotea montereyensis**+						
Idotea resecata**	1					
Pycnogonida (sea spiders)	1					
Pycnogonum stearnsi	1					
Mollusca (molluscs)						I
Hermissenda crassicomis						
Lacuna sp. **	1					1
Nudibranch sp. (?Fiona)	1	5				1

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associated with macrophytes arily associated with macrophytes undances estimated from drop nets undances estimated from gill nets

DATE	L		r of Dates C		-
STATION NUMBER	E-1	E-2	E-3	E-4	E-5
NUMBER OF DATES SAMPLED	21	21	19	. 21	18
Mysidacea (mysids)					
Archeomysis grebnitskii	6				
Holmesimysis costata	3			1	
Neomysis mercedis	5	11	16	17	14
Neomysis nevi	2	1	1	14	1-4
Caridia (shrimps)	1 *	•	•		
Crangon alaskensis elongata	16	1			
Crangon franciscorum	2	10	7	12	3
Crangon nigricauda*	20	16	9	7	3
Heptacarpus brevirostris*	11	2	3	1	3
Heptacarpus carinalus*+	2	4			
• · · · · • • · · · · · · · · · · · · ·	1				
Heptacarpus palpator*+ Heptacarpus paludičola*+	1 .	1			
	10	14	5	1	2
Heptacarpus pictus*	10	3	5	1	2
Hippolyte californiensis*	1	3			
Brachyura (crabs)	4				
Cancer antennarias+	1 .				
Cancer anthonyi		-			
Cancer gracilis	2	4		1	1
Cancer jordani	9	4			
Cancer magister (megalopae)	1		_	_	
Cancer magister	14	11	2	3	1
Cancer productus	9	7			
Cancer spp. megalopae (not C. magister)	1				
Carcinus maenas		1			
Hemigrapsis oregonensis	15	21	16	19	15
Pugettia producta*	10	5		1	1
Pugettia richii*	8	1		2	
Megelopae (not Cancer)+		1	2		
Anomura (hermit crabs)					
isocheles pilosus	2				
Pagurus spp.	4	3			
Amphipoda (amphipods)					
Achelia sp.*+	1				
Allorchestes angusta*+	1				
Ampithoe lacertosa*	6	16	7	3	
Anisogammarus confervicolus*	5	7	4	7	4
Atylus tridens*+	2	1			
Caprella californica*	2	1			1
Corophium spinicorne, incl. juv.		3	3	3	3
Grandidiereila japonica		2	1	-	-
sopoda (isopods)		-	•		
Cirolana hartlordi		1		2	
Excirclana sp.+			2	1	1
lootea fewkesi**	10	3	-	1	2
Idotea montereyensis**+		•		1	-
idotea resecala**	3	3	1	1	1
Pycnogonida (sea spiders)	-	-	•	•	••
Pycnogonum steamsi	1				
Mollusca (malluscs)	•				
Hermissenda crassicomis	2				
Lacuna sp.**	4	1			
	3	3			
Nudibranch sp. (?Fiona)	J	3			
NUMBER OF SPECIES	35	30	14	18	14
	-53	. 19 1	14	18	

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### Appendix E3. Epibenthic and nektonic invertebrates collected in Estero De San Antonio otter trawls, 1989-90 (numbers per tow).

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DATE	1	6-Jul-89	•	1	8-Sep-	89	1	3-Feb-S	NO	1	0-Mar-9	90		4-Apr-9			5-May-9			6-Jun-9			?-Jul-9			9-Sep-9	
STATION NUMBER	S-2	S-4	S-6	<b>S-2</b>	S-4	S-6	S-2	S-4	<b>S-6</b>	S-2	S-4	S-6	S-2	S-4	S-6	S-2	S-4	S-6	<b>S-2</b>	S-4	<u>S-6</u>	S-2	5-4	S-6	<u>S-2</u>	S-4	<u>S-6</u>
NUMBER OF TOWS	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
NUMBER OF TOWS Mysidacea (mysids) Neomysis mercedis Caridia (shrimps) Crangon franciscorum Heptacarpus pictus* Brachyura (crabs) Cancer jordani Carcer magister Hemigrapsis oregonensis Amphipoda (amphipods) Anisogammarus confervicolus* Corophium spinicorne, incl. juv. Isopoda (isopods) Gnormosphaeroma sp. Insecta Corixidae Cencocrixa blaisdelli Coriselta inscripta	6 4 1	0	4 44	1	<u> </u>	1	1 2 11 1	235	9	1 >100 8 2	1	1 1 9 2	1 5 5 37	1 235 5	1	1 3500 1 1,5b 6 6		2	1 110 2b 1 >200	1 26 5 2 1	1 6 5	1 100 5 >1000	60 0 220	6		10 1500	1 4 5 1
Coleoptera Tropisternus sp. larva Diptera Chironomid larvae Chironomid pupae																					1					1	

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STATION NUMBER NUMBER OF DATES SAMPLED Mysidacea (mysids) Neomysis mercedis Cendia (shrimps)	<u>\$-2</u> 9 8	<u>\$-4</u> 7	S-6 9
Mysidacea (mysids) Neomysis mercedis Caridia (shrimpe)		5	
Neomysis mercedis Caridia (shrimps)	8	5	
Caridia (shrimps)	8	5	
			5
Crangon franciscorum	1		
Heptacarpus pictus*	2		
Brachyura (crabs)			
Cancer jordani	1		
Cancer magister	2		
Hemigrapsis oregonensis	3		
Amphipoda (amphipods)			
Anisogammarus confervicolus*	6	4	5
Corophium spinicorne, incl. juv.	7	4	1
isopoda (isopods)			
Gnormosphaeroma sp.	1	1	2
Insecta			
Corixidae			
Cenocorixa blaisdelli			2 2
Corisella inscripta		1	2
Coleoptera			
Tropistemus sp. larva	1		1
Diptera			
Chironomid larvae		1	
Chironomid pupae	<u> </u>		1
NUMBER OF SPECIES	8	6	8

# **BENTHIC INVERTEBRATE APPENDIX**

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DATE			13-A	or-88				2	1-Jul-8	8			20	5-Oct-8	8	
DATE STATION NUMBER	E-1	E-2	E-3	E-4	E-5	E-6	E-2	E-3	E-4	E-5	E-6	E-2		E-4	E-5	E-6
		<u> </u>	ns		ns			ا م ت سنت م		ns					ns	ns
Cnidaria																
unidentified Anthozoa							1									
unidentified Pennatulacea*																I
																I
Platyhelminthes unidentified Turbellaria																
Nematoda				2												
unidentified Nematoda				•												
Nemertea	7	1											1			
unidentified Nemertea	1															
Annelida		2		36					112		6					
Oligochaeta		4		~		2115		2	••=		-	1	2	14		
unidentified Oligochaeta						2110		4				,	-			
Polychaeta																
Ameana occidentalis							1					2	1			
Armandia brevis		13					2					1	•			
Axiothella rubrocincta												1	-			
Capitella capitata complex		6					I	~					5 53			
Capitellidae A		10					l	2				2	33			
Capitellidae B																
Capitellidae, unidentified												1				
Chaetozone setosa							2									
Chone ecaudata							11					3				
Chone mollis*																
Cirriformia spirabrancha*																
Cistenides californiensis												2				
Dorvilez rudolphi							l I									
Eteone nr. californica		2											3			
Euchone limnicola*		-														
	[															
Eumida spp.		4					1					6				
Glycinde polygnatha		-														
Gyptis brevipalpa*							1					1				
Hemipodus borealis .																
Hesionura spp.	89						}									
Heteromastus filobranchus*	1						1									
Heteromastus sp.*		-					1									
Leitoscoloplos elongatus	[	2					1									
Lumbrineris spp.								•				3				
Mediomastus californiensis		26					5	2				3				
Microphthalmus nr. sczelkowii*	1						1					1				
Neanthes limnicola	1			1												
Nephtys caecoides	1	9					4									
Nephtys cornuta franciscana							1									
Nephtys spp. juv												l				
Nereis sp.							1					[				
Nereidae								1				1				
Notomastus tenius	1											1				
Owenia collaris	1											1				
Pectinaria californiensis*	1						1									
	1	6					1					1				
Phyliodoce hartmanae	1	2					1					4				
Platynereis bicanaliculata	l						1						•			
Polydora bracycephala		2					1					1				
Polydora ligni							1					1				
Polydora socialis	1	1					1'					1				
Polydora spp.	1	1						100	1			6	317	•		
Pseudopolydora kempi	1	7					4	129	1			12	1			
Pseudopolydora paucibranchiata	1	4					12					1 12	60			
Pygospio elegans	1											1				
Scolopios sp.*	1						1					1				
Spiophanes missionensis	1										~	1	63	107		
Streblospio benedicti	1	212		- 84			189	162	1260		2	191	83	487		

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DATE	r	13.4	pr-88			1	2	1-Jul-	38			2	3-Oct-88	
DATE STATION NUMBER	E-1 E-		E-4	E-5	E-6	E-2		E-4		E-6	E-2	E-3		E-6
Arthropoda														
Crustacea	1													
Allorchestes angusta	ł											-		
Ampelisca abdita	4					4	1				615	7	142	
Ampithoe valida														
Ampithoe lacertosa*														
Ampithoe spp.						1					1			
Anisogammarus confervicolus														
Anisogammarus spp.														
Aoroides columbiae*											1			1
Atylus tridens	1					3								
Caprella californica			~~~		1	7	196	2			35	426	1	
Corophium spinicorne, incl. juv.	36		281			2	190	4			13	31	•	
Curnella vulgaris	1					11					45	8		
Grandidierella japonica	1					l ''					``	•		
Exosphaeroma sp.*								2		1				
Harpacticoid copepoda						1		~		•		1		
Hemigrapsis oregonensis						Ι'					1	•		
Hemigrapsis oregonensis megalopae											1			
Hemigrapsis sp. juvenile	1					1								
Heptacarpus paludicola*														
idotea resecata Leptochelia dubia*	1													
Mysidacea Nebalia pugettensis*	1					1								
Neomysis mercedis						[								
Neomysis spp.						1					[			
Ostracoda (?Cylindroleberis spp.)						1	1	3					4	
Pagurus sp.*						1					1			
unidentified Amphipoda juveniles														
unidentified Isopoda*	1													
unidentified brachyuran megalopae*	1					1								
insecta					<b></b> .									
Chironomus sp. larvae					51									
Mollusca														
Axinopsida serricata*											1			
Clinocardium nuttalii						5					1 '			
Composomyax subdiaphana?*						1					2			
Cryptomya californica	1	l									1 -			
Lacuna marmorata*											1			
Lyonsia californica						1					1 '			
Macoma balthica	.	2				1								
Macoma nasuta	1 '	5				1								
Macoma yoldiformis*	1					2					18	1		
Macoma spp. juv.	1					1					1			
Mactra spp. Musculista senhousia	1	1										2		
Musculista serindusia Mya arenaria*		•				1					1			
Mysella tumida						1					1			
Mysena tantida Mytilus edulis*	1					1					1			
Mytilus spp. juveniles	1					1					1	1		
Odostomia sp.*	1					1								
Protothaca staminea						1					3.			
Sphenia fragilis						3					1			
Tellina modesta	1					1					11			1
Tapes japonica	1					Ι.					11			
unidentified Bivalvia		3				2					1		•	1
unidentified Gastropoda	1					1						1		
unidentified Tellinidae						1						1		
Phoronida	1										20			ł
Phoronis spp.	1					20					20			ł
Phoronopsis sp.*						1								
Echinodermata	1					1								1
unidentified Holothuroidea	1					<u> </u>					4			

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0475	r	2	)-Jan-8	0	T		4-Ma	v-89			[		1	3-Sep-8	9	
DATE				E-5 E-6	5.2	E-2A	F.3	E-3A	F-4	E-5	F-2	E-2A	E-3	E-3A	E-4	E-5 E-6
STATION NUMBER	E-2	E-3	E-4	E-3   E-0	<u> </u>	E-27	6.0	L-04		<u> </u>						The second s
	i i				1											
Cnidaria					l											
unidentified Anthozoa	1				[											
unidentified Pennatulacea*	1				1											
Platyhelminthes	1				1						_					
unidentified Turbellaria	l				1						2	1				
Nematoda	1				1											
unidentified Nematoda			2		1						3			11		
Nemertea			-		1											
unidentified Nemertea					ł											
	ł															
Annelida	1															
Oligochaeta			• •			~	04	40	60	245			8	375	4	4
unidentified Oligochaeta	1	13	24	149	3	2	91	10	68	245			0	5/5	7	•
Polychaeta																
Ameana occidentalis	1											_				
Armandia brevis	9	2			1						1	8	1			
Axiothella rubrocincta	5	1														
	Ĭ	•			1							63	4	229		
Capitella capitata complex	1 '	167			1						ļ			20		
Capitellidae A	2	101			1	4	19	3								
Capitellidae B	4				1	1		5			I					
Capitellidae, unidentified					1	1					1					
Chaetozone setosa	1				1						l '					
Chone ecaudata	7															
Chone mollis*																
Cirriformia spirabrancha*											1					
Cistenides californiensis	10															
Dorvillea rudolphi											1 1					
Eteone nr. californica	1	6									[	1		2		
		•			1											
Euchone limnicola*											1					
Eumida spp.	1				1						7					
Glycinde polygnatha	5										'					
Gyptis brevipalpa*																
Hemipodus borealis	1				1	1										
Hesionura spp.	1				1						1					
Heteromastus filobranchus*					1						1					
Heteromastus sp.*											1					
	1				1											
Leitoscolopios elongatus	1															
Lumbrineris spp.					9	1					5	2				
Mediomastus californiensis	6				l °	•					1	-				
Microphthalmus nr. sczelkowii*					1								1			
Neanthes limnicola					1								•			
Nephtys caecoides																
Nephtys comuta franciscana	1				1						1					
Nephtys spp. juv	1				1						1					
Nereis sp.	1										1					
Nereidae	1				1						1					
	1		-		1						1	ъ.				
Notomastus tenius	1				1						1					
Owenia collaris	1				1						1					
Pectinaria californiensis*	1.				1						1					
Phyliodoce hartmanae	2				1						1		. 1			
Platynereis bicanaliculata	11				1.						1 '		••			
Polydora bracycephala	1				1						1			3		
Polydora ligni	1				1						]			3		
Polydora socialis	1				1						1					
Polydora spp.	1				1						1					1
	2	184			1						1	10		11		
Pseudopolydora kempi	2	2			1						1					
Pseudopolydora paucibranchiata	1 4				1						1		1			
Pygospio elegans	1	103			1						1					
Scolopios sp.*											I					
Spiophanes missionensis	1				1.	405			-		10	372	42	147	118	3
Streblospio benedicti	326	174	634	998	4	105			37			312	-74		1.19	

.

DATE     2       STATION NUMBER     E-2       Arthropoda       Crustacea       Allorchestes angusta       Ampelisca abdita       Ampithoe valida       Ampithoe spb.       Anisogammarus confervicolus       Anisogammarus spp.	0-Jan-6	<u>5</u> -5 [ E-6	E-2	<u>E-2A</u> 7 2	4-Ma E-3	E-3A	E-4	E-5	E-2	E-2A	E-3	E-3A	E-4 ]	E-5   E-6
Arthropoda Crustacea Allorchestes angusta Ampelisca abdita Ampithoe valida Ampithoe lacertosa* Ampithoe spp. Anisogammarus confervicolus				7			المنستتي				2			, <u></u>
Crustacea Allorchestes angusta Ampelisca abdita 1801 2 Ampithoe valida Ampithoe lacertosa* Ampithoe spp. Anisogammarus confervicolus	16		37		1				5	•		1		
Allorchestes angusta Ampelisca abdita Ampithoe valida Ampithoe spc. Anisogammarus confervicolus	16		37		1				5	•		1		
Ampelisca abdita 1801 2 Ampithoe valida Ampithoe lacertosa* Ampithoe spp. Anisogammarus confervicolus	16		37		1				5	~		1		
Ampithoe valida Ampithoe lacertosa* Ampithoe spp. Anisogammarus confervicolus									-	~				
Ampithoe lacertosa* Ampithoe spp. Anisogammarus confervicolus				•						2	3			
Ampithoe spp. Anisogammarus confervicolus				•										
Anisogammarus confervicolus			[						2	3	4			
				2	2	1				5	8		1	
Ansogeniniarus spp.			4	4	15	1				2	9			
Aproides columbiae*														
Atylus tridens			1											
Caprella californica									4					
Corophium spinicorne, incl. juv. 20 131	70	31	386	203	2416	83	142	54	14	21	118	188	14	21
Cumella vulgaris 41 118			7	1							14	13		
Grandidierella japonica 52			7	7		1		1	9	16	9	8		
Exosphaeroma sp.*														
Harpacticoid copepoda			1									1		
Hemigrapsis oregonensis	2		1			5								•
Hemigrapsis oregonensis megalopae	-		ł						1		1			
Hemigrapsis sp. juvenile								:						
Heptacarpus paludicola*														
Idotea resecata									2	1				
Leptochelia dubia*														
Mysidacea							1							
Nebalia pugettensis*			1											
Neomysis mercedis			ļ											
Neomysis spp.								2						
Ostracoda (?Cylindroleberis spp.)					299			1				197		
Pagurus sp.* unidentified Amphipoda juveniles														
unidentified Isopoda* unidentified brachyuran megalopae*														
Insecta								TBI						
Chironomus sp. larvae Mollusca														•
Axinopsida serricata*														
Clinocardium nuttalii			1											
Composomyax subdiaphana?* Cryptomya californica 3			1											
			1											
Lacuna marmorata*			1											
			ł	1										
			3	•					ł					
			Ĩ						1					
Macoma yoldiformis* Macoma spo, juy. 4			I						41	5		1		
in the second seco			1						1					
the star opp			1						1					
			1						ſ					
Mya arenaria*			1						1					
Mysella turnida			1											
Mytilus edulis* Mytilus sno inveniles 1			2						2					
I mittee opp. Jarrennee			1											
Odostomia sp.* Protothaca staminea 6			ļ						3	•				
			1						1					
Sphenia fragilis Tellina modesta 8			1						6					
Tapes japonica 1			1											
unidentified Bivalvia			1											
			ł											
unidentified Gastropoda			1						1					
			1											
Phoronida Phoronis son 1			1											
i merene opp			1						1					
Phoronopsis sp.*			1						1					
Echinodermata			1						1					
unidentified Holothuroidea 1			1											

Appendix B1. Benthic invertebrates collected in Estero Americano PONAR grabs, 1988-90. (numbers per grab; to obtain no./ m²,multiply by 43.3)

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DATE	T		8-Fe	b-90			<b>F</b>		25-M	ay-90			Γ			19-S	ep-90			
STATION NUMBER	E-2	E-2A			E-4	E-5	E-2	E-2A	E-3	E-3A	E-4	E-5	E-1	E-2	E-2A	E-28	E-3	E-3A	E-4	E-5
				A					A-12-0-10-111-0	<b></b>										
Cnidaria																				
unidentified Anthozoa	1						8													
unidentified Pennatulacea*							-									1				
Platyhelminthes							1													
unidentified Turbellaria																				
Nematoda																				
unidentified Nematoda						5					1			4						
Nemertea	1					•					•									
unidentified Nemertea	2	1					1	1		1				2		1				
Annelida	1 4	,						•		•				-						
Oligochaeta																				
			40	25	54	478		2	2	34	84	188			1		9	2	10	33
unidentified Oligochaeta		•	40	23		4/0		•	•		•••				•		•			
Polychaeta	1																			
Ameana occidentalis		•					1							16		9				
Armandia brevis	1	2					5	3	•					8		Ũ				
Axiothella rubrocincta	20	5					1 3	3						•		1				
Capitella capitata complex									2							•				
Capitellidae A							I	12	4						2					
Capitellidae B							1	12		•					2					
Capitellidae, unidentified																				
Chaetozone setosa	5						8													
Chone ecaudata							9							52						
Chone mollis*														<b>5</b> 2						
Cirriformia spirabrancha*	1							1												
Cistenides californiensis	1													-						
Dorvillea rudolphi	4							1						2	-					
Eteone nr. californica					1		3			1					4	1				
Euchone limnicola*														6						
Eumida spp.	1						1													
Glycinde polygnatha	1	5					2	3						4		1				
Gyptis brevipalpa*	1																			
Hemipodus borealis									_											
Hesionura spo.									•											
Heteromastus filobranchus*							1							2						
Heteromastus sp.*	1		1														1			
Leitoscolopios elongatus	1		•				7													
Lumbrineris spp.							1													
Mediomastus californiensis	105	9		4			263	28	4	1			1	46		5		15		
	105	ų.		•			1		•											
Microphthalmus nr. sczelkowii*							1 '													
Neanthes limnicola													3	1	3	6				
Nephtys caecoides							3						ľ	•	-	-				
Nephtys cornuta franciscana	3																			
Nephtys spp. juv	1										1	1		2						
Nereis sp.	1						[					•		4						
Nereidae					1	1	1 ·													
Notomastus tenius							1 .						l	2						
Owenia collaris	2						3							4						
Pectinaria californiensis*							1							1						
Phyllodoce hartmanae	l													4		3				
Platynereis bicanaliculata	1												I			3				
Polydora bracycephala																				
Polydora ligni	1						l							•						
Polydora socialis	I						1							2						
Polydora spp.	1						1						l						•	
Pseudopolydora kempi	1			4			2	2	20	23	1			_	20	19	10	1	2	
Pseudopolydora paucibranchiata							22	1						6	1	1				
Pygospio elegans	1		2	15				47		2						2				
Scolopios sp.*	2						ł													
Spiophanes missionensis	1						I	1								1				
Streblospio benedicti	10	51	26	123	927	995	57	9	43	81	251	75	1	34	134	121	56	47	454	602
OUCDINGHO DELICUIOU	1	<u> </u>																		

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(a) + 20	r		8-Fe	h.90					25-M	ay-90						19-Se	p-90			
DATE STATION NUMBER	E 2	E-2A	E.3	E-3A	F.4	E-5	<b>F-2</b>	E-2A	E-3	E-3A	E-4	E-5	E-1	E-2	E-2A	E-2B	E-3	E-3A	E-4	E-5
	<u> </u>	16-271	<u> </u>			<u> </u>														
Arthropoda	1																			
Crustacea			1	1												74				1
Allorchestes angusta		1	ſ	•			28	18	14	9				1092			2	1		ł
Ampelisca abdita	3	1					20	10		1										
Ampithoe valida										•						153				1
Ampithoe lacertosa*																100				
Ampithoe spp.																				
Anisogammarus confervicolus						2			1											
Anisogammarus spp.			4		1				4			1								1
Aoroides columbiae*		1																		
Atvius tridens																				
Caprella californica													1							
Corophium spinicorne, incl. juv.	1	125	539	230	28	44	21	435	51	268	20	92	1	648	333	1	39	10	1	
Cumella vulgaris	1	69	47	36			67	15	1	38				4	3	1	1			
		3	39	10			3	18	55	28				26	14	37		2		·
Grandidierella japonica	1	5		1			•		••											
Exosphaeroma sp.*											1	2								
Harpacticoid copepoda	i i										•	-			2	42		7		l
Hemigrapsis oregonensis		1													*	-14		•		
Hemigrapsis oregonensis megalopae	1						i i						l	2						
Hemigrapsis sp. juvenile	I								1				1	2		1				
Heptacarpus paludicola*	I															1				1
Idotea resecata	1												I							
Leptochelia dubia*							1													
Mysidacea	I												1	-						
Nebalia pugettensis*														2		122				
Neomysis mercedis													1							
											2	1								
Neomysis spp.		2		5	4		5			31	9					1		1	4	1
Ostracoda (?Cylindroleberis spp.)		2		5	•		ľ			••	•					2				
Pagurus sp.*																-				
unidentified Amphipoda juveniles	]									t			l							
unidentified isopoda*	1									1			l			1				
unidentified brachyuran megalopae*	[												1			1				
Insecta	1						<b>.</b> .													
Chironomus sp. larvae													[							
Moliusca							i –													
Axinopsida serricata*	1												ţ	2						
Clinocardium nuttalii	1												1							
Composomyax subdiaphana?*																				
	1 '						1							2						
Cryptomya californica	1															8				•
Lacuna marmorata*													1	2		-				
Lyonsia californica		1											[	2						
Macoma balthica								1					1	2		9		1		
Macoma nasuta	2						ł	1					1	2				•		
Macoma yoldiformis*	1			-			1						2	4	1	2				
Macoma spp. juv.	47	5		3			15						1 4		•	4				
Mactra spp.	1						1						1							
Musculista senhousia	1						1 1						1							
Mya arenaria*	1						1						ł	-	1					
Mysella tumida	2						1						1	6						
Mytilus edulis*	1						1		1				1							
Mytilus spp. juveniles	1	2					7						1 1	6						
	2	1					1						1							
Odostomia sp.*	14	2					9	1					1	10	·	4				
Protothaca staminea	1 "	2					Ī	•					1							
Sphenia fragilis	1 ~						5						1							
Tellina modesta	2						ľ						1							
Tapes japonica	1						Į						1							
unidentified Bivalvia	1						1						1							
unidentified Gastropoda	1						Ι.													
unidentified Tellinidae	2						4													
Phoronida	1						1						1							
Phoronis spp.	2						1							10		-				
Phoronopsis sp.*	1						1						17	4		5				
Echinodermata	1						1						1							
	1						1						1							
unidentified Holothuroidea							J						· · · · · · · · · · · · · · · · · · ·							

DATE		3-Feb-9	0	2	5-May-	90		9-Sep-9	90
STATION NUMBER	\$-2	S-4	S-6	<u>S-2</u>	S-4	S-6	<u>S-2</u>	S-4	S-6
Nematoda	1,	2	2		2		7	5	
Nemertea			-	1	-		7	-	
Annelida	1			1					
Oligochaeta	2	189	11	161	165	1	394	883	
Polychaeta			-						
Capitella capitata complex	8	11		173	8	1			
Cirriformia spirabrancha	2						1		
Dorvillea rudolphi		1							
Glycinde polygnatha	1 1								
Polydora ligni				5				124	
Pseudopolydora paucibranchiata					1				
Strebiospio benedicti	31	143	3	104	136		284	141	
Eumida sp.	1								
Mysidacea (mysids)				1					
Neomysis mercedis, incl. juv.				3					
Amphipoda (amphipods)									
Anisogammarus contervicolus, incl. juv.				60	27		44	55	
Corophium spinicorne, incl. juv.				328	158	2	447	906	14
Grandidierella japonica						1			
Isopoda (isopods)									
Gnormosphaeroma ?luteum, incl. juv.							42	56	3
Harpacticoida								5	
Ostracoda	1	17	46		8		45	7	31
Insecta									
Diptera									
Aedes sp. larvae			1			1			
Chironomid Iarvae							1	2	
Mollusca									
Mya arenaria	1			1			20		
Margarites sp.	1 1								

## FISH APPENDIX

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			Station		
DATE	E-1	E-2	E-3	E-4	E-5
28 Nov 89	4	4	4	4	4
7 Feb 90	2	4	4	4	2
9 Mar 90	4	4	4	4	2
5 Apr 90	4	4	4	4	3
24 May 90	4	4	2.7	4	2
25 Jun 90	4	4	4	4	2
26 Jul 90	4	4	4	4	2
18 Sep 90	4	4	4	4	2

Appendix F2. Gillnet Sampling Effort (24-hour Sets) Estero Americano, November 1989 - September 1990.

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		Station		
E-1	E-2	E-3	E-4	E-5
29 Nov 89				
8 Feb 90				
10 Mar 90				
6 Apr 90				
25 May 90				
26 Jun 90				
27 Jul 90				
19 Sep 90				

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		· · · · · · · · · · · · · · · · · · ·	Station			T	% of
Species	E-1	E-2	E-3	E-4	E-5	Total	Total
Plainfin midshipman			2	3133	594	3729	67.57
Staghorn sculpin	27	31	98	233	337	726	13.15
Arrow goby		8	35	324	133	500	9.06
Shiner surfperch		9	55	22	44	130	2.36
Topsmelt				5	89	94	1.70
Northern anchovy		1	7	38	25	71	1.29
Threespine stickleback			9	1	50	60	1.09
English sole	24	16	2	4	3	49	0.89
unk. smelt		25		3	1	29	0.53
Surfsmelt			21	4		25	0.45
Bay pipefish	6	5	1	2	4	18	0.33
Osmeridae			4	10		14	0.25
Goby larvae		4	2	3	3	12	0.22
Cabezon	8	1				9	0.16
Pacific herring			9			9	0.16
Pacific sanddab	5				2	7	0.13
Penpoint gunnel	5	1				6	0.11
Speckled sanddab	5	1				6	0.11
Starry flounder	1	1	2	1		5	0.09
Tidewater goby				1	3	4	0.07
Crevice kelpfish	2 2		1		ĺ	3	0.05
Kelp greenling	2				-	2	0.04
larval flatfish		2				2	0.04
unk. Cottid	2					2	0.04
unk. sculpin	2 2 1					2	0.04
Barred surfperch	1					1	0.02
Cheekspot goby			1			1	0.02
Lingcod	1					1	0.02
Prickly sculpin				1		1	0.02
unk. juv. rockfish					1	1	0.02
Total	91	105	249	3785	1289	5519	100.00

Appendix F4. Otter Trawl Catch (all Species) at Estero Americano Stations, November 1989 - September 1990.

- 383 ES-

			Station						
Date	E-1	E-2	E-3	E-4	E-5	Total			
28 Nov 89	7	7	3	5	9	31			
7 Feb 90	10	14	62	23	6	115			
9 Mar 90	4	5	51	46	10	116			
5 Apr 90	10	14	16	83	92	215			
24 May 90	15	21	25	143	313	517			
25 Jun 90	33	9	31	257	. 33	363			
26 Jul 90	2	7	34	902	221	1166			
18 Sep 90	10	28	27	2326	605	2996			
Total	91	105	249	3785	1289	5519			

Appendix F5. Total Catch in Gillnets at Estero Americano Stations, November 1989 - September 1990.

			Station				% of
Species	E-1	E-2	E-3	E-4	E-5	Total	Total
Topsmelt	89	7	35	86	98	315	54.03
Jacksmelt	37	49	3			89	15.27
Shiner surfperch	8	9	3 3 3	5	36	61	10.46
Staghorn sculpin	4	19	3	1	15	42	7.20
Pacific herring	14	6		5	8	33	5.66
Surfsmelt	2	8	1	1		12	2.06
Leopard shark		9				9	1.54
Bay pipefish			3	2		5	0.86
Opaleye	2	1				3	0.51
Spiny dogfish	2					2	0.34
Steelhead		2				2	0.34
Striped bass		1		1		2	0.34
Buffalo sculpin	1					1	0.17
English sole			1			1	0.17
Kelp surfperch	1					1	0.17
Pacific sanddab	1					1	0.17
Pile surfperch	1					1	0.17
Starry flounder			1			1	0.17
White surfperch	1					1	0.17
Black surfperch	1					1	0.17
Total	164	111	50	101	157	583	100.00

Appendix F6. Gillnet Catch (All Species) at Estero Americano Stations, November 1989 - September 1990.

			Sta	tion		
	E-1	E-2	E-3	E-4	E-5	Total
29 Nov 89	10	9		5	12	36
8 Feb 90	1	2				3
10 Mar 90	11	19	2	3		35
6 Apr 90	20	49	14	3	7	93
25 May 90	89	Į	28	34	97	248
26 Jun 90	27	16		49	40	132
27 Jul 90	2	2	3	6		13
19 Sep 90	4	14	3	1	1	23
Total	164	111	50	101	157	583

		Tow		Total		Fork Len	gth (mm)	Weig	ht (g)
Station	Date	Length	Name	Catch	CPE	mean	SD	mean	SD
		<u> </u>							
E-1	27 Nov 89	4	Speckled sanddab	5	1.3	84.8	16.3	7.4	4.0
-E-1	27 Nov 89	4	unk. Cottid	2	0.5	58.0	4.2	2.9	0.6
E-1	6 Feb 90	2	Cabezon	1	0.5	48.0		2.0	
E-1	6 Feb 90	2	English sole	9	4.5	53.4	15.8	54.0	1.0
E-1	8 Mar 90	4	Cabezon	1	0.3	44.0		1.3	
E-1	8 Mar 90	4	English sole	3	0.8	25.0	3.6	0.1	0.0
E-1	4 Apr 90	4	Bay pipefish	3	0.8	156.0	41.4	1.1	0.7
E-1	4 Apr 90	4	Cabezon	3	0.8	53.0	2.6	2.1	0.4
E-1	4 Apr 90	4	English sole	3	0.8	22.0	1.0	0.2	0.0
E-1	4 Apr 90	4	Penpoint gunnel	1	0.3	47.0		0.4	
E-1	23 May 90	4	Cabezon	3	0.8	87.7	15.5	17.8	1.0
E-1	23 May 90	4	English sole	5	1.3	50.4	23.5	2.4	2.1
E-1	23 May 90	4	Pacific sanddab	3	0.8	65.0	9.2	2.7	1.1
E-1	23 May 90	4	Penpoint gunnel	1	0.3	81.0		2.2	
E-1	23 May 90	4	Staghom sculpin	3	0.8	90.3	4.9	7.8	1.4
E-1	23 May 90	4	Starry flounder	1	0.3	225.0		175.0	
	20 may 00		orany nounder	<u> </u>					
E-1	24 Jun 90	4	English sole	3	0.8	84.0	5.6	5.9	1.4
E-1	24 Jun 90	4	Kelp greenling	2	0.5	72.0	18.4	4.3	4.0
E-1	24 Jun 90	4	Lingcod	1	0.3	111.0		7.5	
E-1	24 Jun 90	4	Penpoint gunnel	1	0.3	194.0		29.2	
E-1	24 Jun 90	4	Staghorn sculpin	1	0.3	101.0		2.1	
E-1	24 Jun 90	4	unk. sculpin	2	0.5	33.0	15.6		
		<u> </u>							
E-1	25 Jul 90	4	Barred surfperch	1	0.3	69.0		5.1	
E-1	25 Jul 90	4	English sole	1	0.3	67.0		2.8	
	20 00/ 00								
E-1	17 Sep 90	4	Bay pipefish	3	0.8	231.3	55.6	4.4	2.4
E-1	17 Sep 90	4	Crevice kelpfish	2	0.5	48.5	27.6	1.4	1.6
E-1	17 Sep 90	4	Pacific sanddab	2	0.5	85.5	7.8	7.1	0.8
E-1	17 Sep 90	4	Penpoint gunnel	3	0.8	93.3	20.2	3.4	2.0
<b>1</b>		7	· vipour gamior	¥	~.~	~~.~			
E-2	27 Nov 89	4	Arrow goby	5	1.3	27.8	2.5.	0.1	0.0
E-2	27 Nov 89	4	larval flatfish	2	0.5	20.0	0.0	<0.1	0.0
		• •							
E-2	6 Feb 90	4	Bay pipefish	3	0.8	275.0	5.0		
E-2	6 Feb 90	4	English sole	6	1.5	38.7	9.7	0.7	0.5
E-2	6 Feb 90	4	Speckled sanddab	1	0.3	73.0		3.9	
E-2	6 Feb 90	4	Staghorn sculpin	4	1.0	24.5	5.4	0.2	0.1
		<u>т</u>	-industry combin	•					
E-2	8 Mar 90	4	English sole	4	1.0	45.0		1.1	
E-2 E-2	8 Mar 90	4	Staghorn sculpin	1	0.3	40.0 50.0	12.3	1.0	0.8
L-2			oragnom soupm	1			1 au , V	+ + +#	
E-2	4 Apr 90	4	Cabezon	1	0.3	42.0		1.5	
E-2 E-2	4 Apr 90 4 Apr 90	4	English sole	5	1.3	42.0 49.0	0.9	1.5	0.9
E-2 E-2	4 Apr 90 4 Apr 90	4	Staghorn sculpin	8	2.0	49.0 58.3	12.2	2.5	1.5
<u> </u>	- vhi 20	*	otaynom souipin	<u>0</u>	£U	00.0	1 44 . 44		

Appendix F7. Summary of Fish Catch Data in Estero Americano Otter Trawis, November 1989 - September 1990

Appendix F7.	Summary of Fish Catch Data in Estero Americano Otter Trawls, November 1989 - September
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		Tow		Total		Fork Len	gth (mm)	and the second	ht (g)
Station	Date	Length	Name	Catch	CPE	mean	SD	mean	SD
E-2	23 May 90	4	Arrow goby	1	0.3	37.0		0.2	
E-2	23 May 90	4	Bay pipefish	1	0.3	150.0		1.3	
E-2	23 May 90	4	English sole	1	0.3	43.0		0.9	
E-2	23 May 90	4	Northern anchovy	1	0.3	56.0		1.0	
E-2	23 May 90	4	Staghom sculpin	16	4.0	81.6	9,6	5.7	1.9
E-2	23 May 90	4	Starry flounder	1	0.3	280.0		350.0	
E-2	24 Jun 90	4	Shiner surfperch	8	2.0	96.6	8.5	19.8	7.1
E-2	24 Jun 90	4	Staghorn sculpin	1	0.3	100.0			
E-2	25 Jul 90	4	Bay pipefish	1	0.3	240.0			
E-2	25 Jul 90	4	Goby larvae	4	1.0				
E-2	25 Jul 90	4	Penpoint gunnel	1	0.3	82.0		2.2	
E-2	25 Jul 90	4	Staghom sculpin	1	0.3	81.0			
E-2	17 Sep 90	4	Arrow goby	2	0.5	31.0	7.1	0.3	0.1
E-2	17 Sep 90	4	Shiner surfperch	1	0.3	68.0		6.6	
<u>E-2</u>	17 Sep 90	4	unk. Smelt	25	6.3	49.6	9.6	0.7	0.3
		·····							
E-3	27 Nov 89	4	Arrow goby	1	0.3	31.0	<b>—</b> .	0.3	
E-3	27 Nov 89	4	Surf Smelt	2	0.5	116.0	7.1	12.5	3.2
			A						
E-3	6 Feb 90	4	Arrow goby	11	2.8	30.3	8.0		
E-3	6 Feb 90	4	English sole	1	0.3	22.0			<.1
E-3	6 Feb 90	4	Staghorn sculpin	50	12.5	22.3	4.1	0.1	0.1
<b>E</b> 0	0 Mar 00		Arrowenbu	~~~~~	0.5	27.5	2.1	0.2	0.1
E-3	8 Mar 90	4	Arrow goby Osmeridae	2		27.5	2.1	0.2	0.1
E-3	8 Mar 90	4		4	1.0	106.0		17.6	
E-3	8 Mar 90	4	Shiner surfperch	1	0.3	31.5	7.8	0.4	0.3
E-3	8 Mar 90	4	Staghorn sculpin	27	6.8		1.0	400.0	0.5
E-3	8 Mar 90	4	Starry flounder	1	0.3	295.0	2.0	400.0	0.1
E-3	8 Mar 90	4	Surfsmelt	16	4.0	46.3	3.0	0.5	0.1
<b>F</b> 0	4 4 00		Caslich asis	4	0.2	56.0		2.0	
E-3	4 Apr 90	4	English sole	1	0.3	56.0 22.0		<b>2</b> .0	
E-3	4 Apr 90	4	Goby larvae Pacific herring	2	0.5 1.3	22.0 36.7			
E-3	4 Apr 90	4	-	5 5	1.3	30.7 48.0	15.3	1.6	1.7
E-3 E-3	4 Apr 90 4 Apr 90	4 4	Staghorn sculpin Surfsmelt	3	0.8	48.0 53.7	3.8	1.0	1.1
C•J	+ vhi an	4	Sunamen	<u> </u>	0.0	<u> </u>	0.0		
E-3	24 May 90	2.67	Arrow goby	2	0.7	54.0	0.0		
E-3	24 May 90 24 May 90	2.67	Bay pipefish	1	0.4	210.0	9.9	3.8	
E-3	24 May 90 24 May 90	2.67	Cheekspot goby	1	0.4	35.0		0.3	
E-3	24 May 90 24 May 90	2.67	Staghorn sculpin	12	4.5	82.4	16.2	7.0	4.9
E-3 E-3	-	2.67	Threespine stickleback	9	4.5 3.4	36.2	10.2	0.6	0.5
<u> </u>	24 May 90	2.01	Inceshine Suckienack	3	<u>.</u>	30.2	10.0		
E-3	24 Jun 90	4	Crevice kelpfish	1	0.3	35.0			
E-3 E-3	24 Jun 90 24 Jun 90	4	Northern anchovy	7	1.8	41.7	4.5		
E-3	24 Jun 90 24 Jun 90	4	Pacific herring	2	0.5	45.0	·····		
E-3	24 Jun 90 24 Jun 90	4	Shiner surfperch	17	4.3	72.3	25.0		
E-3	24 Jun 90 24 Jun 90	4	Staghorn sculpin	4	1.0	89.0	10.2		
<u> </u>	27 JUII 80	*	oragnom sculpin	<b></b>	1.0		:		

				550					
[	1	Tow	T	Total	T	Fork Len	gth (mm)	Weig	ht (g)
Station	Date	Length	Name	Catch	CPE	mean	SD	mean	SD
E-3	25 Jul 90	4	Arrow goby	10	2.5	23.9	2.4	0.1	0.0
E-3	25 Jul 90	4	Pacific herring	1	0.3	50.0		1.0	
E-3	25 Jul 90	4	Plainfin midshipman	2	0.5	29.0	8.5	0.4	0.4
E-3	25 Jul 90	4	Shiner surfperch	21	5.3	67.4	10.1	•	
E-3	17 Sep 90	4	Агтоw goby	9	2.3	30.4	4.6	0.2	0.0
E-3	17 Sep 90	4	Pacific herring	1	0.3	58.0		1.9	
E-3	17 Sep 90	4	Shiner surfperch	16	4.0	75.8	6.8	8.3	2.3
E-3	17 Sep 90	4	Starry flounder	1	0.3	365.0		650.0	
E-4	27 Nov 89	4	Arrow goby	2	0.5	24.5	2.1	0.1	0.0
E-4	27 Nov 89	4	unk. smelt	3	0.8	55.3	1.5	0.7	0.1
E-4	6 Feb 90	4	Prickly sculpin	1	. 0.3	145.0		53.4	
E-4	6 Feb 90	4	Staghorn sculpin	20	5.0	30.2	12.6	0.5	0.8
E-4	6 Feb 90	4	Tidewater goby	1	0.3	44.0		0.8	
E-4	6 Feb 90	4	Topsmelt	1	0.3	89.0		4.5	
			5						
E-4	8 Mar 90	4	Staghorn sculpin	42	10.5	42.0	10.3		
E-4	8 Mar 90	4	Surfsmelt	3	0.8	70.7	34.1	3.9	5.5
E-4	4 Apr 90	4	English sole	4	1.0	59.5	11.6	2.3	1.3
E-4	4 Apr 90	4	Goby larvae	3	0.8	25.0			
E-4	4 Apr 90	4	Osmeridae	10	2.5				
E-4	4 Apr 90	4	Shiner surfperch	5	1.3	111.2	19.8	29.6	18.6
E-4	4 Apr 90	4	Staghom sculpin	61	15.3	64.8	8.9		
									_
E-4	23 May 90	4	Northern anchovy	34	8.5	52.2	10.2	1.2	0.7
E-4	23 May 90	4	Shiner surfperch	15	3.8	84.5	36.5	18.0	15.7
<u>E-4</u>	23 May 90	4	Staghorn sculpin	94	23.5	81.5	8.7		
E-4	24 Jun 90	4	Arrow goby	187	46.8	26.3	5.4		
E-4	24 Jun 90	4	Plainfin midshipman	53	13.3	22.5	3.0		
E-4	24 Jun 90	4	Staghorn sculpin	14	3.5	97.0	8.5		
E-4	24 Jun 90	4	Threespine stickleback	1	0.3	49.0			
E-4	24 Jun 90	4	Topsmelt	2	0.5	43.0			
	AF 1.1.44	A	A	405	00.0	05.4			
E-4	25 Jul 90	4	Arrow goby	135	33.8	25.1	4.6	04	0.0
E-4	25 Jul 90	4	Bay pipefish	2	0.5	71.0	2.8	0.1	0.0
E-4	25 Jul 90	4	Plainfin midshipman	760	190.0	34.8	11.6	OF	
E-4	25 Jul 90	4	Shiner surfperch	1	0.3	103.0	e 7	25.6	
E-4	25 Jul 90	4	Staghorn sculpin	2	0.5	112.0	5.7		
E-4	25 Jul 90	4	Topsmelt	2	0.5	46.0	0.0		
							A		·····
	17 Sep 90	4	Northern anchovy	4	1.0	49.0	1.4		
	17 Sep 90		Plainfin midshipman	2320	580.0	38.6	6.7	40.0	
	17 Sep 90		Shiner surfperch	1	0.3	87.0		13.6	
E-4	17 Sep 90	4	Starry flounder	1	0.3	130.0		29.3	

Appendix F7.	Summary of Fish Catch Data in Estero Americano Otter Trawls, November 1989 - September
	1990

<b></b>		Tow		Total	[	Fork Len	gth (mm)	Weig	ht (g)
Station	Date	Length	Name	Catch	CPE	mean	SD	mean	SD
<u> </u>	0410	Longas		1	L.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
E-5	27 Nov 89	4	Arrow goby	3	0.8	22.3	0.0		
E-5	27 Nov 89	4	Goby larvae	3	0.8	33.7	1.2		
E-5	27 Nov 89	4	Plainfin midshipman	1	0.3	33.0		0.4	
E-5	27 Nov 89	4	unk. juv. rockfish	1	0.3	21.0		<0.1	
E-5	27 Nov 89	4	unk. smelt	1	0.3				
E-5	6 Feb 90	2	Staghorn sculpin	3	1.5	22.7	0.0		
E-5	6 Feb 90	2	Tidewater goby	3	1.5	49.3	0.1		
<b></b>									
E-5	8 Mar 90	2	Staghorn sculpin	10	5.0	41.9	8.3	0.9	0.6
E-5	4 Apr 90	3	Northern anchovy	23	7.7	40.0			
E-5	4 Apr 90	3	Pacific sanddab	1	0.3	63.0		2.5	
E-5	4 Apr 90	. 3	Shiner surfperch	8	2.7	117.5	10.8	33.7	9.6
E-5	4 Apr 90	3	Staghorn sculpin	57	19.0	59.7	9.7		
E-5	4 Apr 90	3	Threespine stickleback	3	1.0	42.0	10.1	0.6	0.4
E-5	23 May 90	2	Bay pipefish	4	2.0	191.5	19.1	3.3	1.1
E-5	23 May 90	2	English sole	3	1.5	46.3	10.0	1.1	0.7
E-5	23 May 90	2	Northern anchovy	2	1.0	37.0			
E-5	23 May 90	2	Pacific sanddab	1	0.5	68.0		3.3	
E-5	23 May 90	2	Shiner surfperch	36	18.0	99.4	27.8	25.3	13.5
E-5	23 May 90	2	Staghorn sculpin	263	131.5	81.2	9.9	6.8	
E-5	23 May 90	2	Threespine stickleback	4	2.0	56.5	2.4	1.9	0.3
E-5	24 Jun 90	2	Arrow goby	3	1.5	19.7	4.0		
E-5	24 Jun 90	2	Threespine stickleback	29	14.5	33.9	7.5		
E-5	24 Jun 90	2	Topsmelt	1	0.5	32.0			
				0.1	40.0	04.0	5.0		
E-5	26 Jul 90	2	Arrow goby	84	42.0	21.6	5.0		
E-5	26 Jul 90	2	Plainfin midshipman	35	17.5	31.1	9.5 7 7	0.0	0.5
E-5	26 Jul 90	2	Threespine stickleback	14	7.0	41.9 57.6	7.7	0.9	0.5
E-5	26 Jul 90	2	Topsmelt	88	44.0	57.6	11.1		
				10	04.5		4.0		
E-5	17 Sep 90	2	Arrow goby	43	21.5	21.3	4.0	07	
E-5	17 Sep 90	2	Plainfin midshipman	558	279.0	35.6	7.5	0.7	
E-5	17 Sep 90	2	Staghorn sculpin	4	2.0	126.0	12.0		

Appendix F7. Summary of Fish Catch Data in Estero Americano Otter Trawls, November 1989 - September 1990

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# Appendix F8. Summary of Fish Catch Data in Estero Americano 24-hour Gillnet Sets, November 1989 - September 1990

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	· · · · ·	1	Total	Fork Leng	th (mm)	Weigl	nt (a)
Chatlan	Data	Name	Catch	mean	SD	mean	SD
Station	Date	inallie	Catch	inean		intouri	
EI	29 Nov 90	Staahom couloin	1	155.0		42.3	
E-1	28 Nov 89	Staghom sculpin	9	123.7	31.5	27.6	18.1
E-1	28 Nov 89	Topsmelt	<u> </u>	123.1	31.5	21.0	10.1
r	7 7 4 00	D. Cala andala		290.0		530.0	
E-1	7 Feb 90	Buffalo sculpin	1	290.0			
E-1	9 Mar 90	Jacksmelt	1	305.0		269.7	
E-1	9 Mar 90	Pacific herring	9	172.8	17.3	69.7	4.7
E-1	9 Mar 90	Surfsmelt	1	142.0		21.6	
	9 Mai 90	Surismen		( 74			
E-1	5 Apr 90	Jacksmelt	17	194.5	54.0	93.2	8.3
E-1	5 Apr 90	Pacific herring	2	185.0	<b>U</b> 1. <b>U</b>	90.4	••••
E-1	•	Shiner surfperch	1	138.0		••••	
	5 Apr 90	Similer Surperch	1	100.0			
E-1	24 May 00	Jacksmelt	3	201.0	5.0	78.9	8.2
E-1 E-1	24 May 90		1	305.0	0.0	774.7	
E-1 E-1	24 May 90	Opaleye Shiner surfperch	5	149.8	42.1	149.8	18.6
E-1	24 May 90	Staghorn sculpin	2	128.5	29.0	26.8	18.2
	24 May 90	Surfsmelt	1	155.0	23.0	24.5	
E-1	24 May 90		76	192.9	23.5	64.2	19.8
E-1	24 May 90	Topsmelt	10	192.9	20.0	20.0	10.0
E-1	24 May 90	White surfperch	1	112.0		20.0	
	05 hun 00	Jacksmelt	15	225.8	23.6	88.8	40.4
E-1	25 Jun 90			310.0	20.0	00.0	70.7
E-1	25 Jun 90	Opaleye Daaliin haariga	1	176.0	13.9	68.0	21.1
E-1	25 Jun 90	Pacific herring	3		13.9	00.0	£1.1
E-1	25 Jun 90	Pile surfperch	1	128.0		24.4	
E-1	25 Jun 90	Shiner surfperch	1	109.0	0.0	24.4 975.0	35.4
E-1	25 Jun 90	Spiny dogfish	2	670.0	0.0	975.0	35.4
E-1	25 Jun 90	Staghom sculpin	24	106.3	70		
<u>E-1</u>	25 Jun 90	Topsmelt	4	198.0	7.8		
			4	293.0		652.0	
E-1	26 Jul 90	Black surfperch	1	293.0 71.0		6.0	
<u>E-1</u>	26 Jul 90	Kelp surfperch	1	/1.0		0.0	
64	40.000.00	laskomalt		292.0		216.2	1
E-1	18 Sep 90	Jacksmelt	1	292.0 79.0		6.8	
E-1	18 Sep 90	Pacific sanddab	1			0.0	
E-1	18 Sep 90	Shiner surfperch	1	109.0		38.6	
E-1	18 Sep 90	Staghorn sculpin	1	152.0	•	30.0	
	00 11 00	Olashan naulain		150 4	8.8	52.9	11.8
E-2	28 Nov 89	Staghorn sculpin	1	159.1	0.0	52.9 880.0	
E-2	28 Nov 89	Steelhead	1	420.0		77.3	
E-2	28 Nov 89	Topsmelt	1	197.0		11.3	J
E 0	7 500 00	Decific bering	4	171.0			
E-2	7 Feb 90	Pacific herring	1 4	177.0			
E-2	7 Feb 90	Staghorn sculpin	1	177.0			
<b>E</b> 0	0 1405 00	laskamalt	15	248.7	19.9	127.7	30.2
E-2	9 Mar 90	Jacksmelt Decide begins		240.7 155.0	13.3	48.4	00.2
E-2	9 Mar 90	Pacific herring	2			40.4 2106.0	
E-2	9 Mar 90	Steelhead	1	583.0			
E-2	9 Mar 90	Topsmelt	1	211.0		85.8	

#### Appendix F8. Summary of Fish Catch Data in Estero Americano 24-hour Gillnet Sets, November 1989 -September 1990

	- <u>1</u> r			Produt	ath (	Mair	ght (g)
	_		Total	Sector Se	gth (mm)	and the second secon	SD
Station	Date	Name	Catch	mean	SD	mean	
					47.0	109.4	31.0
E-2	5 Apr 90	Jacksmelt	28	238.3	17.8	109.4	51.0
E-2	5 Apr 90	Opaleye	1	~220		50.4	40.0
E-2	5 Apr 90	Pacific herring	3	165.0	40.7	59.1	42.2
E-2	5 Apr 90	Shiner surfperch	1	117.0		28.4	
E-2	5 Apr 90	Staghorn sculpin	4	184.3	7.5	79.4	15.8
E-2	5 Apr 90	Striped bass	1	597.0		2700.0	
E-2	5 Apr 90	Surfsmelt	7	146.7	10.4	22.6	4.9
E-2	5 Apr 90	Topsmelt	4	201.7	8.1	67.8	15.2
E-2	24 May 90	no catch					
E-2	25 Jun 90	Jacksmelt	6	247.4	30.1	93.3	14.9
E-2	25 Jun 90	Leopard shark	2	520.0			
E-2	25 Jun 90	Shiner surfperch	3	107.0	11.3	21.0	0.1
E-2	25 Jun 90	Staghorn sculpin	3	130.0	36.8		
E-2	25 Jun 90	Surfsmelt	1	135.0	••••	25.0	
E-2	25 Jun 90	Topsmelt	1	124.0			
<u> </u>	20 001 90	Topomen	•	127.0			
E-2	26 Jul 90	Staghom sculpin	2	141.0			
E*2	20 Jul 90	Stagnorn Scuipin	<u></u>	141.0			
<b>F</b> 0	40.0++ 00	Lessed abort		<u> </u>	136.2	4766 7	1050.4
E-2	18 Sep 90	Leopard shark	7	604.3		1766.7	
E-2	18 Sep 90	Shiner surfperch	5	95.0	23.1	17.8	10.9
E-2	18 Sep 90	Staghorn sculpin	2	122.0			
E-3	00 May 80	no catch					
<u>E-3</u>	28 Nov 89	no catch					
E-3	7 Feb 90	no catch					
<u> </u>	1160 30						
E-3	9 Mar 90	Surfsmelt	1				
			4				
<u>E-3</u>	9 Mar 90	Topsmelt					
<b>E A</b>	5 4 00		4	200.0			
E-3	5 Apr 90	English sole	1	300.0	0.5	60 7	
E-3	5 Apr 90	Jacksmelt	3	193.0	9.5	62.7	6.8
E-3	5 Apr 90	Topsmelt	10	194.2	10.1	72.1	11.0
					10.0	E 0	
E-3	24 May 90	Bay pipefish	3	213.0	40.8	5.0	3.4
E-3	24 May 90	Shiner surfperch	3	127.0	<b>5.7</b> .	50.1	10.9
<u>E-3</u>	24 May 90	Topsmelt	22	200.0			
E-3	25 Jun 90	Plainfin midshipman	1	140.0		34.2	
<u>E-3</u>	25 Jun 90	Topsmelt	20	153.5	33.9		]
E-3	26 Jul 90	Staghorn sculpin	1				
E-3	26 Jul 90	Topsmelt	2				
E-3	18 Sep 90	Staghorn sculpin	2				
E-3	18 Sep 90	Starry flounder	1	115.0			
E-4	28 Nov 89	Pacific herring	5	185.0	9.9	74.7	11.5
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#### Appendix F8. Summary of Fish Catch Data in Estero Americano 24-hour Gillnet Sets, November 1989 -September 1990

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	Т	·····	Total	Fork Len	gth (mm)	Weig	iht (g)
Station	Date	Name	Catch	mean	SD	mean	SD
	M P AA						
E-4	7 Feb 90	no catch					
E-4	9 Mar 90	Shiner surfperch	2	148.0		58.3	
E-4	9 Mar 90	Surfsmelt	1	138.0		22.8	
tan T		Guildinon		100.0			
E-4	5 Apr 90	Shiner surfperch	2	108.0		19.8	
E-4	5 Apr 90	Topsmelt	1	203.0		71.2	
E-4	24 May 90	Bay pipefish	2	185.0	12.7	3.4	0.4
E-4	24 May 90	Shiner surfperch	5	114.5	13.4	33.1	12.6
E-4	24 May 90	Staghom sculpin	1	96.0 206.0		9.4 244 1	
E-4	24 May 90	Striped bass	1	306.0	00.5	344.1 60.2	26.1
<u>E-4</u>	24 May 90	Topsmelt	30	180.0	30.5	00.2	20.1
E-4	25 Jun 90	Topsmelt	49	146.0	27.8	71.8	10.5
E-4	26 Jul 90	Topsmelt	6	165.4	43.3		
E-4	18 Sep 90	Shiner surfperch	1	115.0			
E-5	28 Nov 89	Pacific herring	5	177.6	14.7	81.7	23.4
E-5	28 Nov 89	Staghorn sculpin	7	150.7	8.3	44.4	8.1
E-5	7 Feb 90	no catch					
E-5	9 Mar 90	no catch					
E-5	5 Apr 90	Shiner surfperch	7	118.9	12.9	34.5	10.4
-			_				
E-5	24 May 90	Pacific herring	3	114.0	0.4	17.7	• •
E-5	24 May 90	Shiner surfperch	29	112.6	8.1	29.6	8.8
E-5	24 May 90	Staghorn sculpin	7 59	94.0 159.7	7.7	8.3 38.6	1.3 26.1
E-5	24 May 90	Topsmelt	58	158.7	32.3	30.0	20.1
E-5	25 Jun 90	Topsmelt	40	139.9	25.1		
E-5	26 Jul 90	no catch					
				407.0			
E-5	18 Sep 90	Staghorn sculpin	1	127.0			

Appendix F9. Otter Trawl Sampling Effort (Minutes), Estero de San Antonio, February - September 1990

table latter i to the

	Station					
Date	<b>S-2</b>	S-4	S-6			
8 Feb 90	2.0	4.0	1.3			
10 Mar 90	4.0	2.0	2.0			
5 Apr 90	2.0	2.0	2.0			
25 May 90	2.0	2.0	2.0			
26 Jun 90	2.0	2.0	2.0			
27 Jul 90	2.0	2.0	2.0			
19 Sep 90	2.0	2.0	1.5			

Appendix F10. Gillnet Sampling Effort (24-hour Sets), Estero de San Antonio, February - September 1990

STATES -

Station								
S-2	S-4	S-6						
	8 Feb 90	8 Feb 90						
10 Mar 90	10 Mar 90	10 Mar 90						
5 Apr 90	5 Apr 90	5 Apr 90						
25 May 90	25 May 90	25 May 90						
26 Jun 90	26 Jun 90	26 Jun 90						
27 Jul 90	27 Jul 90	27 Jul 90						
19 Sep 90	19 Sep 90	19 Sep 90						

Appendix F11. Total Catch in Otter Trawls at Estero de San Antonio, February - September 1990

1. 200 P.S. 1. 1.

		Station			% of
Species	S-2	S-4	S-6	Total	Total
Threespine stickleback	110	117	447	674	47.63
Tidewater goby	36	31	556	623	44.03
Staghorn sculpin	31	34	19	84	5.94
Cheekspot goby		11		11	0.78
Prickly sculpin	6	2	1	9	0.64
Arrow goby	2	2		4	0.28
English sole	4			4	0.28
Pacific herring	1	3		4	0.28
Bay pipefish	1	1		2	0.14
Total	191	201	1023	1415	100.00

Appendix F12. Otter Trawl Catch (All Species) at Estero de San Antonio Stations, February - September 1990

		Station		
	S-2	S-4	S-6	Total
8 Feb 90	1	12	4	17
10 Mar 90	61	5	327	393
5 Apr 90	3	6	0	9
25 May 90	20	23	179	222
26 Jun 90	74	48	6	128
27 Jul 90	15	40	470	525
19 Sep 90	17	67	37	121
Total	191	201	1023	1415

		Station	[	% of	
Species	S-2	S-4	S-6	Total	Total
Staghorn sculpin	83	87	1	171	52.29
Pacific herring	88	14	1	103	31.50
Topsmelt	19	2	17	38	11.62
Striped bass	7	2	3	12	3.67
Starry flounder	2			2	0.61
English sole	1			1	0.31
Total	200	105	22	327	100.00

Appendix F14. Gillnet Catch (All Species) at Estero de San Antonio Stations, February - September 1990

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		Station		]
[[	S-2	S-4	S-6	Total
8 Feb 90		0	0	0
10 Mar 90	93	10	0	103
6 Apr 90	1	2	3	6
25 May 90	9	4	18	31
26 Jun 90	32	6	1	39
27 Jul 90	55	78	0	133
19 Sep 90	10	5	0	15
Total	200	105	22	327

		Tow		Total	-	and the second s	gth (mm)	Weig	
Station	Date	Length	Name	Catch	CPE	mean	SD	mean	SD
S-2	7 Feb 90	2	English sole	1	0.5	30.0		0.2	
S-2	9 Mar 90	4	Pacific herring	1	0.3	195.0		84.5	
S-2	9 Mar 90	4	Prickly sculpin	3	0.8	69.7	31.5	6.7	8.9
S-2	9 Mar 90	4	Staghorn sculpin	21	5.3	41.2	6.4	0.8	0.4
<u>S-2</u>	9 Mar 90	4	Tidewater goby	36	9.0	41.9	3.7		
S-2	4 Apr 90	2	English Sole	3	1.5	44.3	2.1	0.9	0.2
S-2	24 May 90	2	Arrow goby	1	0.5	40.0		0.4	
S-2	24 May 90	2	Prickly sculpin	1	0.5	93.0		11.5	
S-2	24 May 90	2	Staghorn sculpin	1 -	0.5	80.0		5.1	
S-2	24 May 90	2	Threespine stickleback	17	8.5	32.2	16.0	1.1	0.9
S-2	25 Jun 90	2	Staghorn sculpin	5	2.5	127.6	8.3		
S-2	25 Jun 90	2	Threespine stickleback	69	34.5	33.6	6.4		
S-2	26 Jul 90	2	Arrow Goby	1	0.5	30.0		0.3	
S-2	26 Jul 90	2	Bay Pipefish	1	0.5	165.0		1.6	
S-2	26 Jul 90	2	Prickly Sculpin	1	0.5	31.0		0.2	
S-2	26 Jul 90	2	Staghorn Sculpin	1	0.5	136.0			
<u>S-2</u>	26 Jul 90	2	Threespine stickleback	11	5.5	31.5	8.0		
S-2	18 Sep 90	2	Prickly sculpin	1	0.5	81.0		7.7	<u></u>
S-2	18 Sep 90	2	Staghorn sculpin	3	1.5	72.7	58.7		
<u>S-2</u>	18 Sep 90	2	Threespine stickleback	13	6.5	38.9	6.1	0.6	
S-4	7 Feb 90	4	Staghorn Sculpin	1	0.3	26.0		0.2	
S-4	7 Feb 90	4	Threespine Stickleback	2	0.5				
<u>S-4</u>	7 Feb 90	4	Tidewater Goby	9	2.3	40.3	3.4	0.6	0.2
S-4	9 Mar 90	2	Prickly sculpin	2	1.0	133.0	15.0	38.3	15.0
S-4	9 Mar 90	2	Staghorn sculpin	2	1.0	49.5	13.4	1.3	0.8
S-4	9 Mar 90	2	Threespine stickleback	1.	0.5	28.0		0.1	
S-4	4 Apr 90	2	Arrow goby	2	1.0	44.0	2.8	0.6	0.1
S-4	4 Apr 90	2	Staghorn sculpin	4	2.0	58.8	11.0	2.6	1.8
S-4	24 May 90	2	Cheekspot goby	11	5.5	29.1	3.8	0.2	0.1
S-4	24 May 90	2	Pacific herring	2	1.0	63.5	2.1	2.4	0.4
S-4	24 May 90	2	Threespine stickleback	9	4.5	21.3	5.4	0.2	0.1
S-4	24 May 90	2	Tidewater goby	1	0.5	48.0		1.0	
S-4	25 Jun 90	2	Staghorn sculpin	5	2.5	126.8	4.6		
S-4	25 Jun 90	2	Threespine stickleback	31	15.5	45.0	2.0		
<u>S-4</u>	25 Jun 90	2	Tidewater goby	12	6.0	39.3	6.8		
S-4	26 Jul 90	2	Pacific Herring	1	0.5	60.0		2.7	
S-4 S-4	26 Jul 90 26 Jul 90		Staghorn Sculpin	22	11.0	132.6	12.5	<b>4</b> 1	
S-4	26 Jul 90		Threespine stickleback	16	8.0	39.8	11.1	1.0	8.0
				1.0	<b>W</b> . <b>W</b>				

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		Tow		Total		Fork Length (mm)		Weight (g)	
Station	Date	Length	Name	Catch	CPE	mean	SD	mean	SD
S-4	18 Sep 90	2	Bay pipefish	1	0.5	86.0		0.2	
S-4	18 Sep 90	2	Threespine stickleback	58	29.0	39.7	7.5	0.8	
S-4	18 Sep 90	2	Tidewater goby	8	4.0	42.0	4.4	0.7	0.2
0.6	7 Feb 90	1.28	Staghorn sculpin		0.8	29.0		0.2	
S-6 S-6	7 Feb 90 7 Feb 90	1.28	Tidewater Goby	3	2.3	39.7	9.9	0.6	0.4
			Delably aculaia		0.5	100.0		13.2	
S-6	9 Mar 90	2	Prickly sculpin	1	0.5		0.0		
S-6	9 Mar 90	2	Staghorn sculpin	18	9.0	49.7	9.0	1.6	A 4
S-6	9 Mar 90	2	Threespine stickleback	10	5.0	41.7	7.6	0.8	0.4
<u>S-6</u>	9 Mar 90	2	Tidewater goby	298	149.0	43.2	3.3	0.8	
S-6	4 Apr 90	2	no catch						
S-6	24 May 90	2	Threespine stickleback	81	40.5	31.1	8.7	0.4	
S-6	24 May 90	2	Tidewater goby	98	49.0	28.0	5.9	0.2	0.3
S-6	25 Jun 90	2	Threespine stickleback	1	0.5	55.0		1.9	
<u>S-6</u>	25 Jun 90	2	Tidewater goby	5	2.5	29.0	5.9	0.3	0.2
S-6	26 Jul 90	2	Threespine stickleback	352	176.0	35.3	8.0		
<u>S-6</u>	26 Jul 90	2	Tidewater goby	118	59.0	31.4	6.7	0.6	0.1
S-6	18 Sep 90	1.5	Threespine stickleback	3	2.0	37.3	0.6	0.4	0.1
S-6	18 Sep 90	1.5	Tidewater goby	34	22.7	33.8	5.6	0,4	0.2

#### Appendix F16. Summary of Fish Catch Data in Estero de San Antonio 24-hour Gillnet Sets, February -September 1990

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		<u> </u>	Total Fork Length (mm)			Weight (g)		
Otalian	Data	Name	Catch	mean	SD	mean	SD	
Station	Date	Haino	Outon	1 1110411 1				
	0.14++ 00	Pacific herring	87	151.6	35.3	55.2		
S-2	9 Mar 90	•		281.0	00.0	321.1		
S-2	9 Mar 90	Starry flounder	1		440 0	1805.0	1410.8	
S-2	9 Mar 90	Striped bass	4	476.3	113.6		1410.0	
S-2	9 Mar 90	Topsmelt	1	198.0		73.4		
S-2	5 Apr 90	English Sole	1	280.0				
S-2	24 May 90	Staghorn sculpin	7	114.8	3.1	18.3	1.2	
S-2	24 May 90	Striped bass	1	380.0		920.0		
S-2	24 May 90	Topsmelt	1	123.0		15.5		
S-2	25 Jun 90	Staghorn sculpin	27	134.3	15.1			
S-2	25 Jun 90	Striped bass	1	502.0		1800.0		
S-2 S-2	25 Jun 90	Topsmelt	4	123.0	135.5	6.0		
<b>0-</b> 2	20 0011 00	I SPOILING						
6.0	26 Jul 90	Pacific herring	1	194.0		91.0		
S-2		Staghorn sculpin	44	146.8	15.4			
S-2	26 Jul 90	•	_		10.4	520.0		
S-2	26 Jul 90	Starry flounder	1	332.0		209.2		
S-2	26 Jul 90	Striped bass	1	248.0		209.2		
S-2	26 Jul 90	Topsmelt	88	152.0	6.2			
S-2	18 Sep 90	Staghorn sculpin	5	143.0	4.4	41.6	5.2	
S-2	18 Sep 90	Topsmelt	5	152.4	27.6	40.1	24.7	
S-4	7 Feb 90	no catch						
S-4	9 Mar 90	Pacific herring	10	181.1	16.0	82.7	19.9	
S-4	5 Apr 90	Pacific herring	1	116.0				
S-4	5 Apr 90	Striped bass	1	355.0		607.4		
0-4	<u>3 Api 30</u>	Caliped 2000						
S-4	24 May 90	Pacific herring	1	192.0		71.3		
		Staghorn sculpin	•	106.0		13.2		
S-4	24 May 90	÷ .	4	490.0		1700.0		
S-4	24 May 90	Striped bass	1			18.3		
<u>S-4</u>	24 May 90	Topsmelt	1	130.0		10.5		
			~	440.0	0 5			
S-4	25 Jun 90	Staghorn sculpin	6	140.2	9.5	•		
					477.4			
S-4	26 Jul 90	Staghorn sculpin	78	130.0	17.1			
S-4	18 Sep 90	Pacific herring	2	108.5	2.8	13.3	2.8	
S-4	18 Sep 90	Staghorn sculpin	2	146.0	4.2	38.5	3.3	
S-4	18 Sep 90	Topsmelt	1	122.0		15.6		
S-6	7 Feb 90	no catch						
~ ~			and the second secon					
S-6	9 Mar 90	no catch						
0-0	A 14101 AA	111 WWWWWI						
S-6	5 Apr 90	Striped Bass	3	344.0	12.1	628.0	75.8	
3-0	2 Vhi an		<u>`</u>	VITIV	, 1			

### Appendix F16. Summary of Fish Catch Data in Estero de San Antonio 24-hour Gillnet Sets, February -September 1990

	<u></u>		Total	Fork Length (mm)		Weight (g)	
Station	Date	Name	Catch	mean	SD	mean	SD
		De silie herring	- 1	107.0		15.8	
S-6 S-6	24 May 90 24 May 90	Pacific herring Topsmelt	17	129.4	8.1	19.0	4.6
				155.0			
S-6	25 Jun 90	Staghorn sculpin	1	155.0			
S-6	26 Jul 90	no catch					
S-6	18 Sep 90	no catch					