

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 Assessment* Technical Reports (MSC 1996).

Table 1.

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

Parameters	Americano Creek	Estero Americano	Stemple Creek	Estero de San Antonio
Water Quality	'88, '89, '90, '94	'88, '89, '90, '94	'88, '89, '90, '94	'88, '89, '90, '94
Zooplankton	'88, '89, '90	'88, '89, '90	'89, '90	'89, '90
Epibenthos	'88, '89, '90	'88, '89, '90	'89, '90	'89, '90
Benthos	'88, '89, '90	'88, '89, '90	'89, '90	'89, '90
Fish	'88, '89, '90	'88, '89, '90	'89, '90	'89, '90

2.0 FINDINGS

2.1 BACKGROUND

Americano Creek is about 16 kilometers (km) long and drains a 125 square kilometer (km²) 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-1 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.

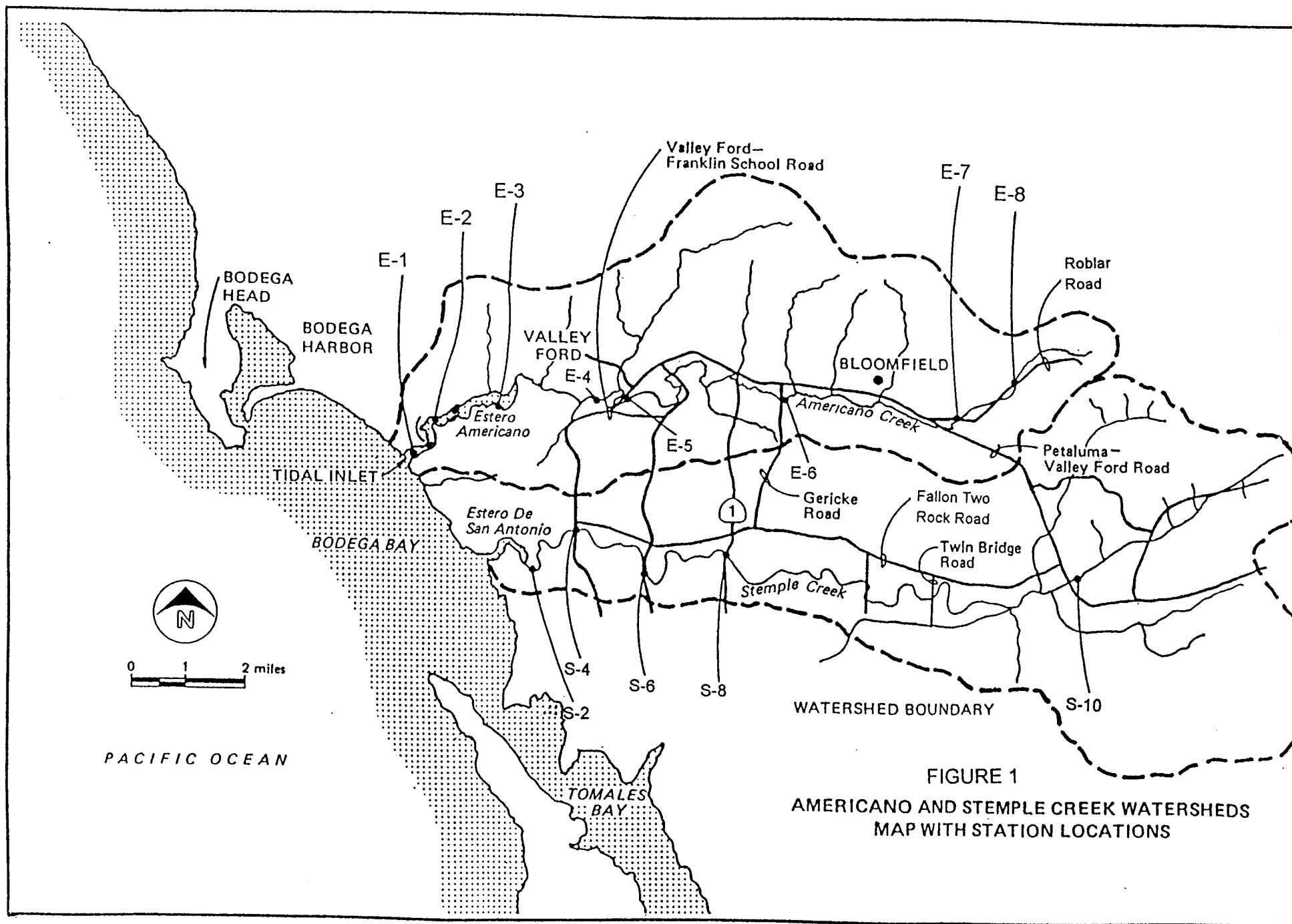


FIGURE 1
AMERICANO AND STEMPLE CREEK WATERSHEDS
MAP WITH STATION LOCATIONS

Table 2.

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

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

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. 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
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 Stemple	E-1 - E-5 S-2,S-4,S-6	E-2 - E-5,E-2A, E-2B,E-3A S-2,S-4,S-6	E-1 - E-5 S-2,S-4,S-6	E-1 - E-5 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 CaCO₃. 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 µg/L) to 27 µg/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 µg/L) and Critical Continuous Concentration (CCC = 11 µg/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 µg/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 µg/L) at station E-1 in winter to 32 µg/L at station E-6 in fall. The overall average of total copper from station E-6 was 17 µg/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 µg/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 µg/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 µg/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 CaCO₃). The concentration of dissolved zinc in Estero Americano during this time period ranged from below detection (1.0 µg/L) to 50 µg/L. There were no exceedances of the EPA saltwater CCC or CMC.

Mean seasonal total zinc ranged from undetectable (detection limit = 1 µg/L) at station E-1 in summer to 161 µg/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 at E-7). Zinc levels exceeded the chronic or both the chronic and acute freshwater guidelines (110 µg/L and 120 µg/L, respectively, assuming hardness = 100 mg/L as CaCO₃) at station E-6 two times out of seven measurements. The overall average total zinc at station E-6 was 78 µg/L, similar to the previous average (May 1988 through September 1989) of 74 µg/L, but the high average was due to just one exceptionally high measurement (300 µg/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 µg/L to 26 µg/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 µg/L) to 17 µg/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 CaCO₃) in 2 of 14 measurements. In Estero de San Antonio copper exceeded the chronic and acute guideline (both = 2.9 µg/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 µg/L) to 5.2 µg/L. The EPA CCC of 2.5 µg/L (assuming a hardness of 100 mg/L as CaCO₃) 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 µg/L). This detection limit is below the saltwater CCC for dissolved lead (8.1 µg/L).

Dissolved zinc concentrations in Stemple Creek stations S-8 and S-10 during October 1989 through 1990 ranged from 13 to 80 µg/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 µg/L) to 21 µg/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 µg/L) to 55 µg/L (fall, station S-10). The EPA guidelines for zinc toxicity (assuming a hardness of 100 mg/L as CaCO₃) 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 μm and 130 μm . 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^3 . 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 zooplankton, 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- μ 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.

Estero Americano Nektonic/Epibenthic Invertebrate Summary

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

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.

Estero de San Antonio Nektonic/Epibenthic Invertebrate Summary

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

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/American 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 kemp*i, *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 nuttallii*, 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.

Estero Americano Benthic Invertebrate Summary

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

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 individuals²/m² over 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/m² (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/m². 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/m²) and *Chironomus* larvae (ca. 2000/m²), 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 (muscoïd 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.

Estero de San Antonio Benthic Invertebrate Summary

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

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, ¼ in. mesh bag) and gillnet (variable mesh, ¾-5 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 Americano, and on 10 occasions from 1989 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 marine-like 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.

Fish Species Caught in Estero Americano, 1988 - 1990

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

Table 7.

Fish Species Caught in Estero Americano, 1988 - 1990

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

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

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

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 a 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 Museum *pers. 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 will be similar to that in the upper Estero. Changes in the biota of the lower part of 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.

4.0 REFERENCES

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5.0 APPENDICES

WATER QUALITY FIGURES

Figure WQ1. Seasonal Average Salinity
Estero Americano October 1989 through November 1990

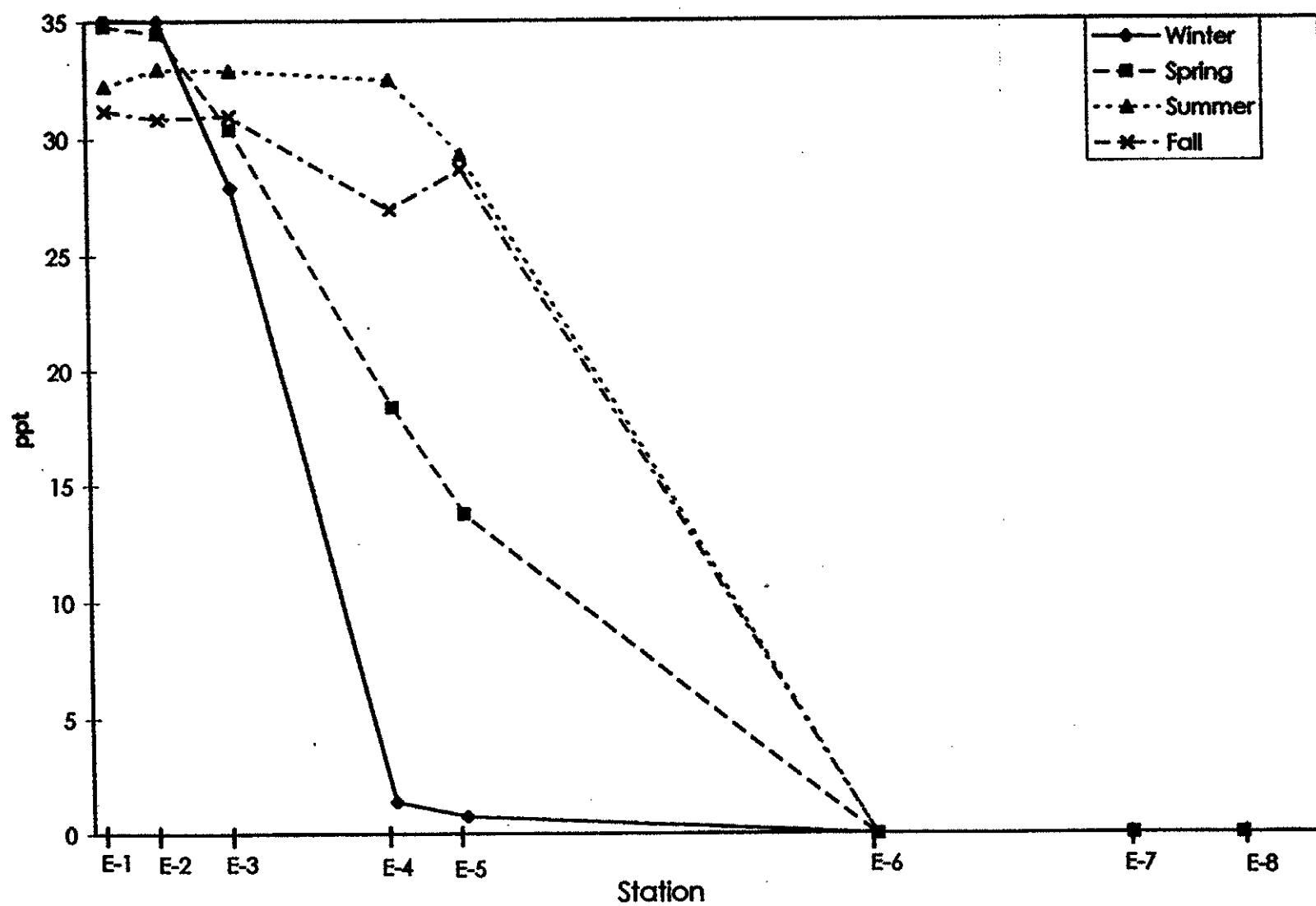
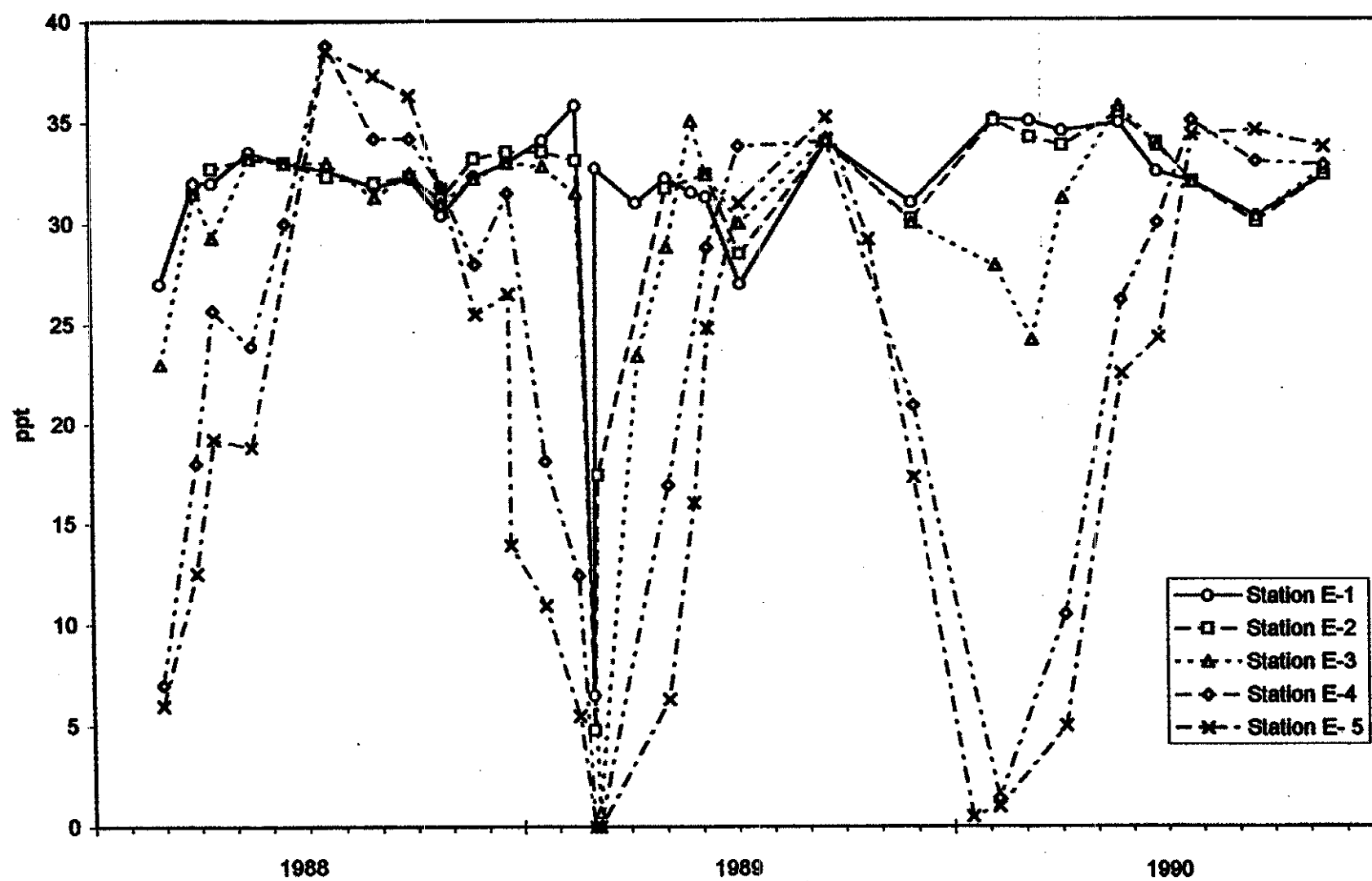
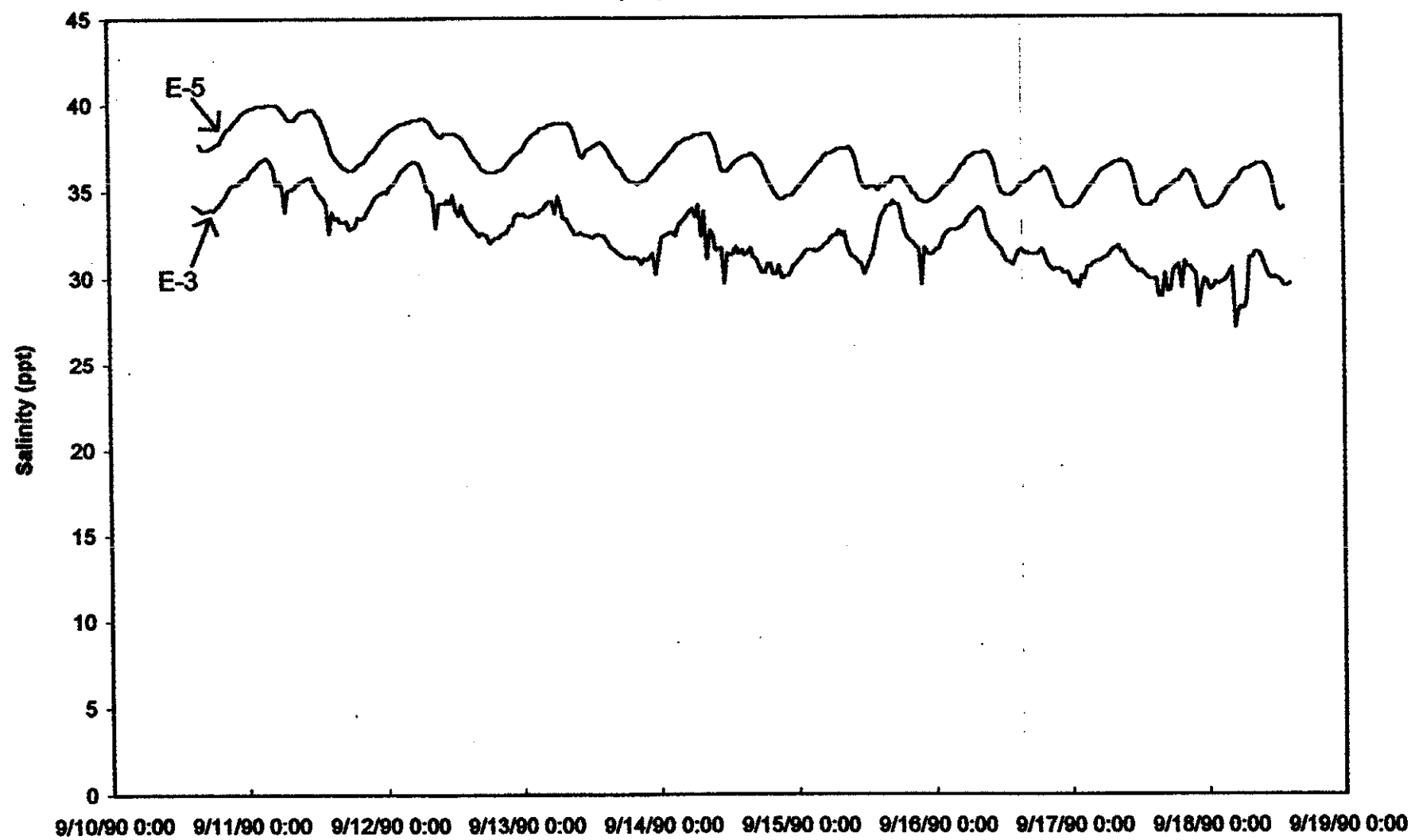


Figure WQ2. Salinity
Estero Americano



**Figure WQ3. Salinity in Estero Americano Stations E-3 and E-5
(September 1990)**



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

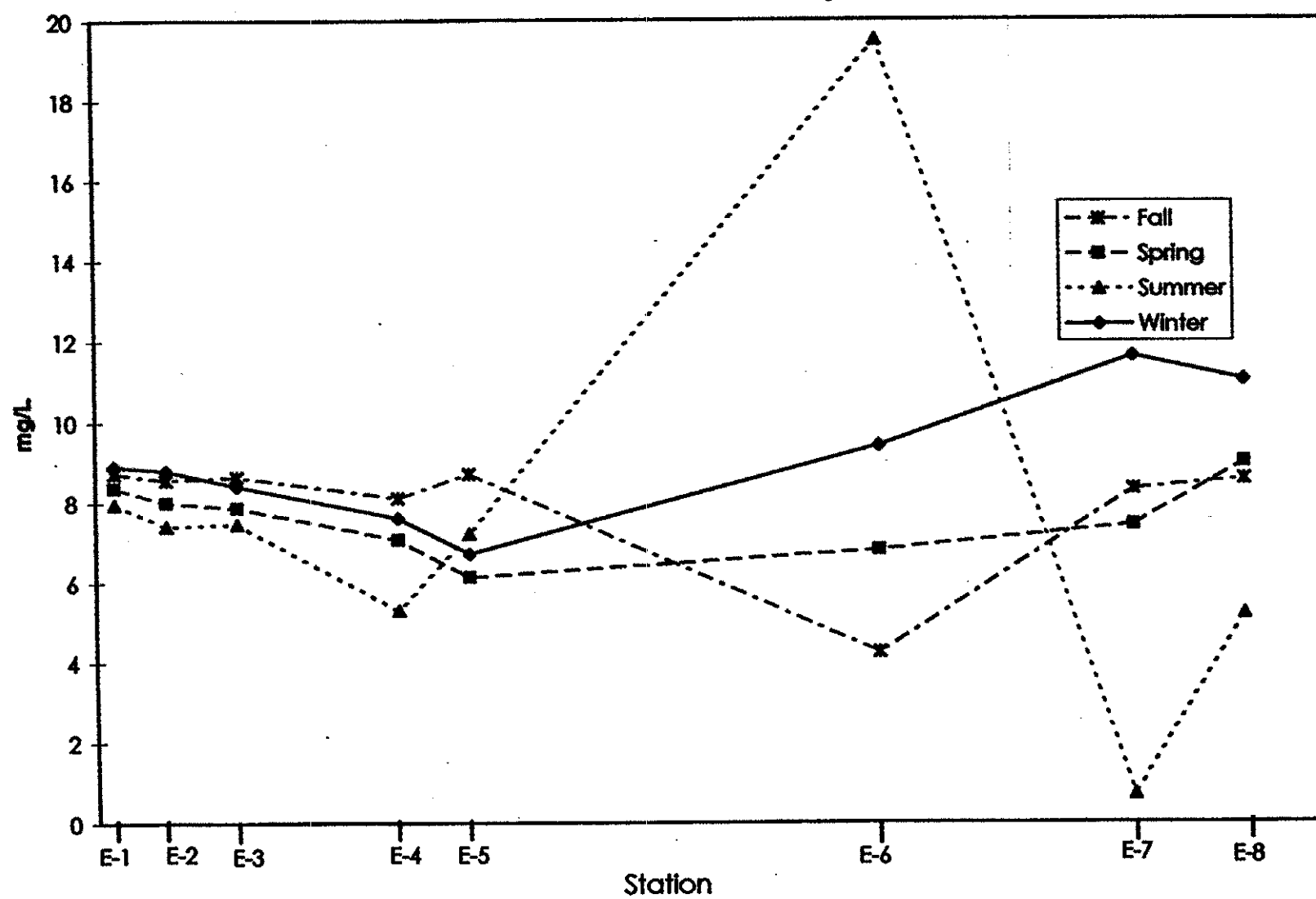
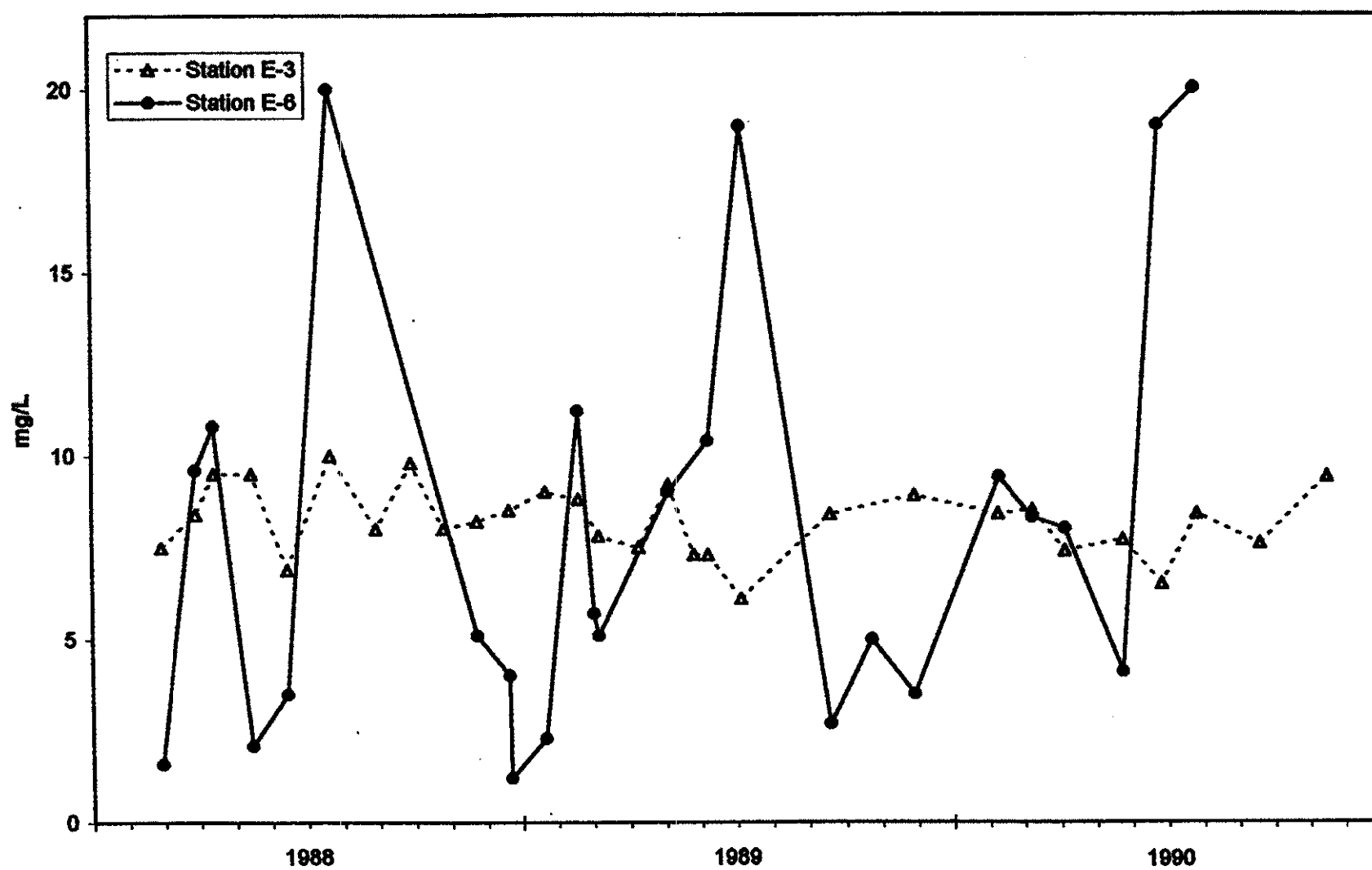
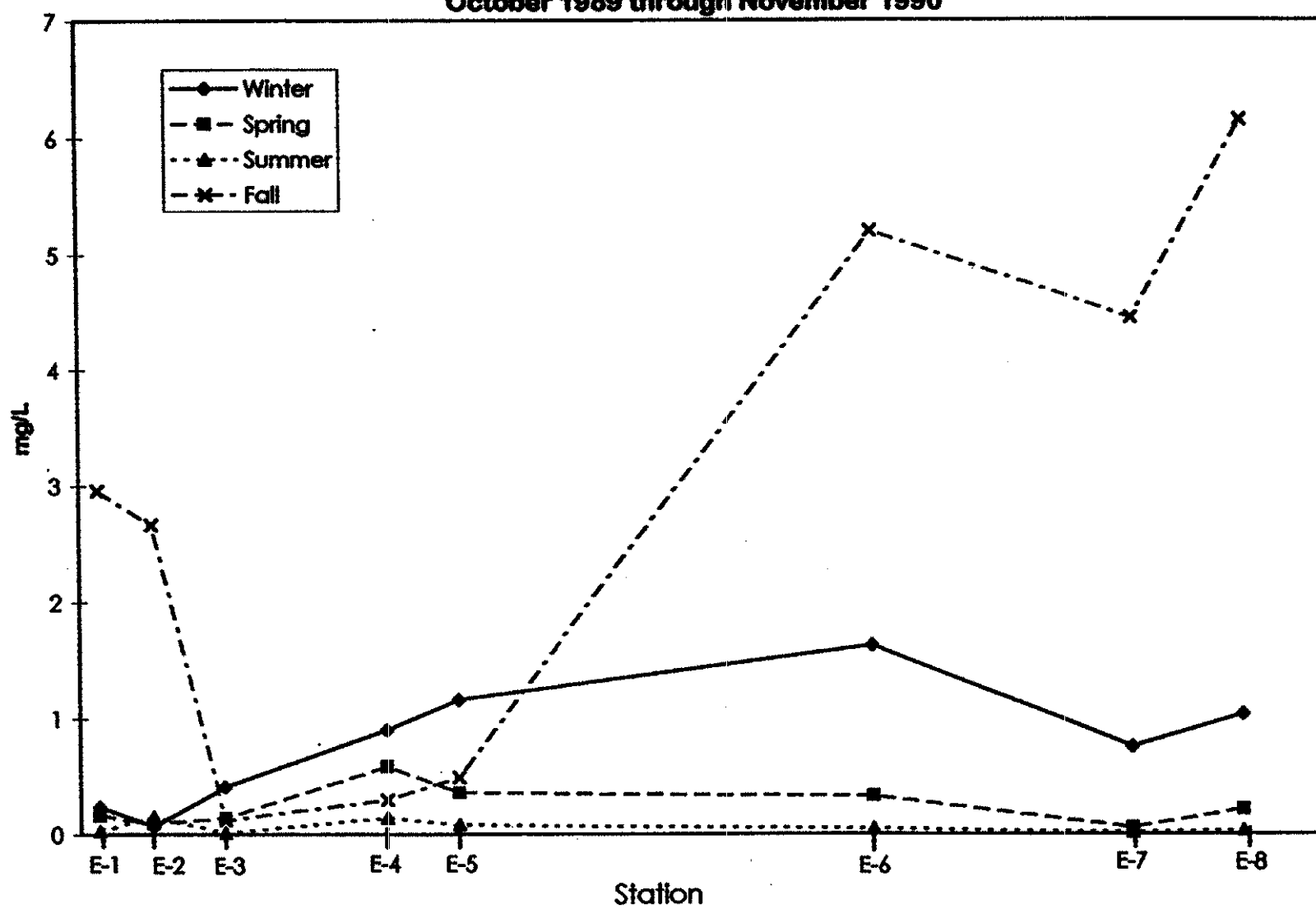


Figure WQ5. Dissolved Oxygen
Estero Americano (Station E-3) versus Americano Creek (Station E-6)

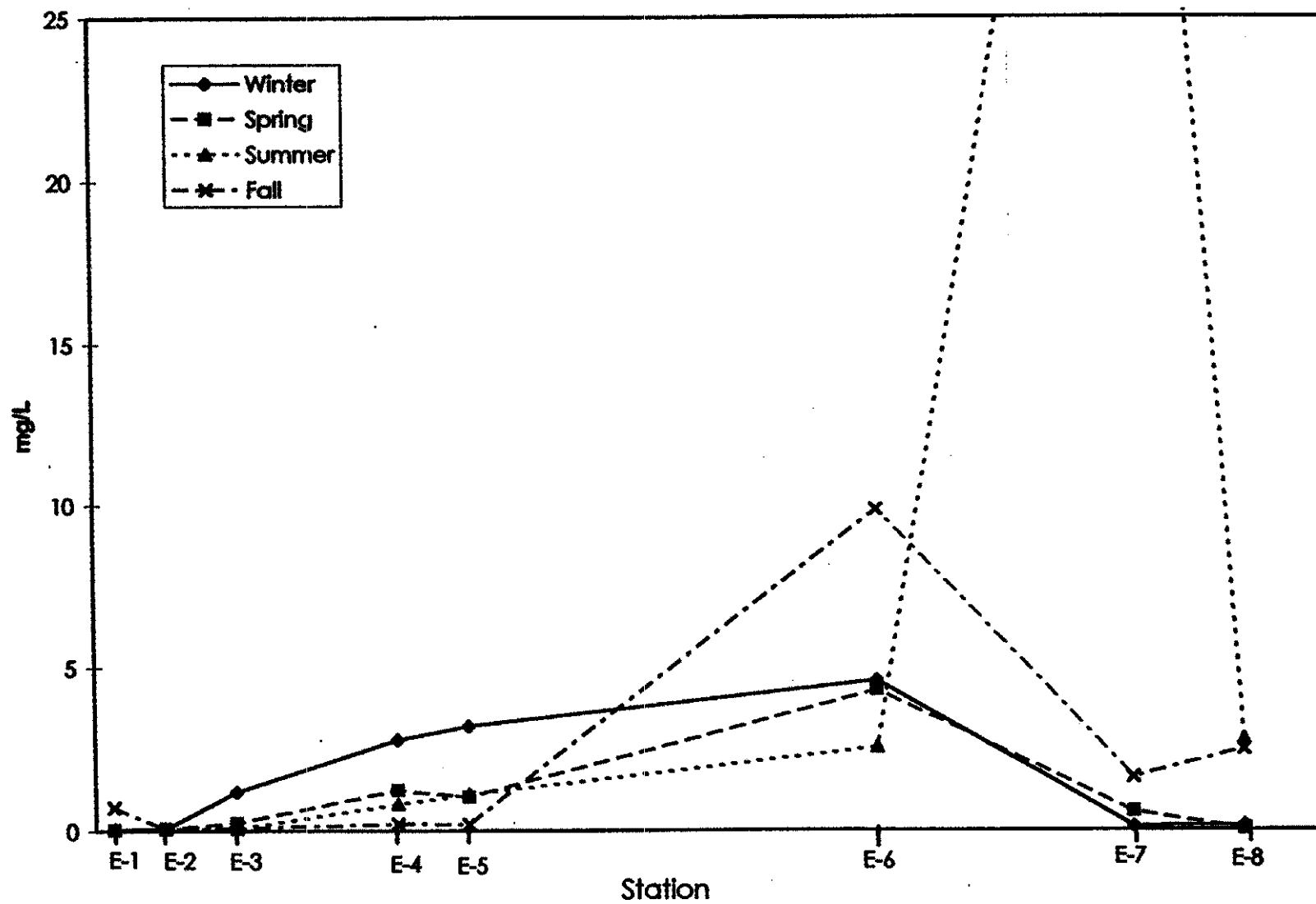


**Figure WQ6. Seasonal Average Nitrate
Estero Americano and Americano Creek
October 1989 through November 1990**



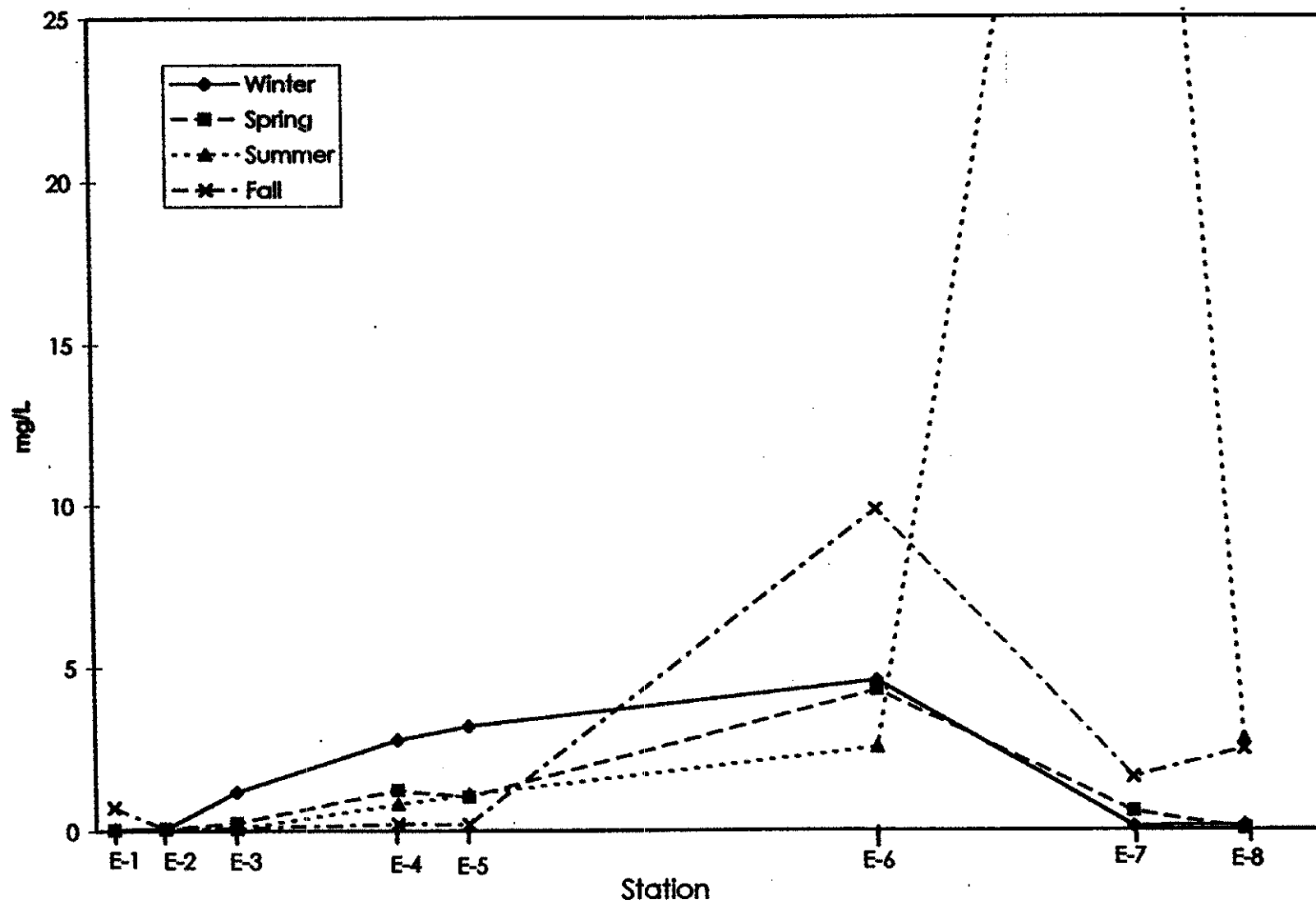
**Figure WQ7. Seasonal Average Ammonia
Estero Americano October 1989 through November 1990**

49



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

49



**Figure WQ8. Seasonal Un-ionized Ammonia
Estero Americano and Americano Creek
October 1989 through November 1990**

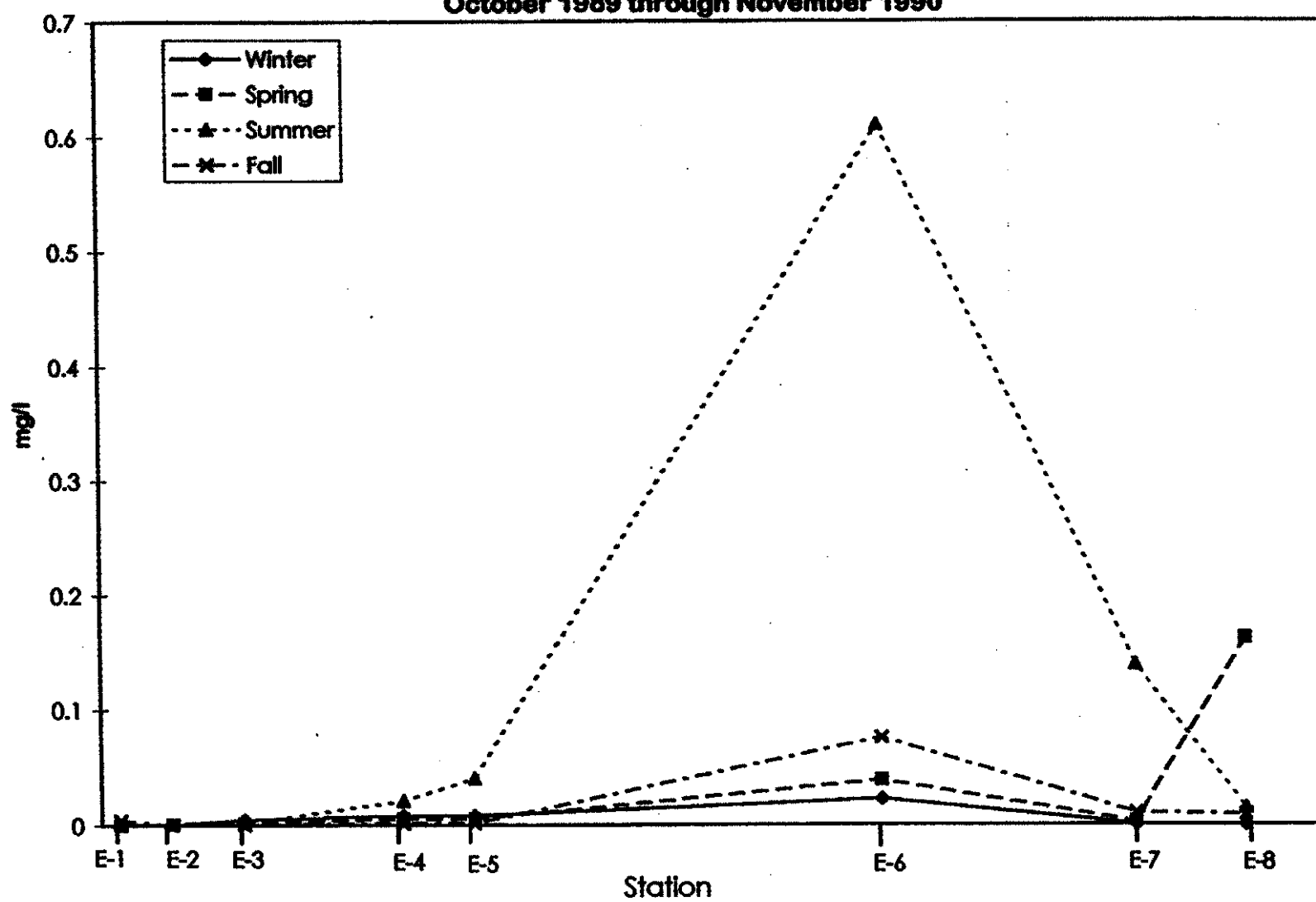


Figure WQ9. Un-ionized Ammonia
Estero Americano

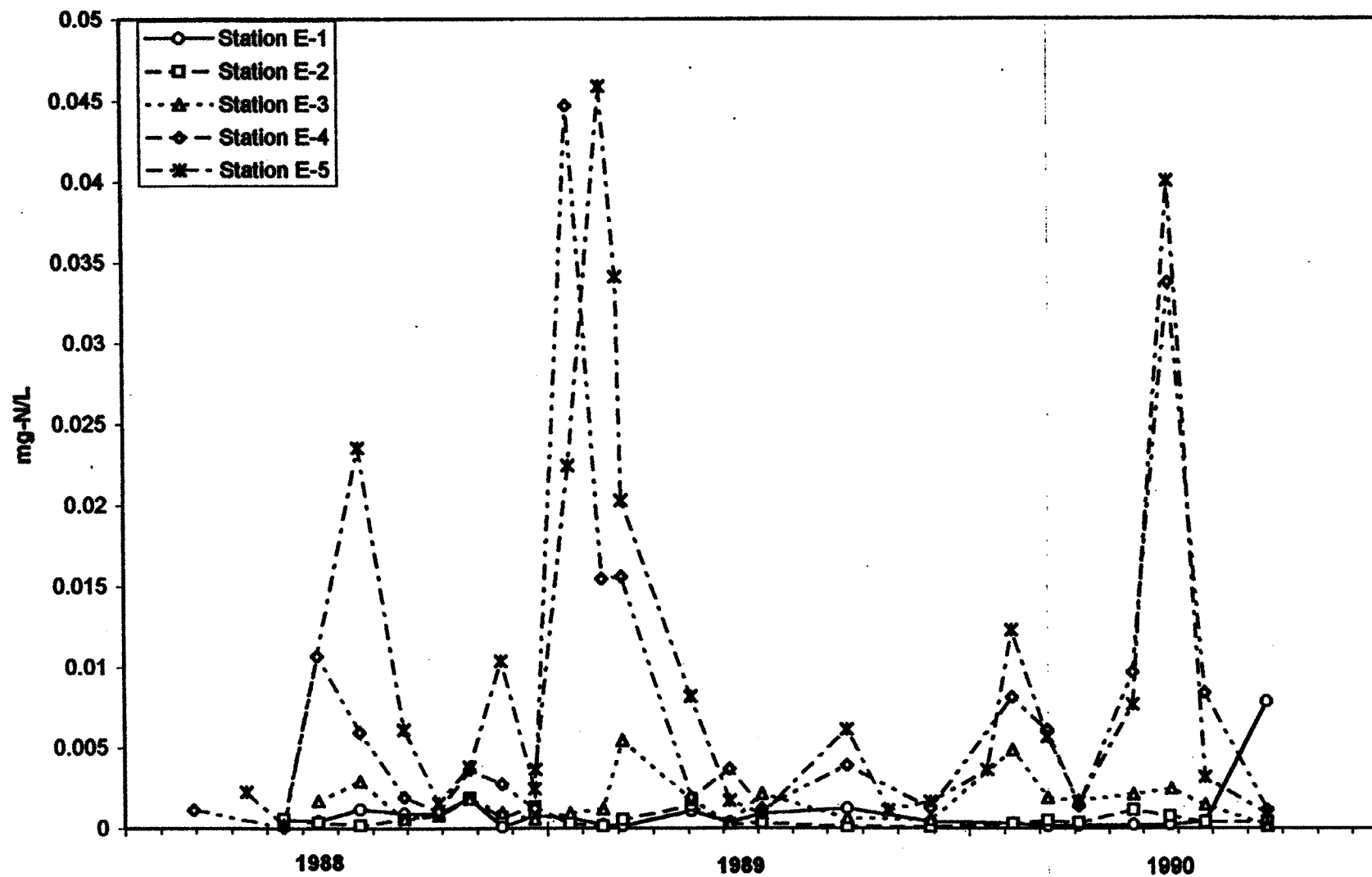
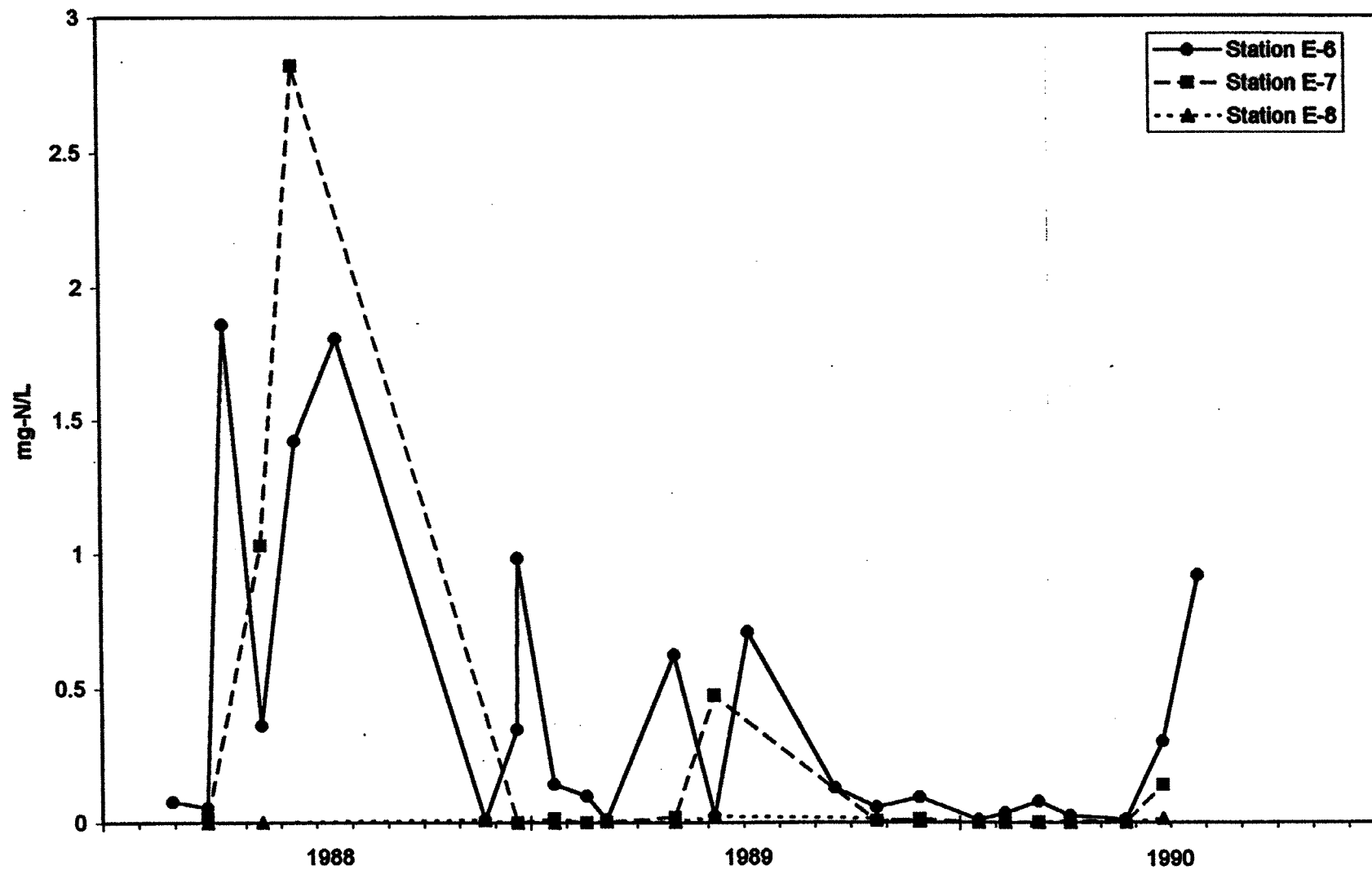


Figure WQ10. Un-ionized Ammonia
Americano Creek



**Figure WQ11. Seasonal Average Chlorophyll a
Estero Americano October 1989 through November 1990**

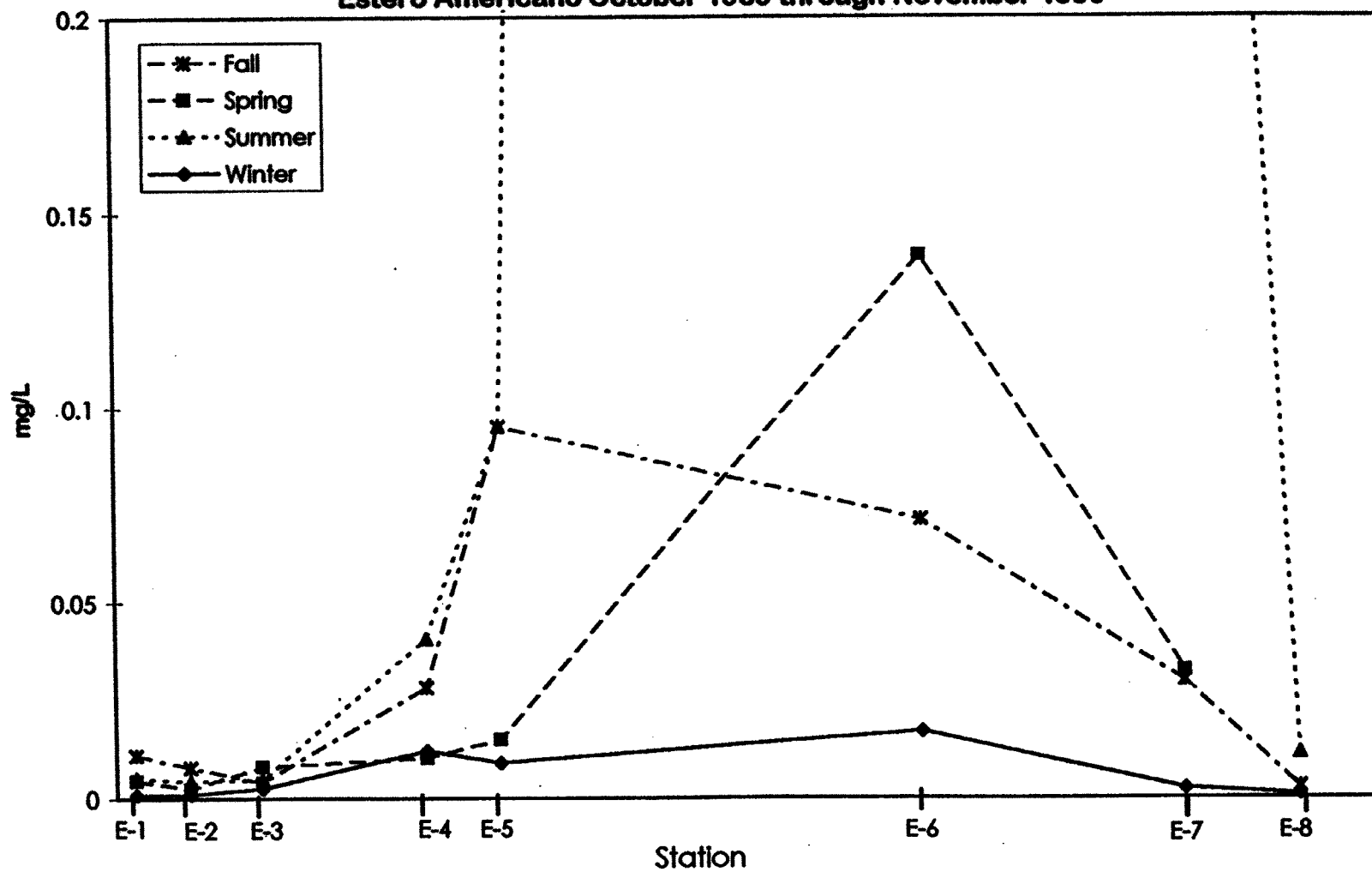
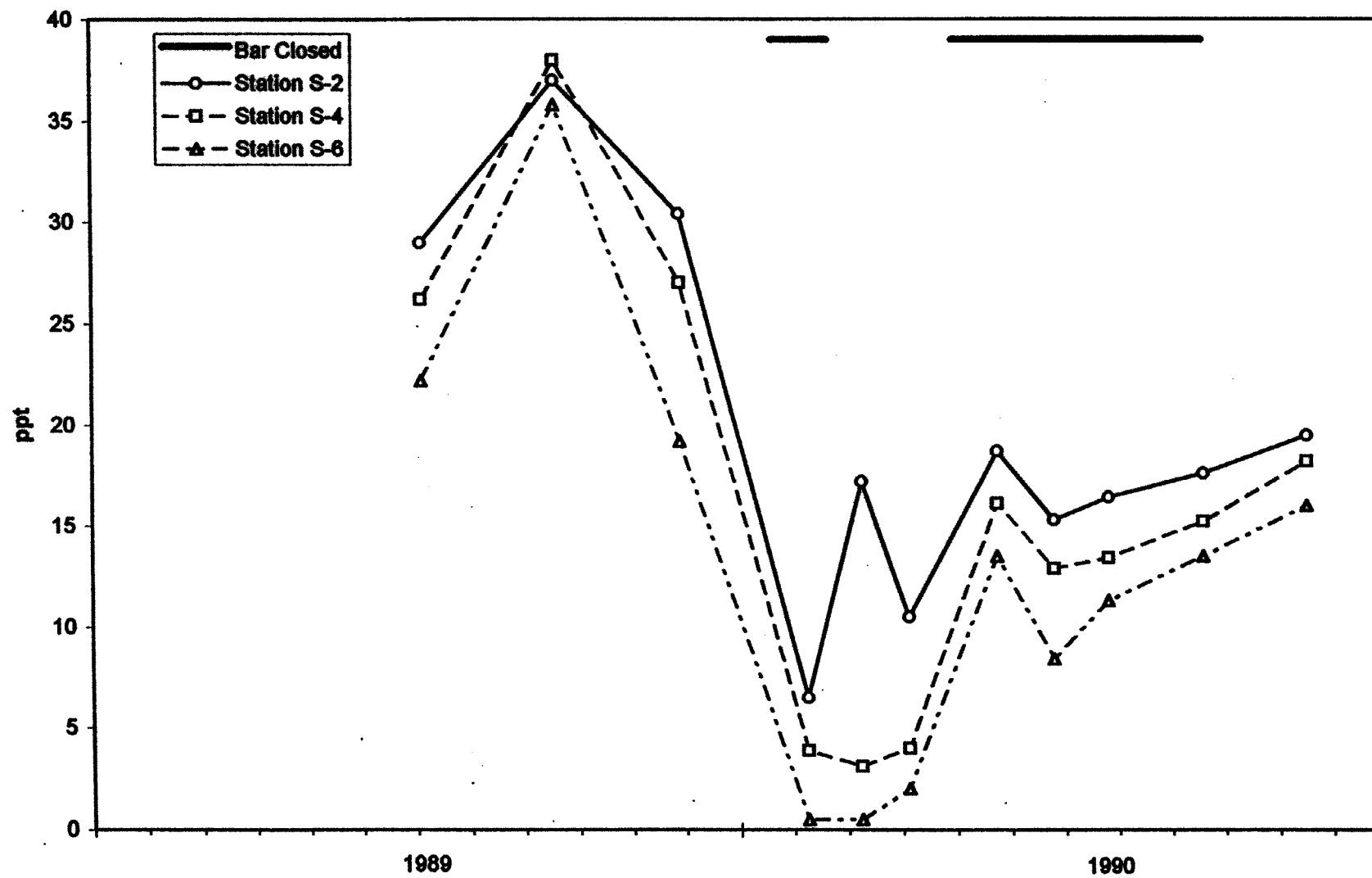


Figure WQ12. Salinity
Estero de San Antonio



**Figure WQ13. Surface Dissolved Oxygen
Estero de San Antonio**

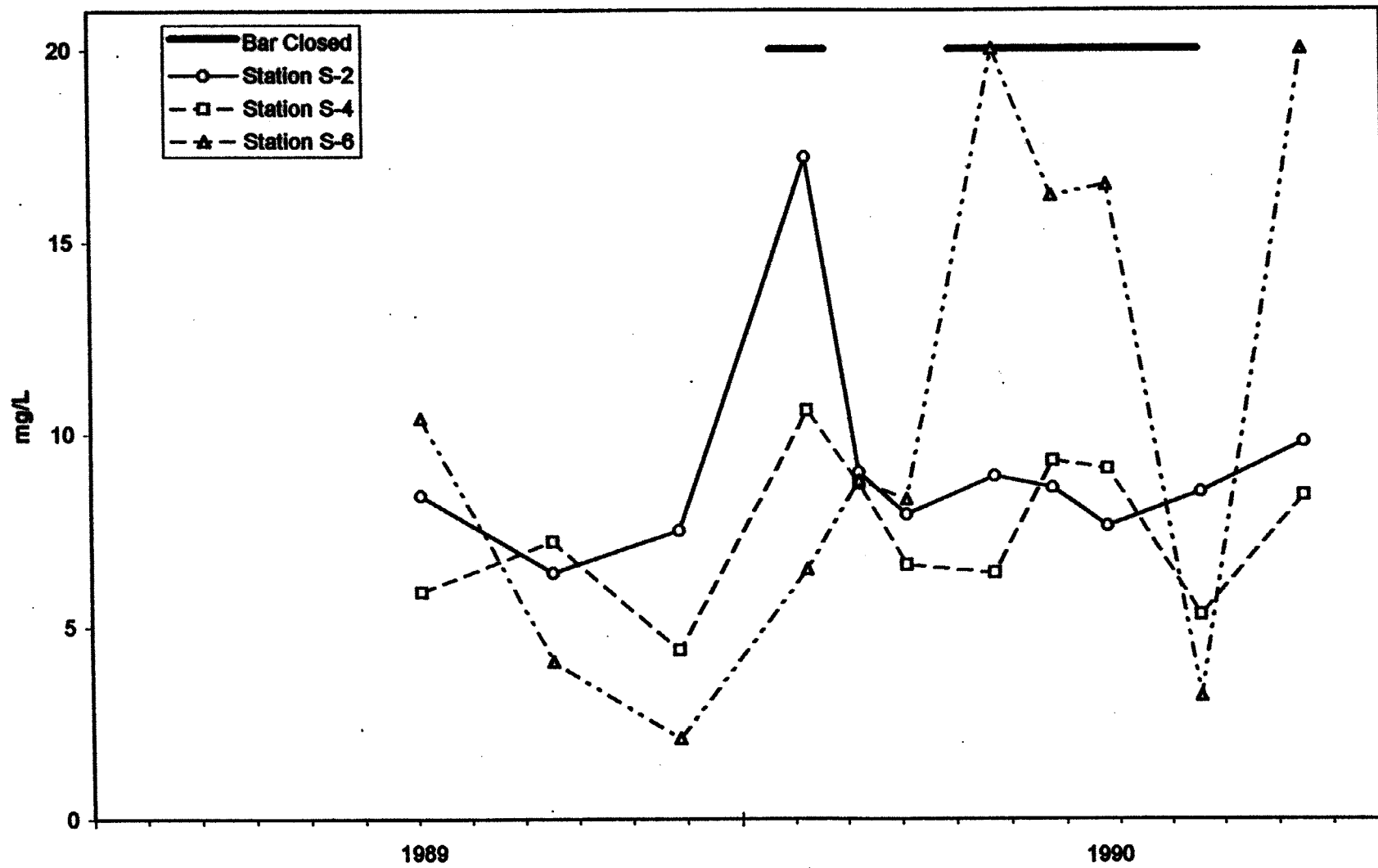


Figure WQ14. Dissolved Oxygen
Estero de San Antonio

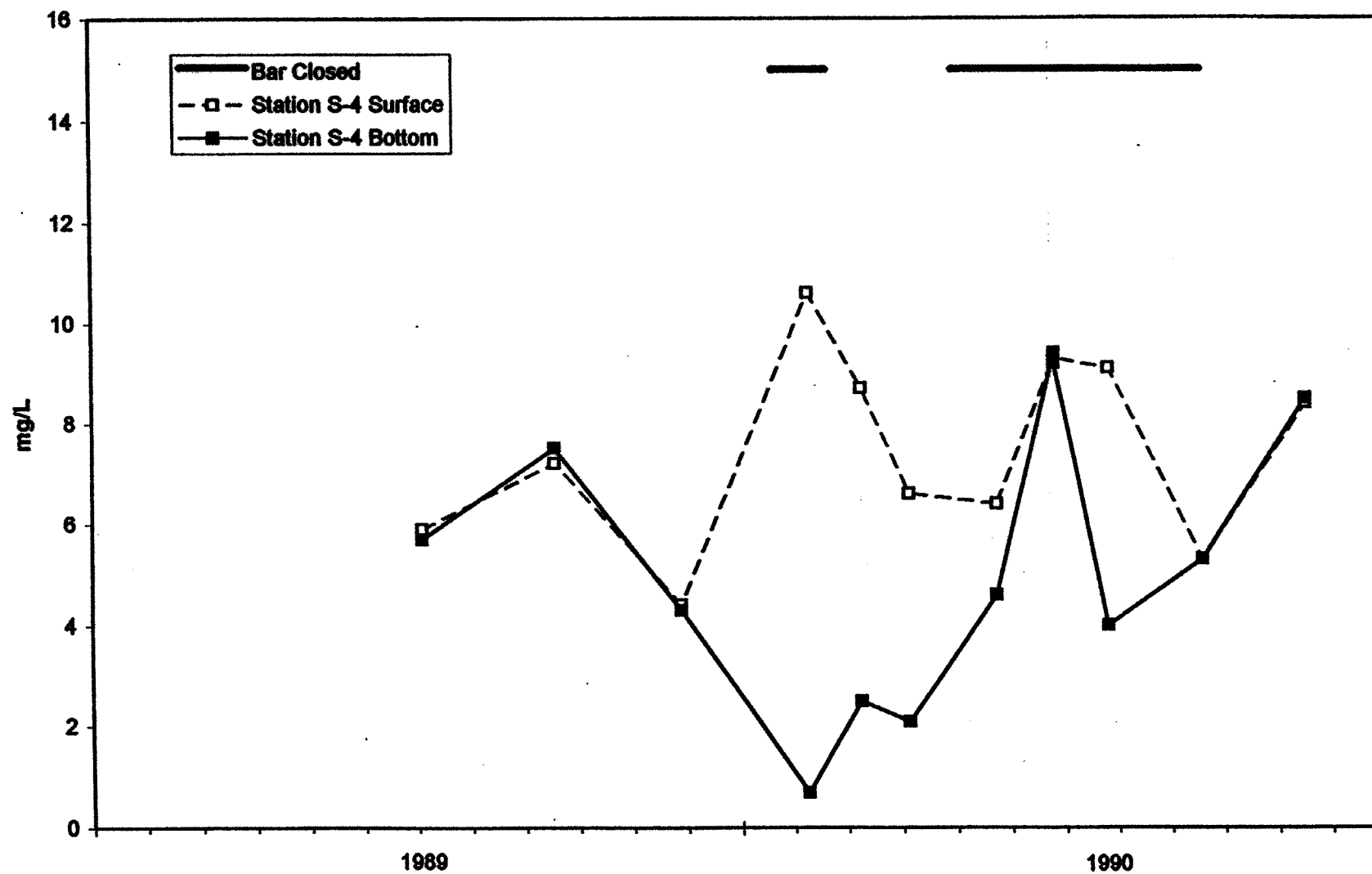
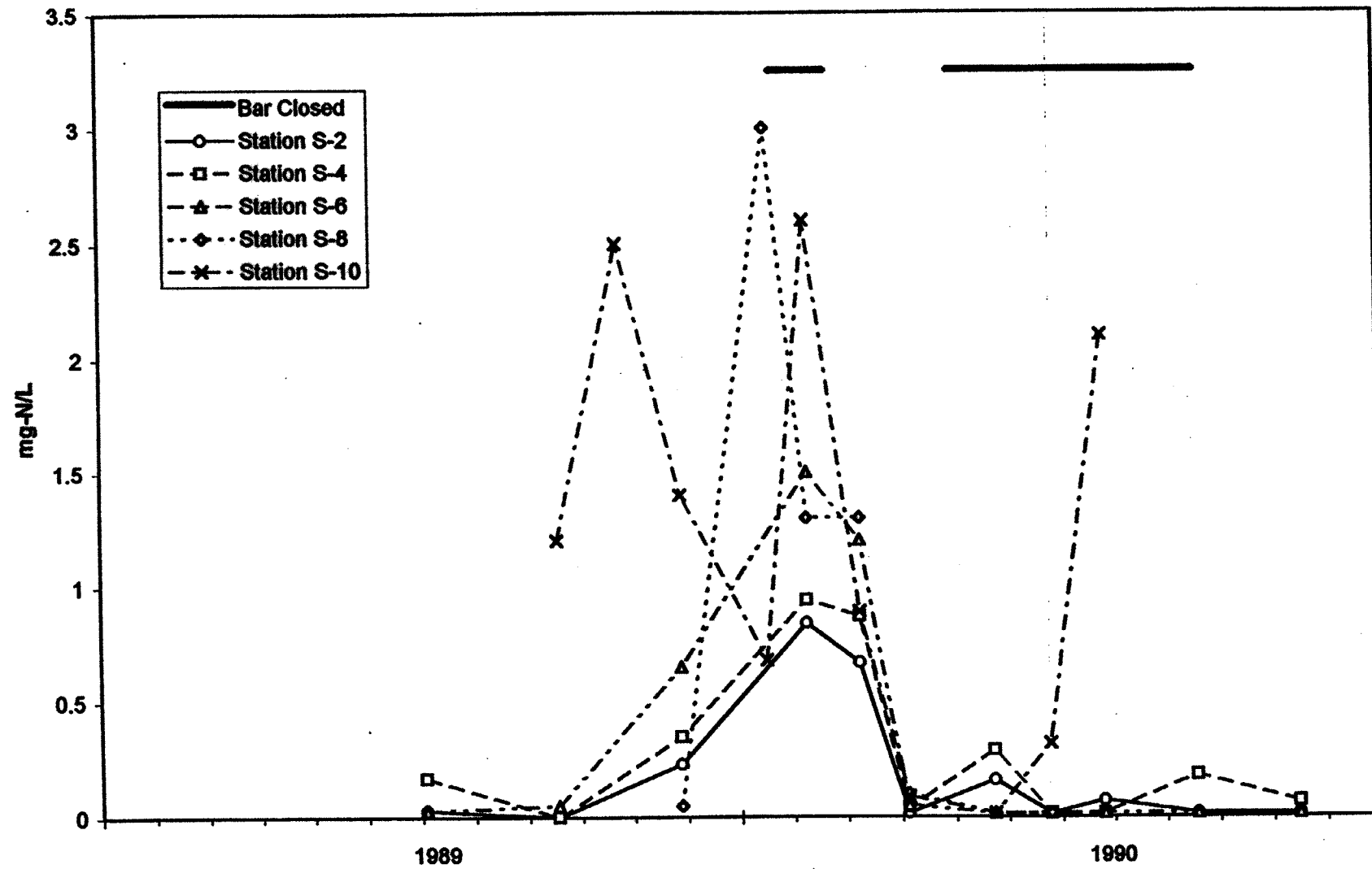


Figure WQ15. Nitrate
Estero de San Antonio



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

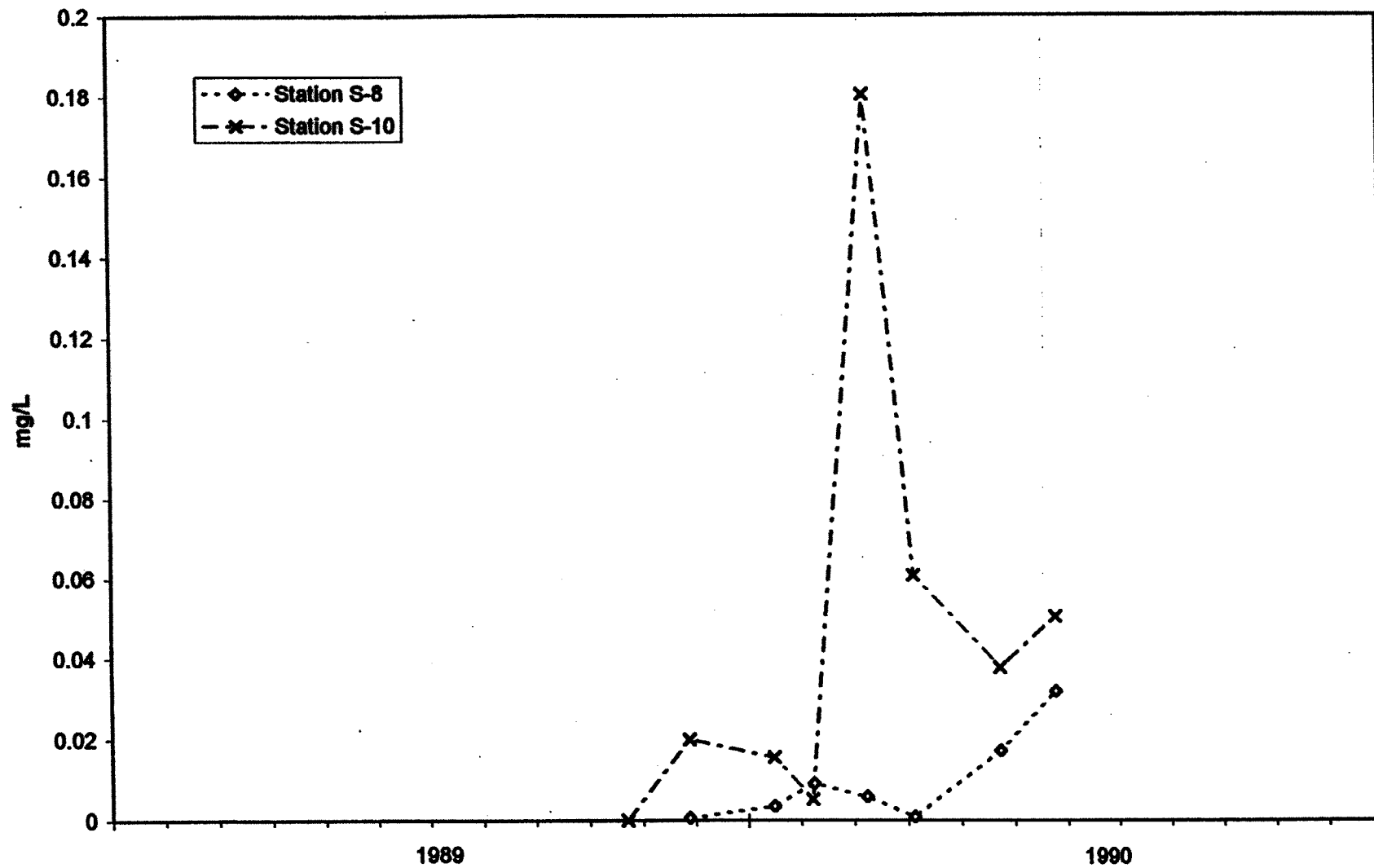
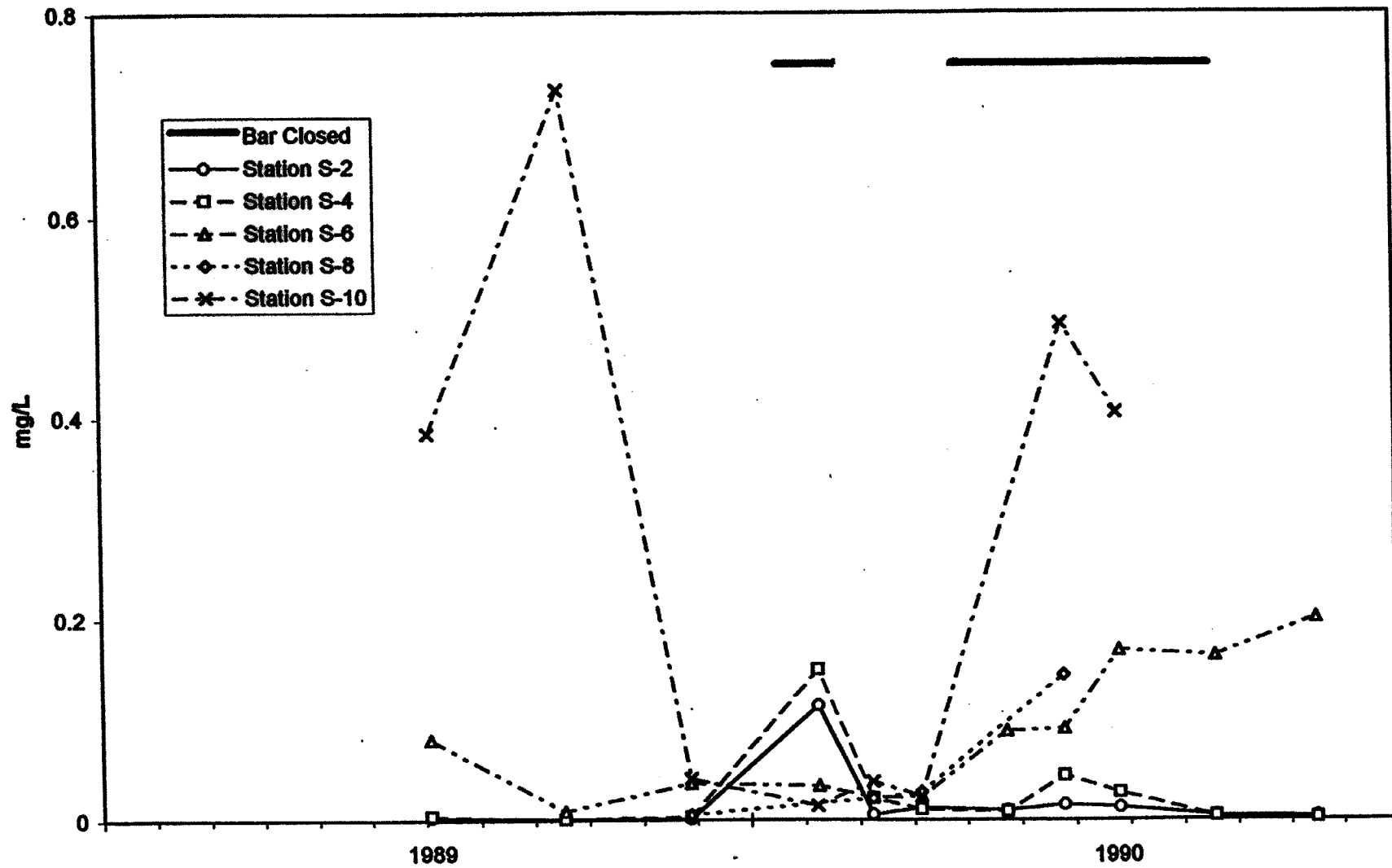


Figure WQ17. Chlorophyll *a*
Estero de San Antonio and Stemple Creek



ZOOPLANKTON AND FISH LARVAE FIGURES

**Figure P1. Estero Americano: Zooplankton Invertebrate Diversity
(Number of Taxa), 1988 -1990.**

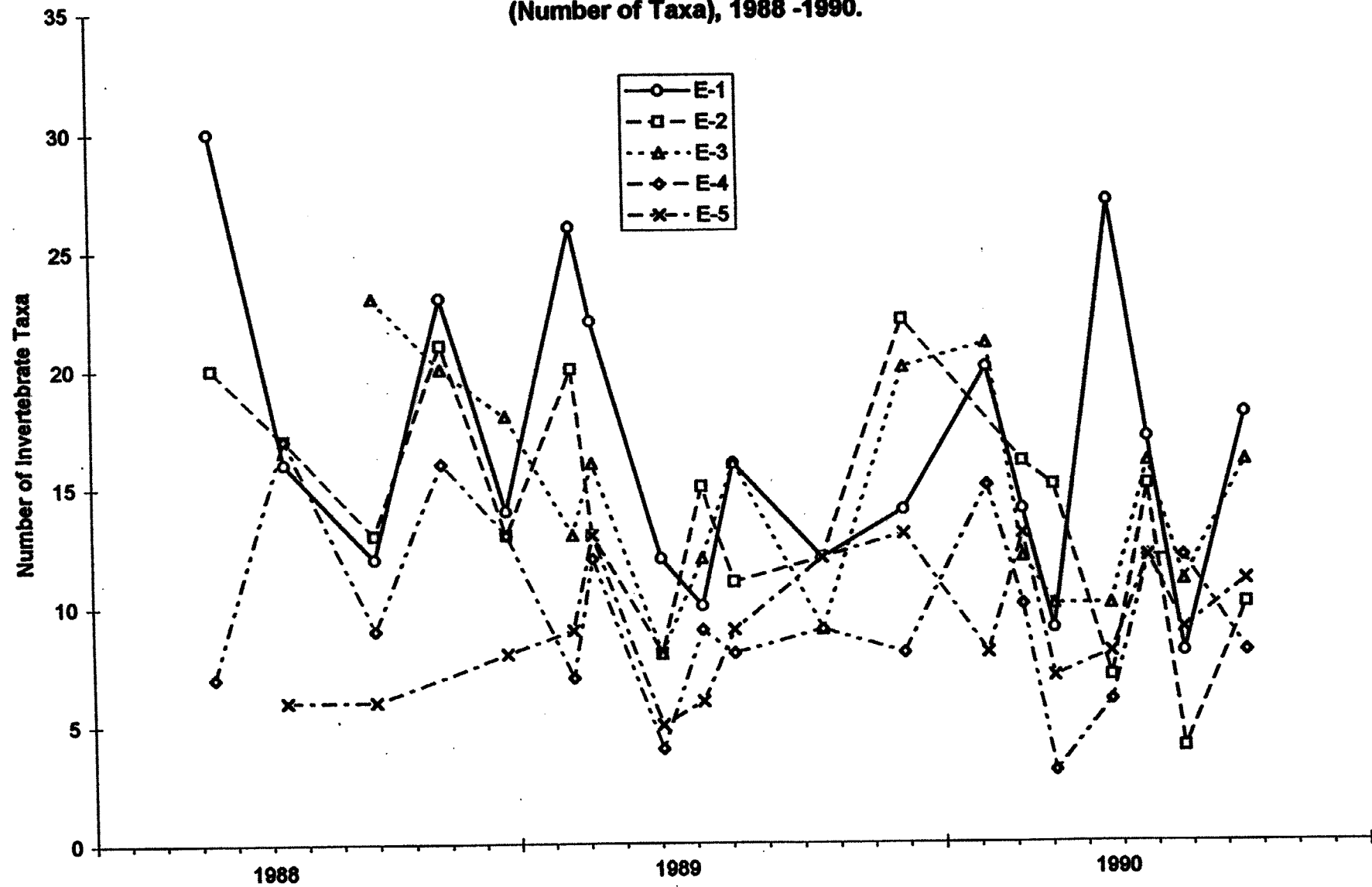


Figure P2. Estero Americano: Zooplankton Invertebrate Abundance, 1988 -1990.

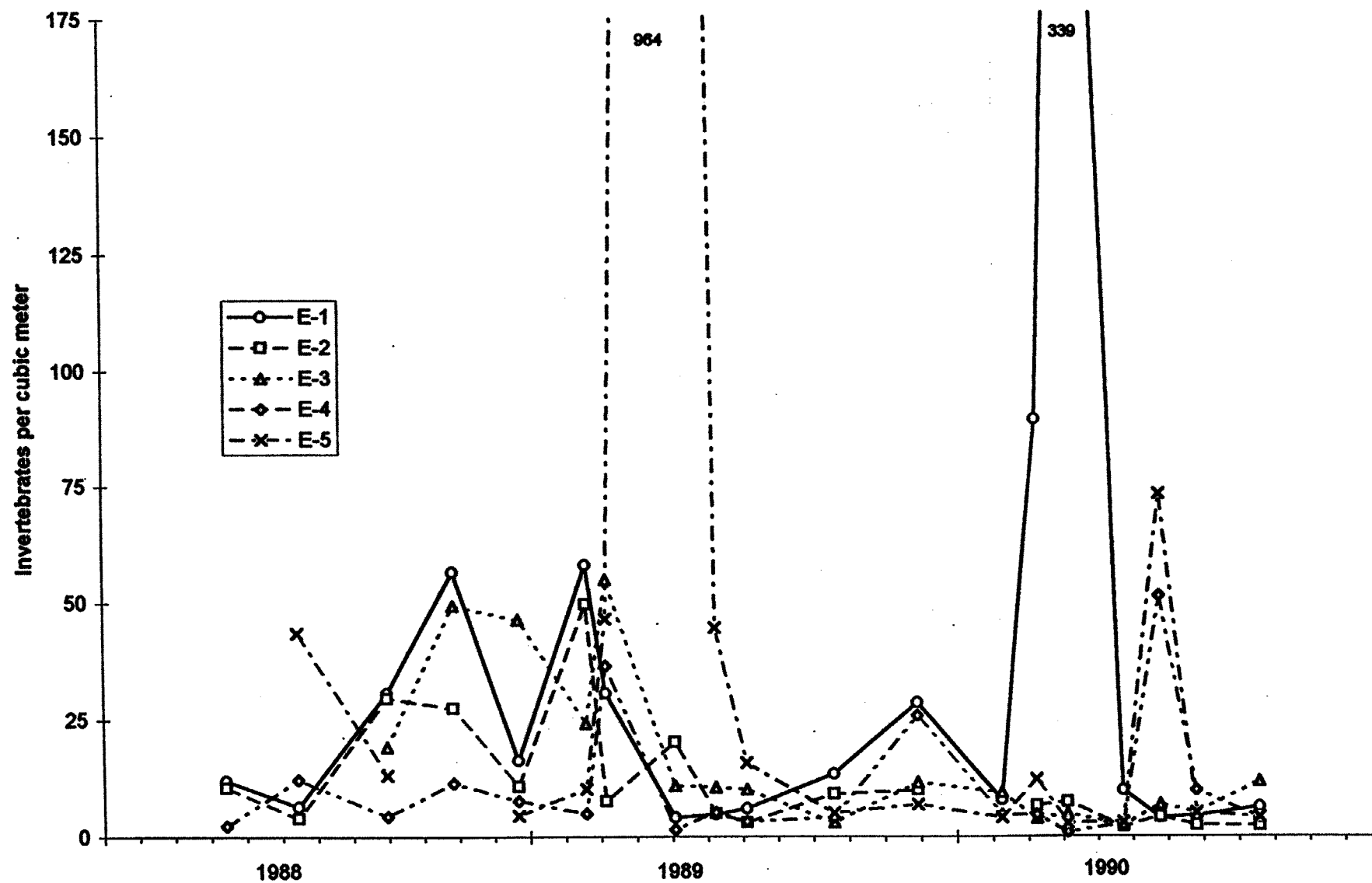


Figure P3. Estero Americano: Larval Fish Diversity (Number of Taxa), 1988 -1990.

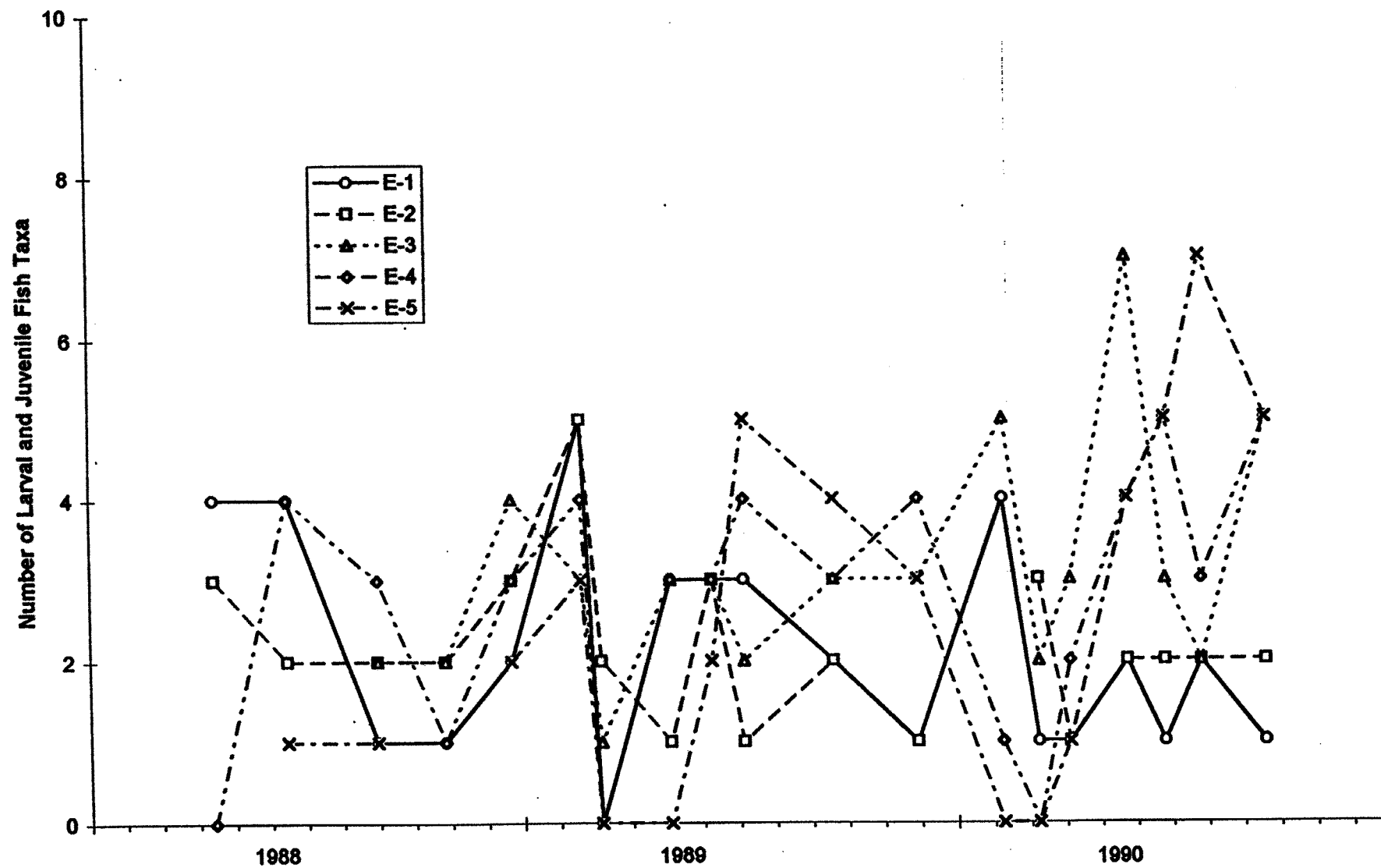


Figure P4. Estero Americano: Larval Fish Abundance, 1988 -1990.

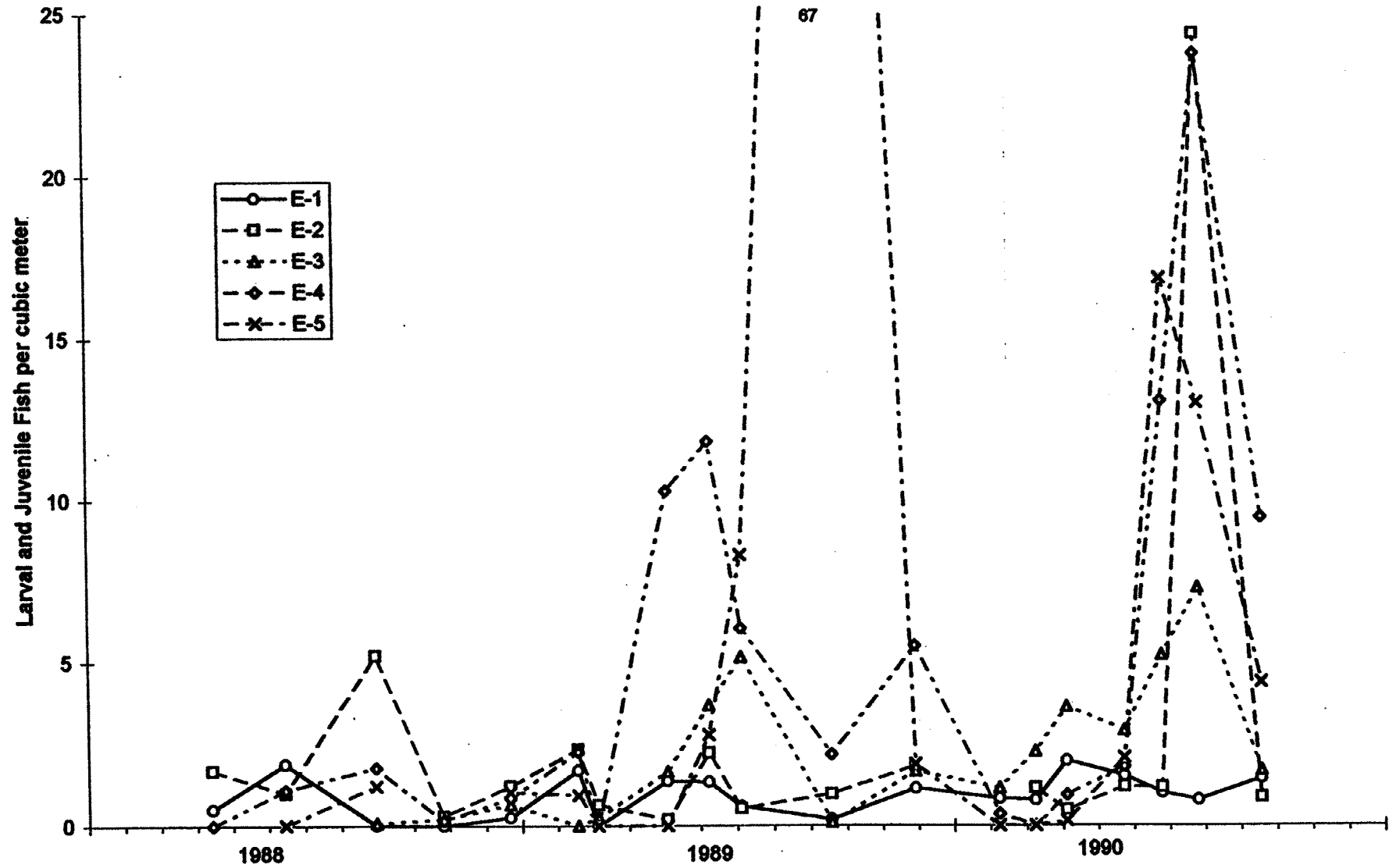


Figure P5. Estero de San Antonio: Zooplankton Invertebrate Diversity (Number of Taxa), 1988 -1990.

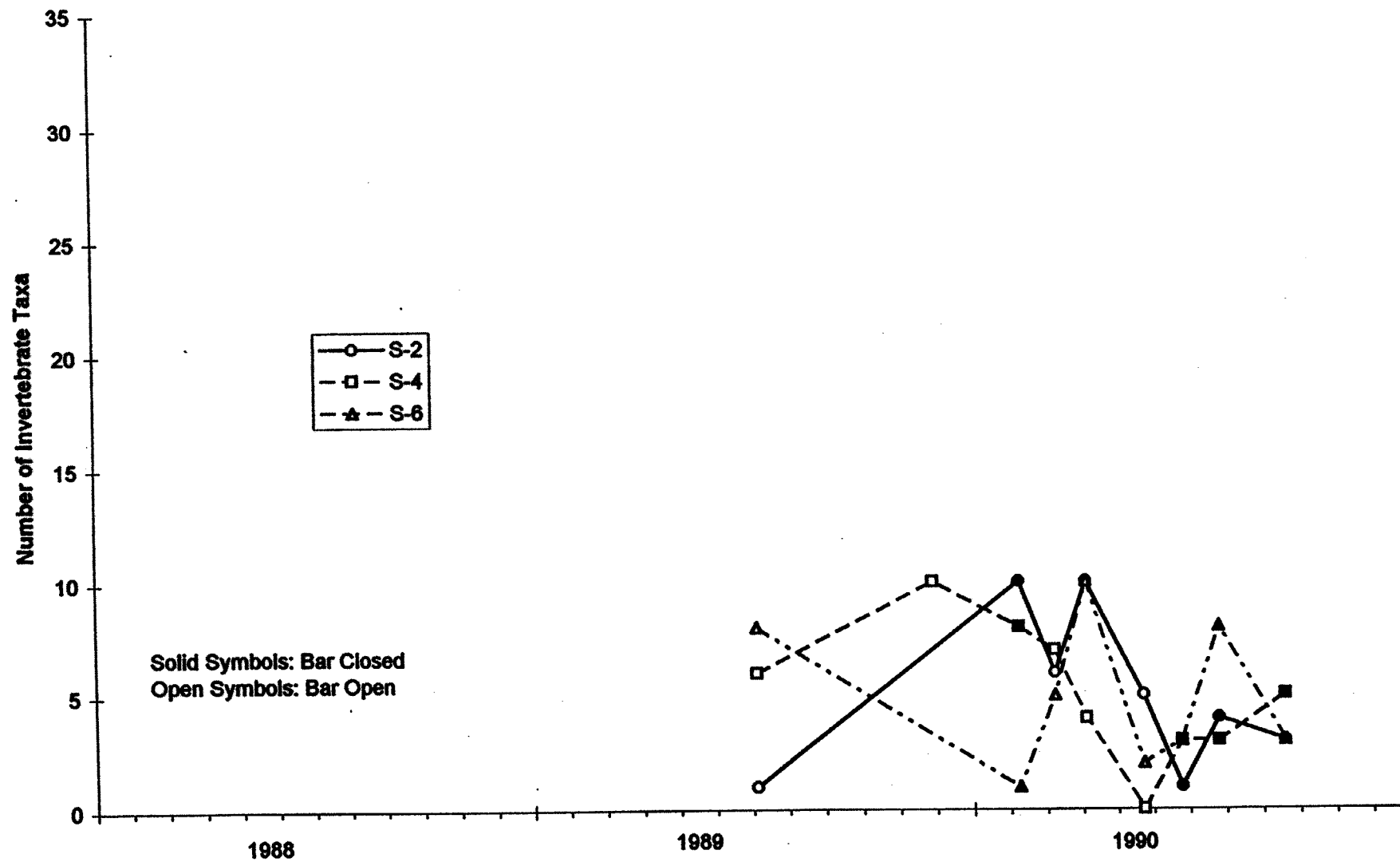


Figure P6. Estero de San Antonio: Zooplankton Invertebrate Abundance, 1989 -1990

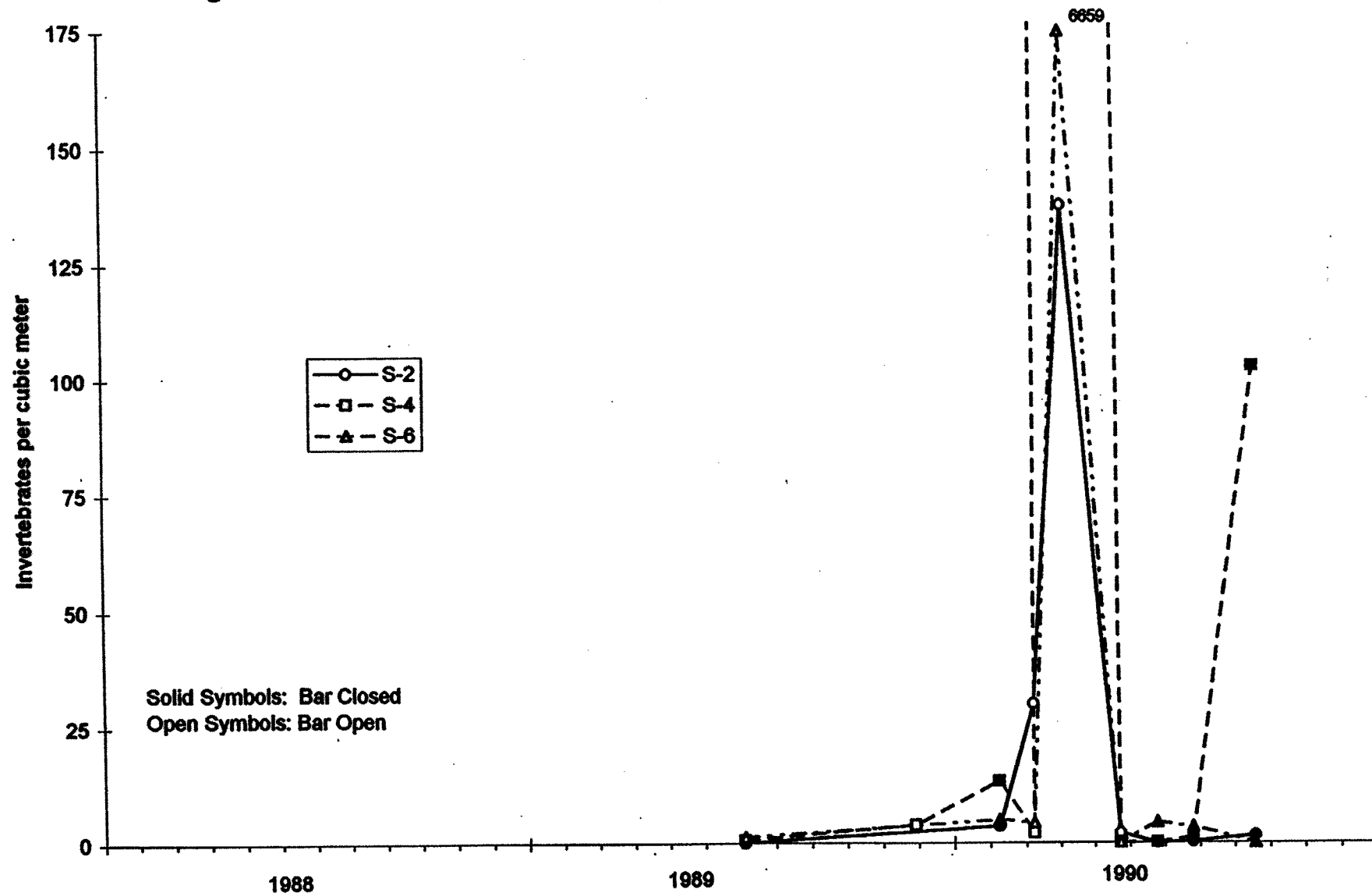


Figure P7. Composition of Estero Zooplankton.

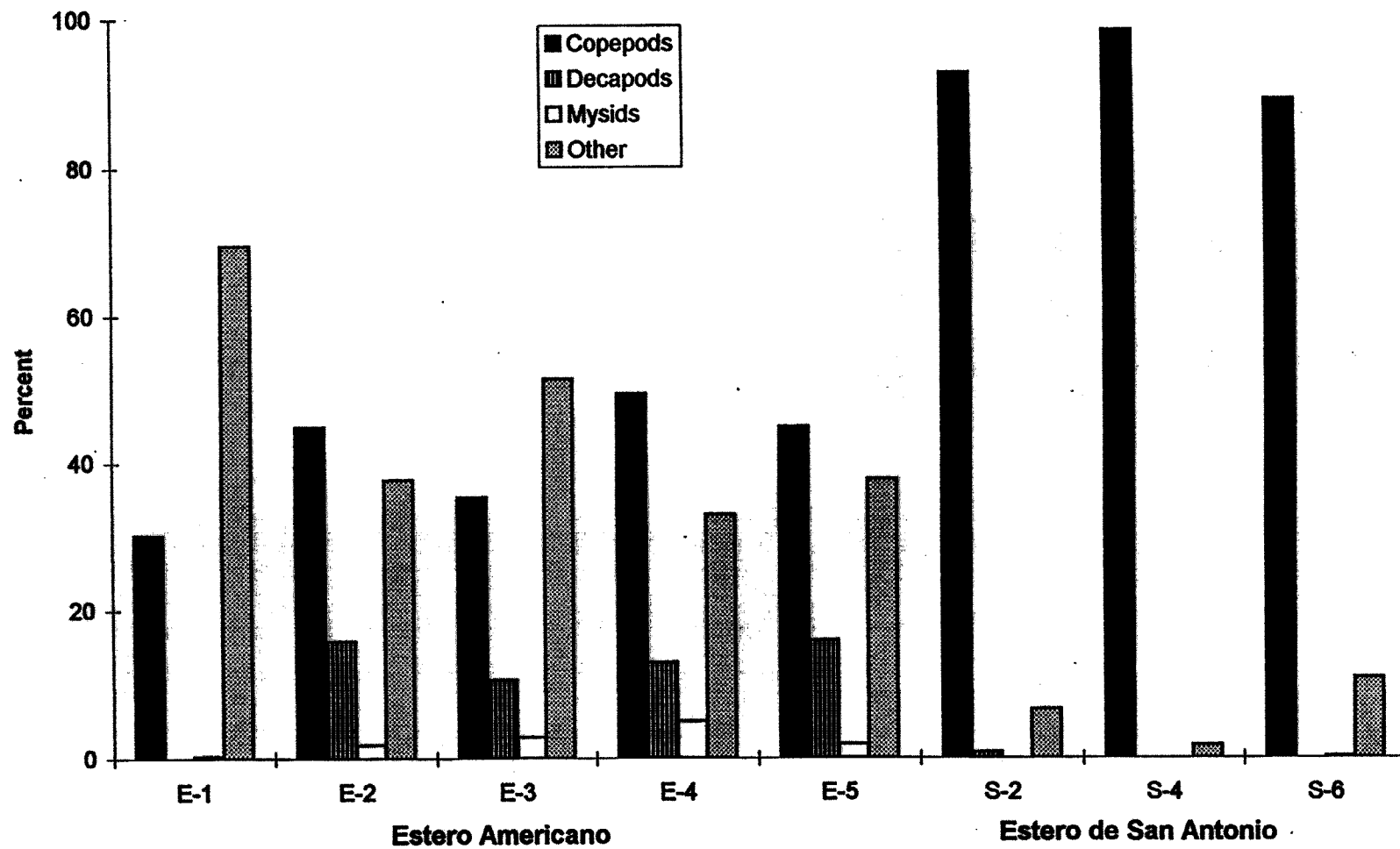


Figure P8. Estero de San Antonio: Bar Closure versus Zooplankton Diversity.

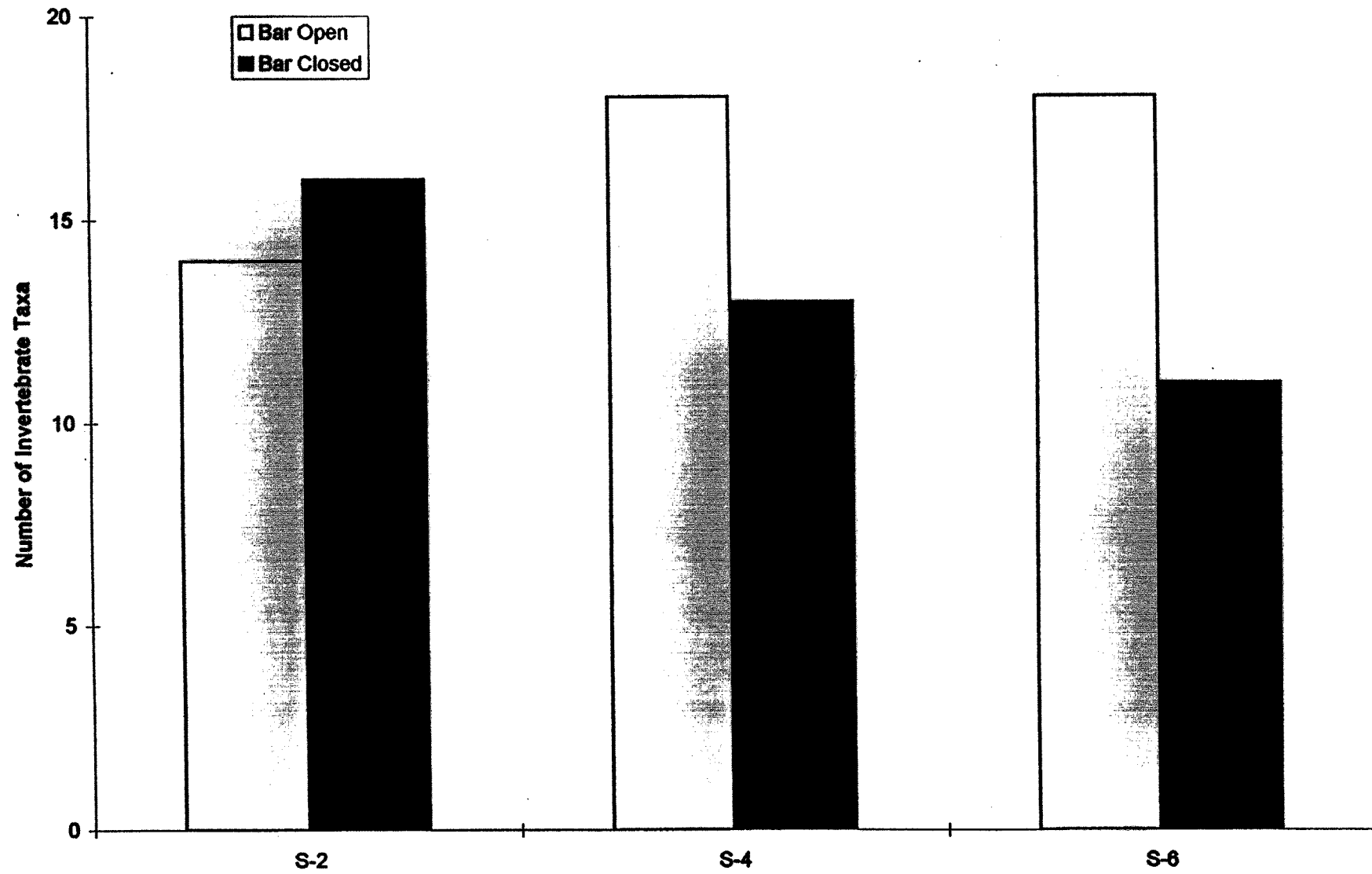


Figure P9. Estero de San Antonio: Bar Closure versus Zooplankton Abundance.

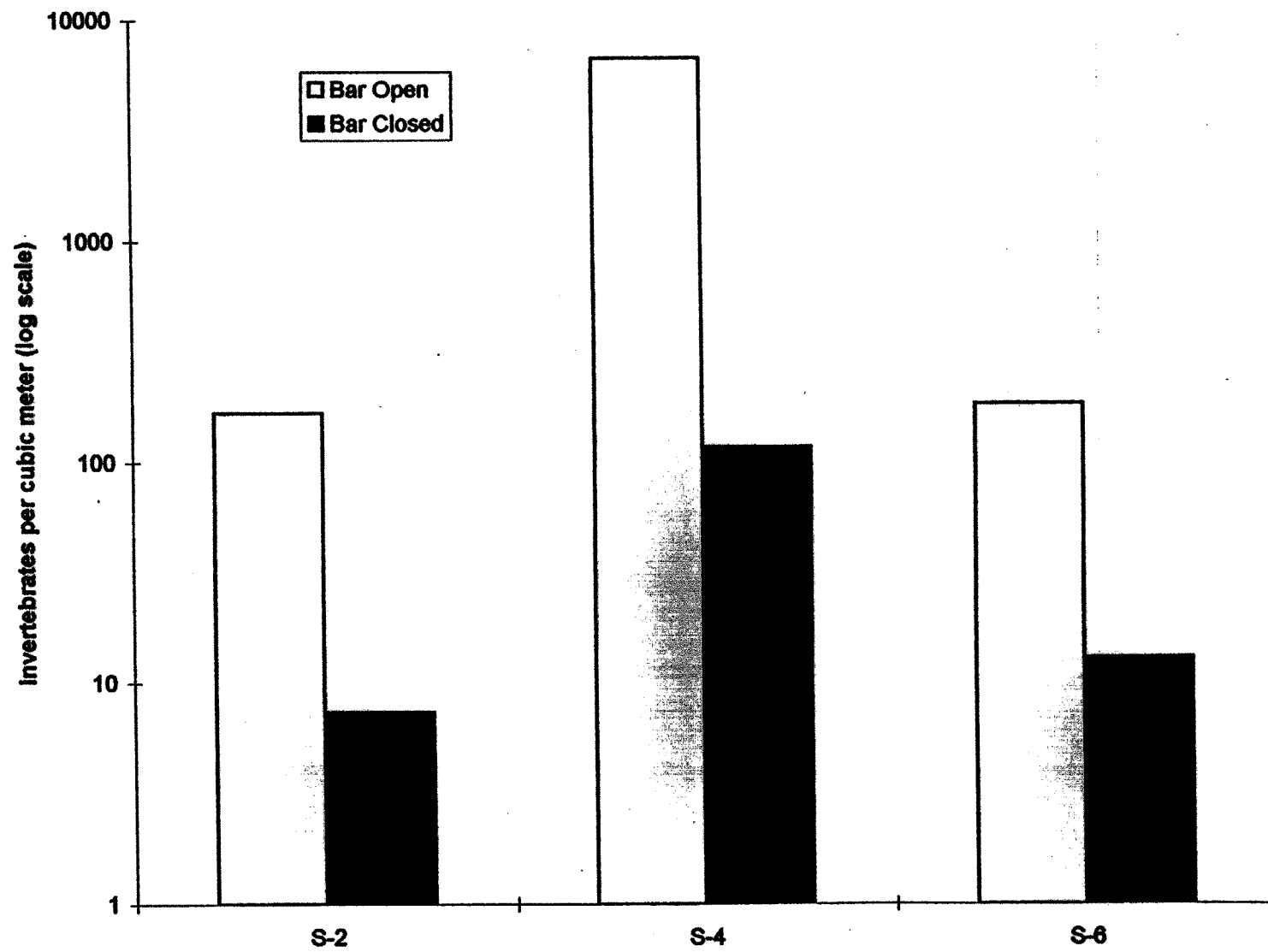
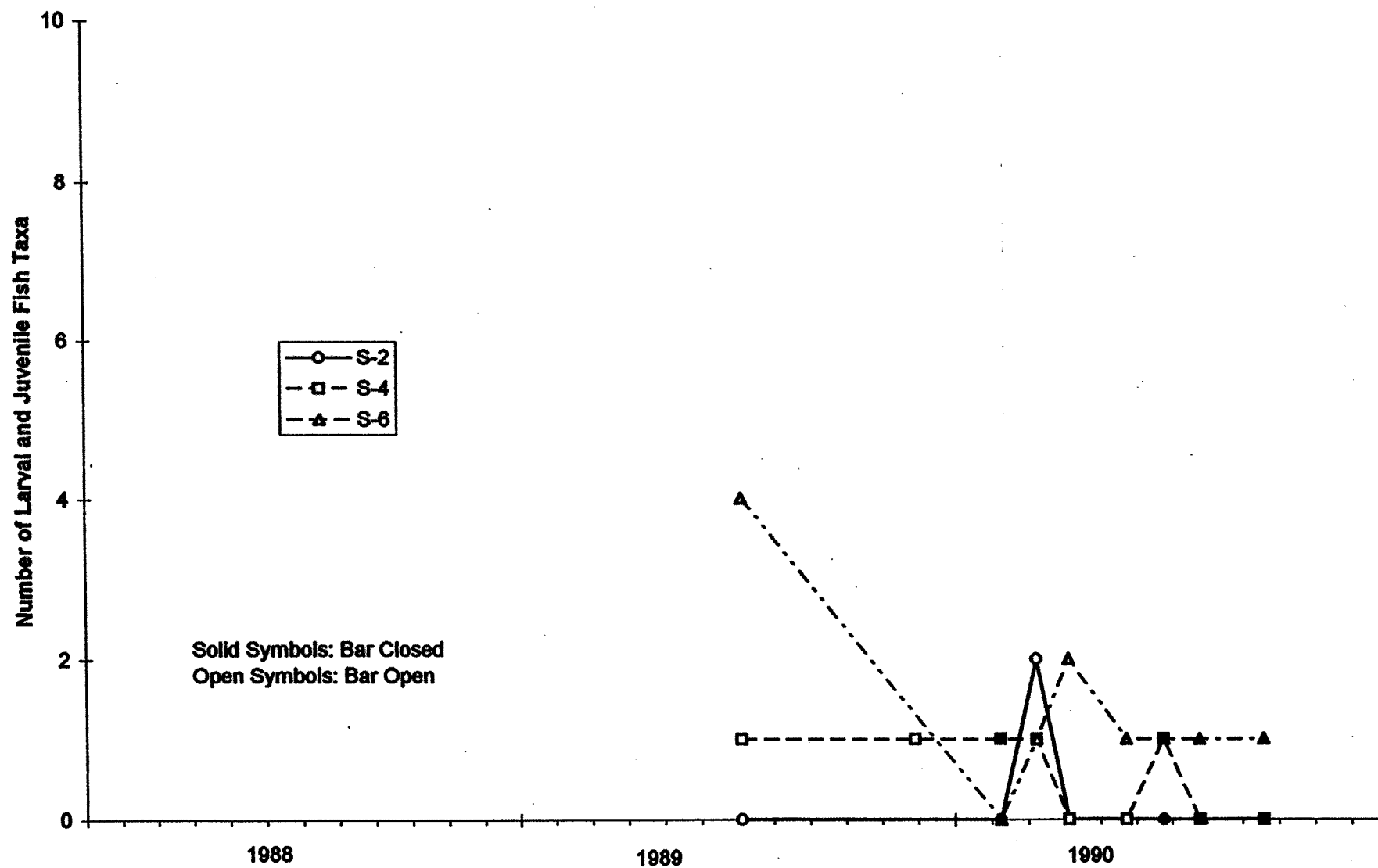
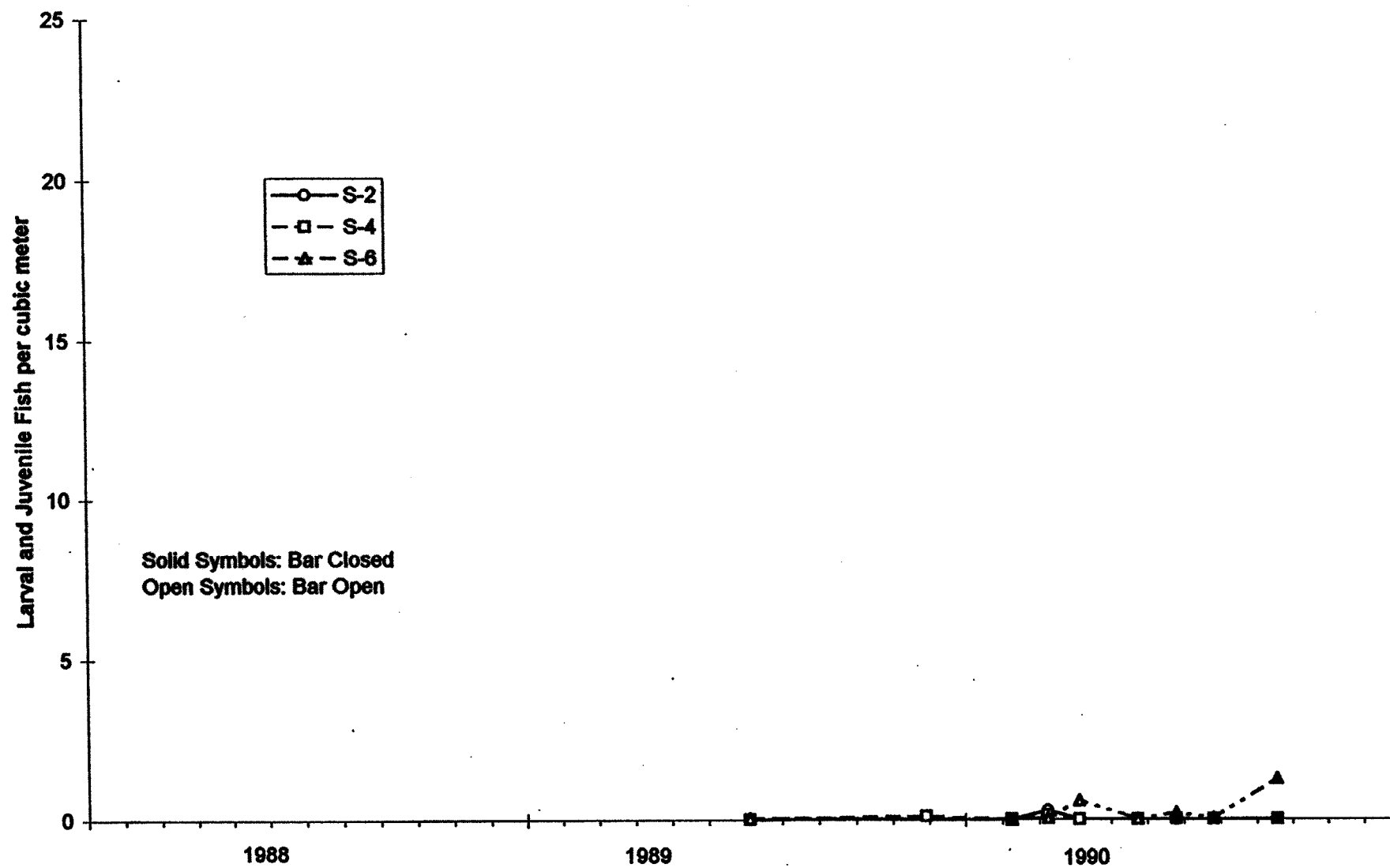


Figure P10. Estero de San Antonio: Larval Fish Diversity (Number of Taxa), 1988 -1990.



1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840.



NEKTON/EPIBENTHIC INVERTEBRATE FIGURES

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

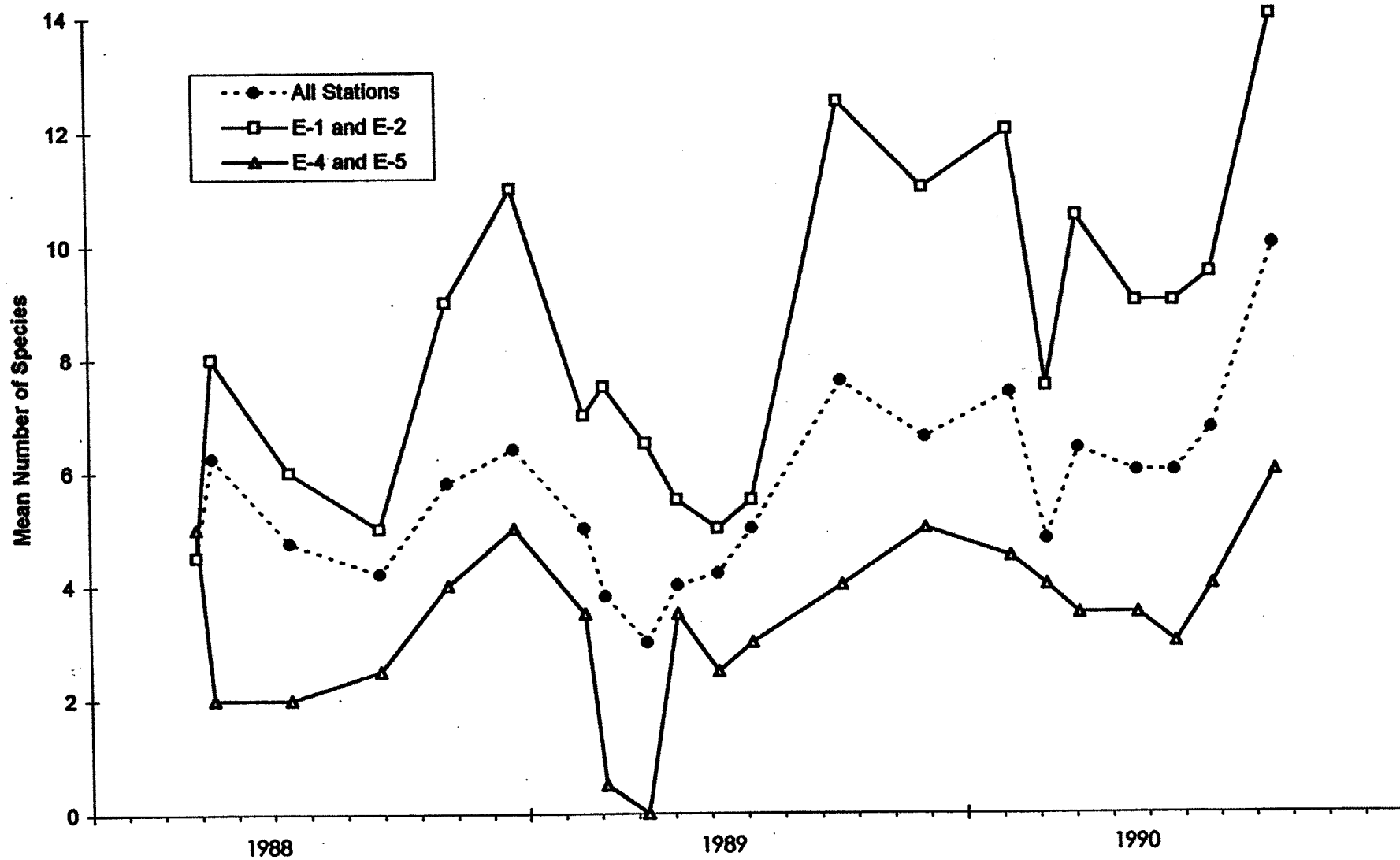
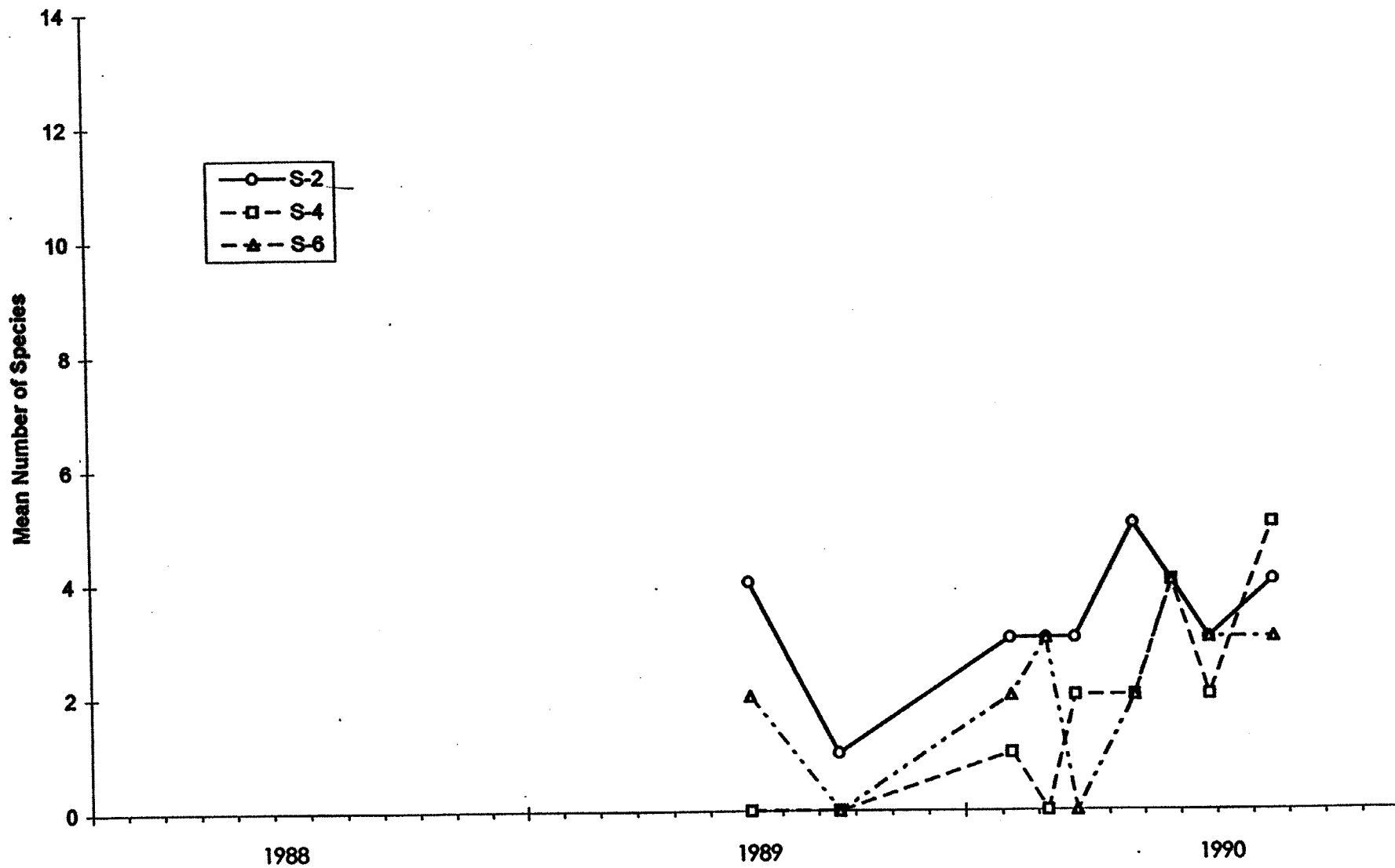
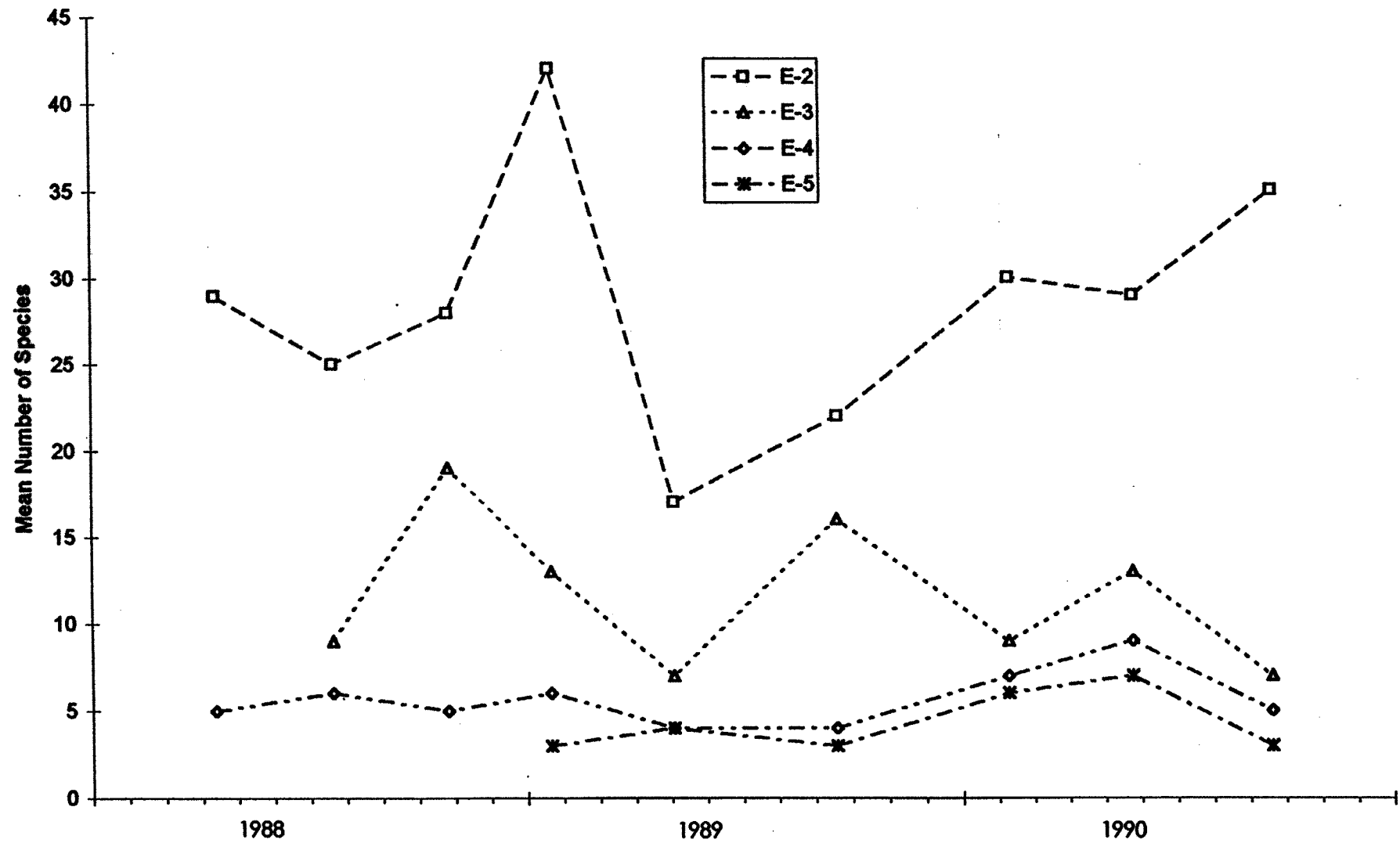


Figure E2. Mean Number of Species of Epibenthic Invertebrates Collected in Otter Trawls in Estero de San Antonio, 1989-1990.



BENTHIC INVERTEBRATE FIGURES

**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.**

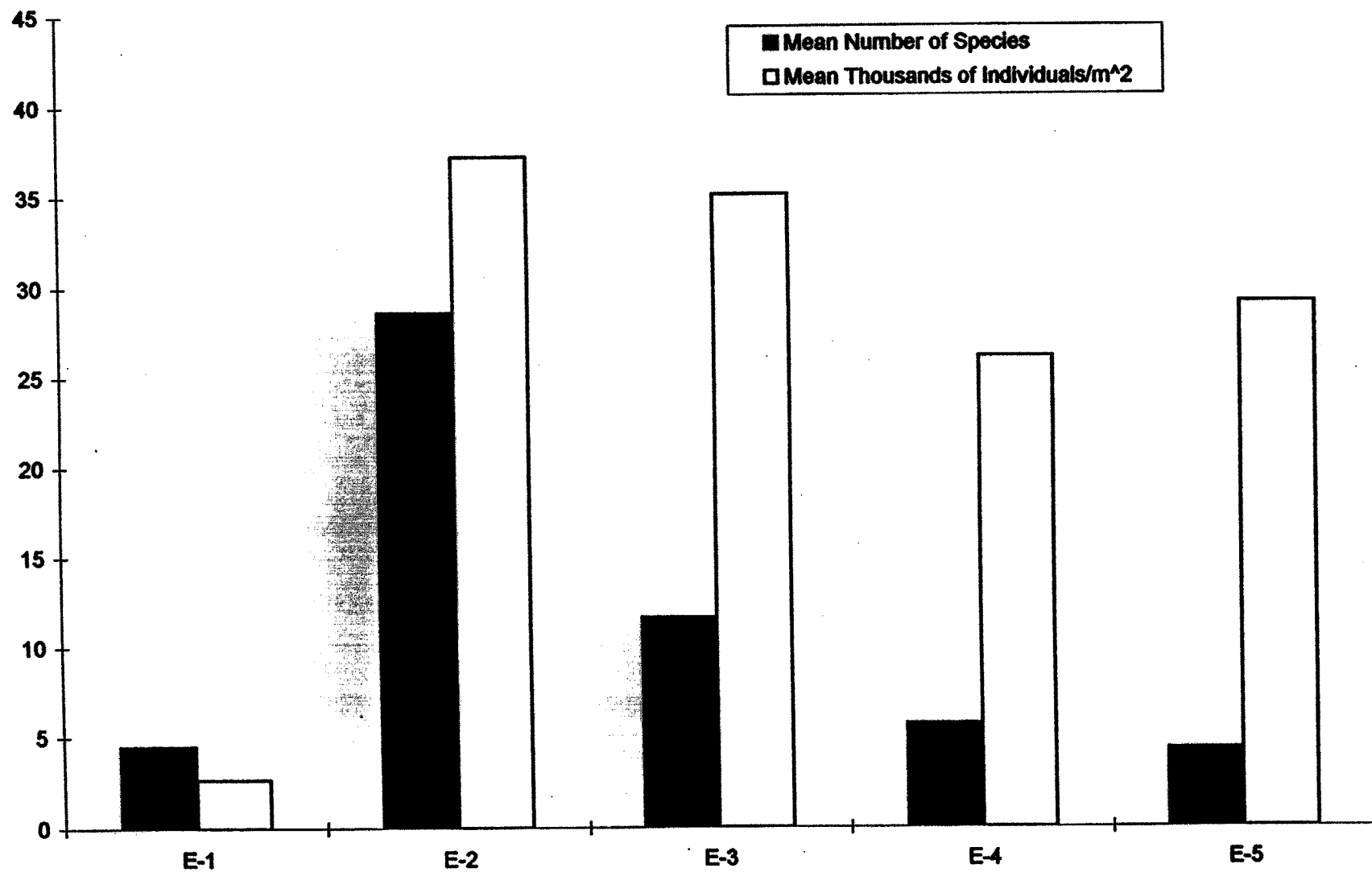


Figure B3. Estero de San Antonio Benthic Invertebrates: Mean Number of Species and Mean Number per Square Meter.

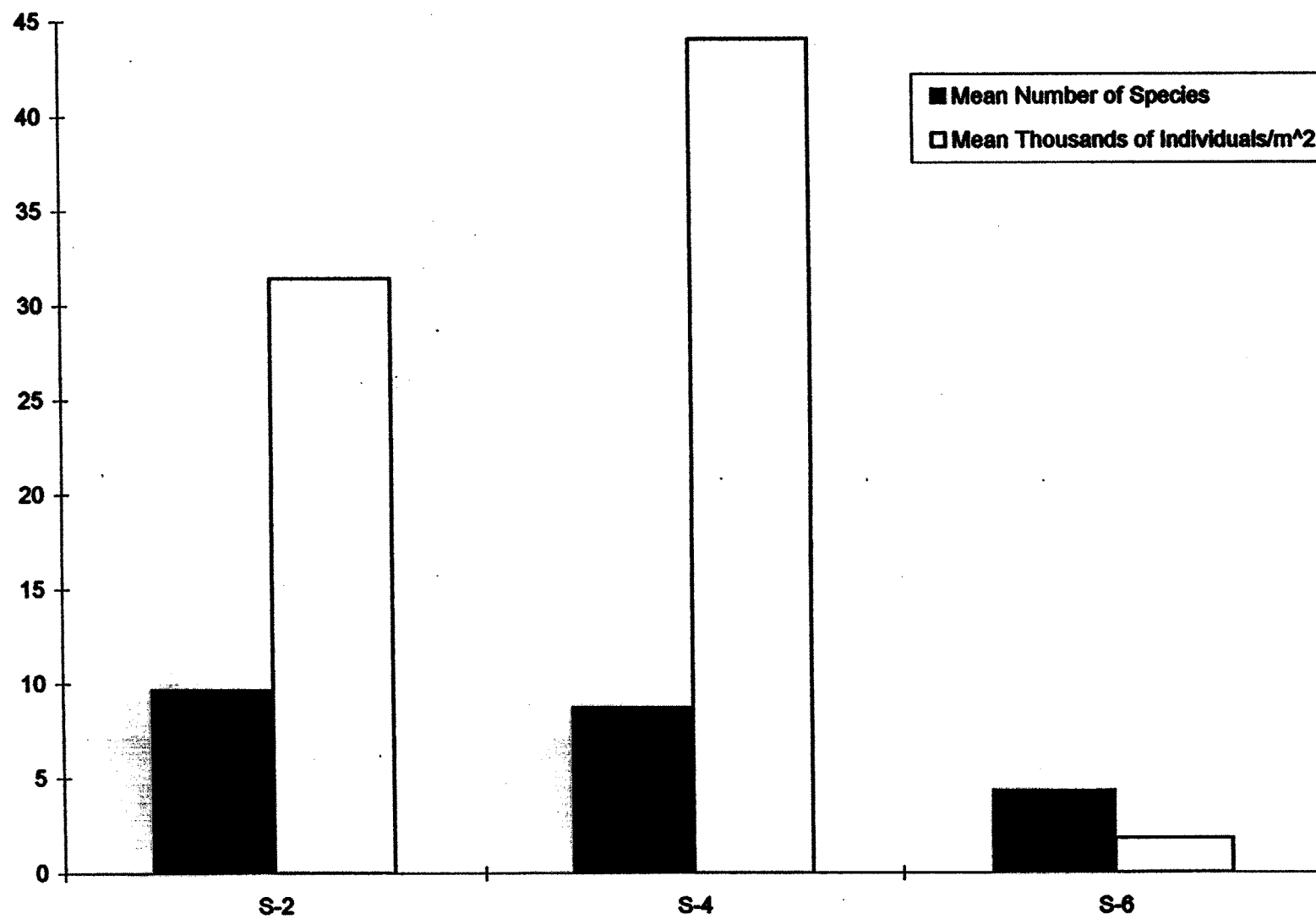
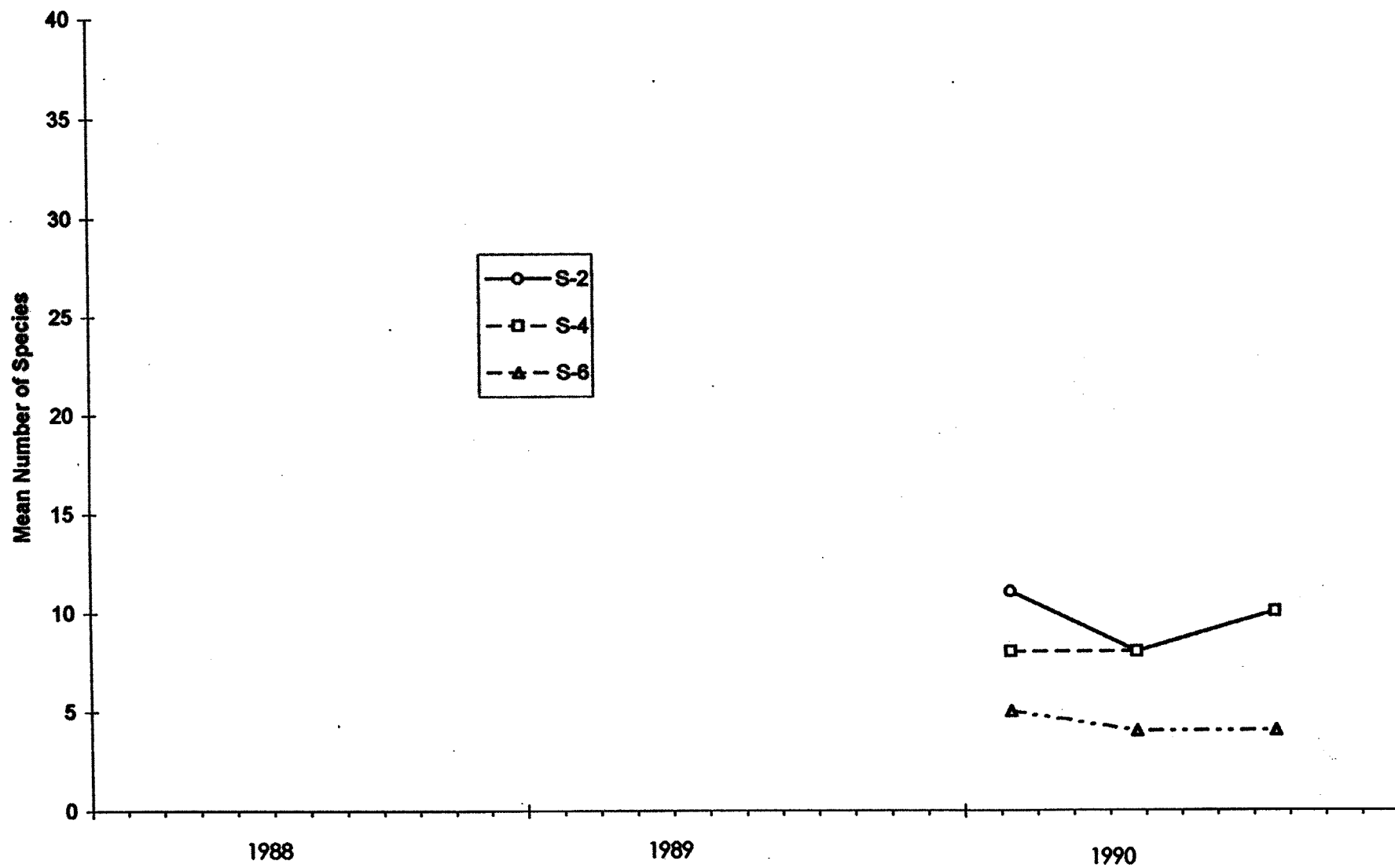


Figure B4. Estero de San Antonio Benthic Invertebrates: Mean Number of Species.



FISH FIGURES

Otter Trawl Catch (All Species), November 1989 - September 1990

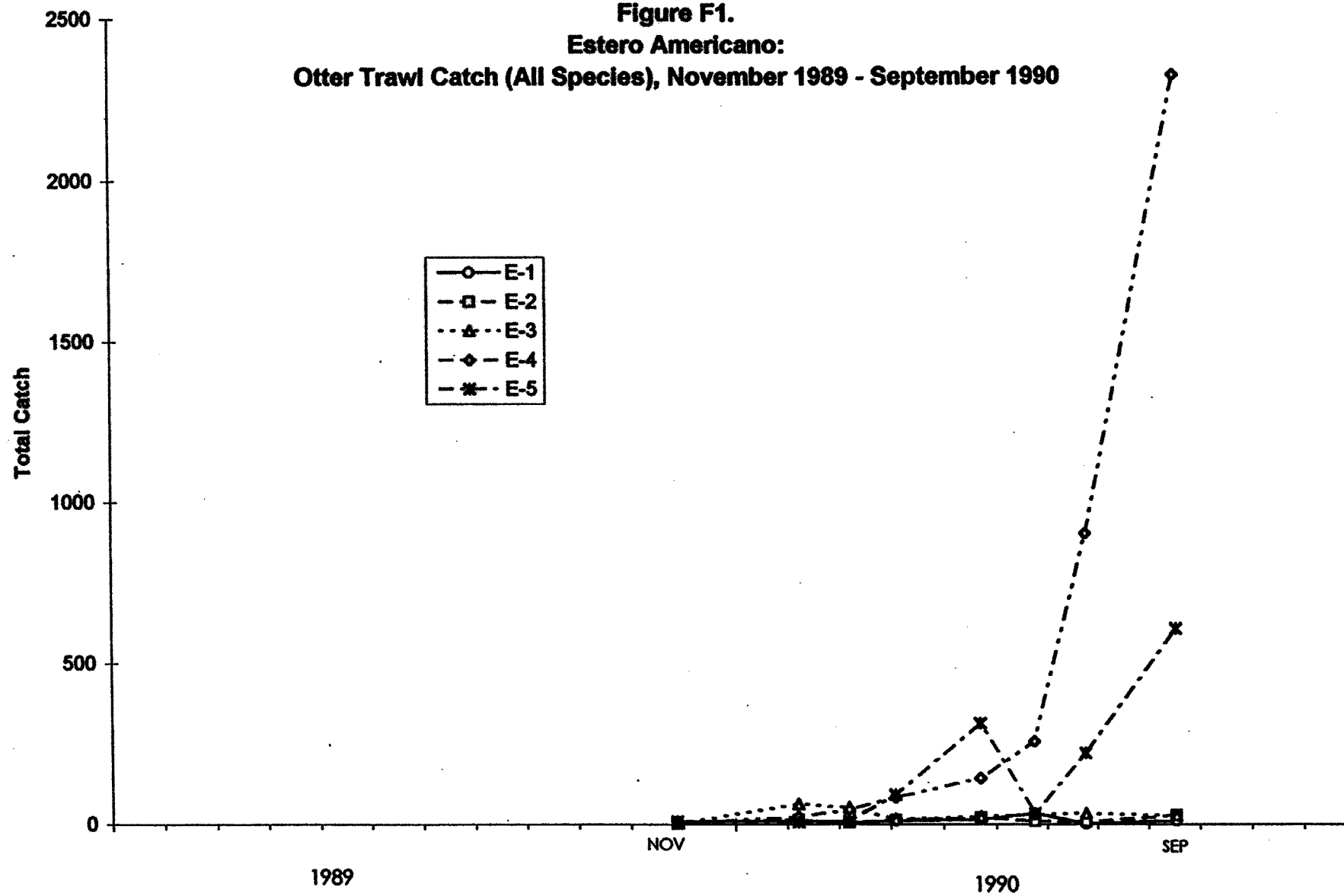


Figure F2.
Estero Americano:
Gillnet Catch (All Species), November 1989 - September 1990

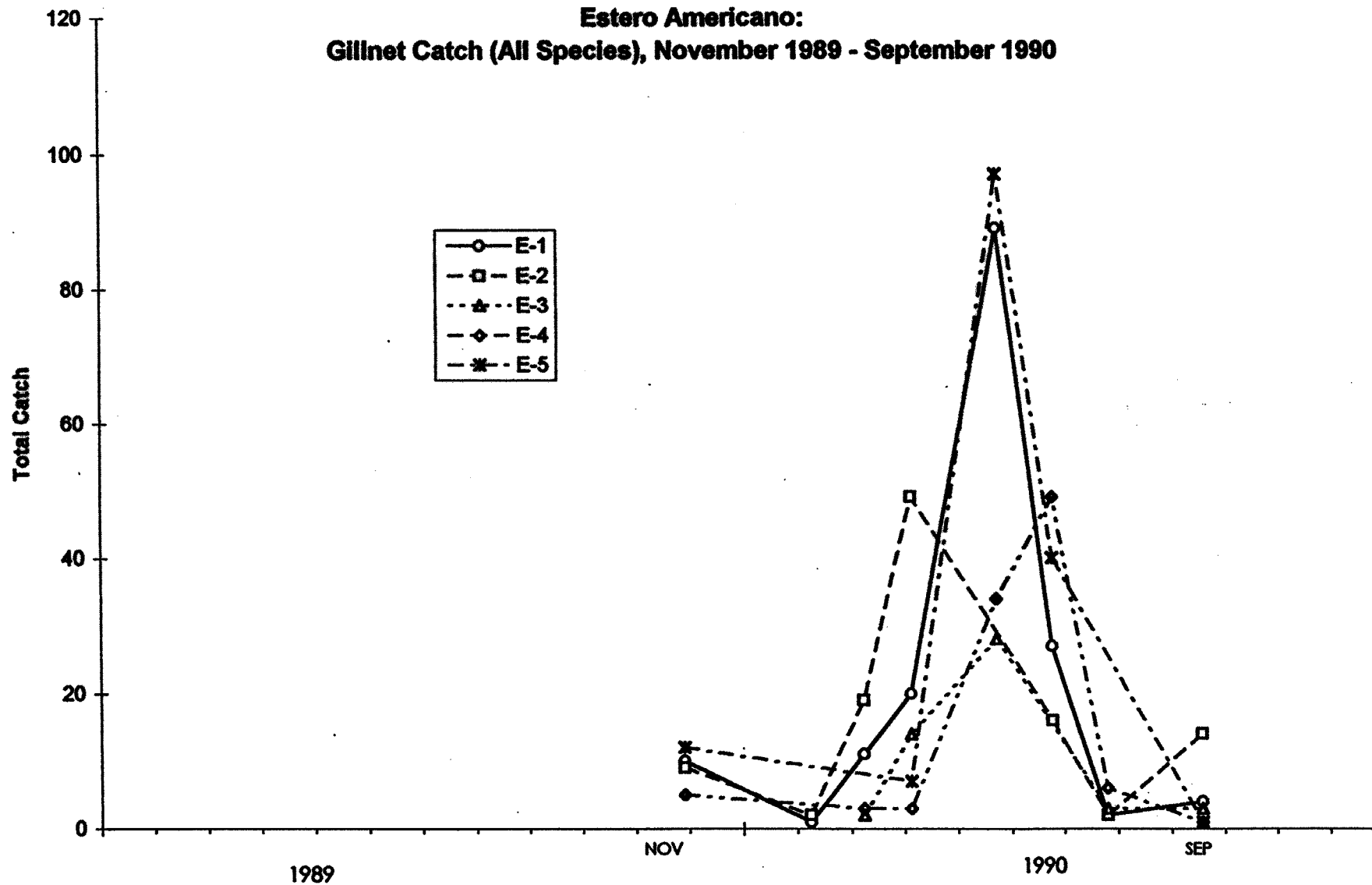


Figure F3.
Estero de San Antonio:
Otter Trawl Catch (All Species), February - September 1990

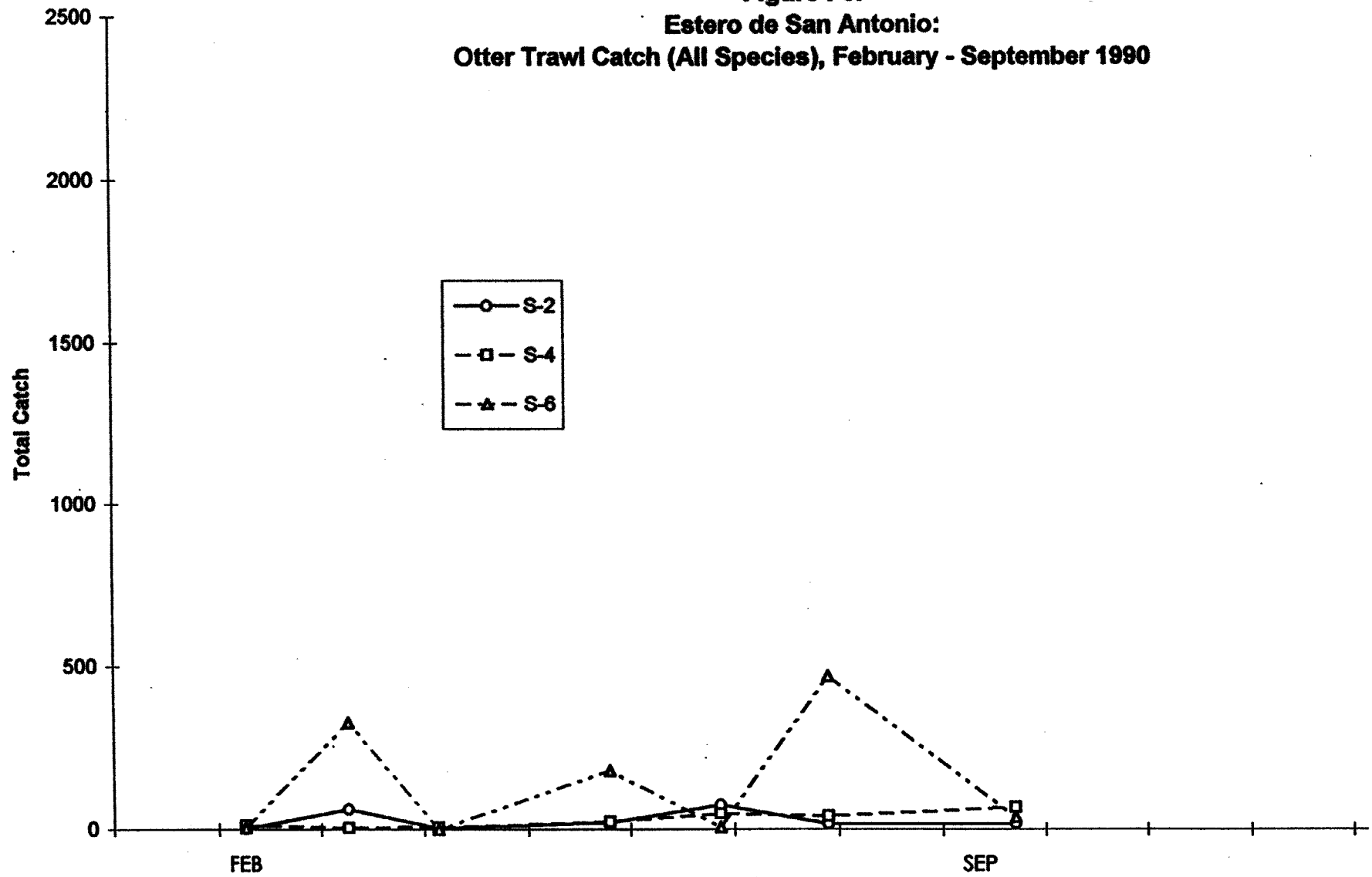


Figure F3.
Estero de San Antonio:
Otter Trawl Catch (All Species), February - September 1990

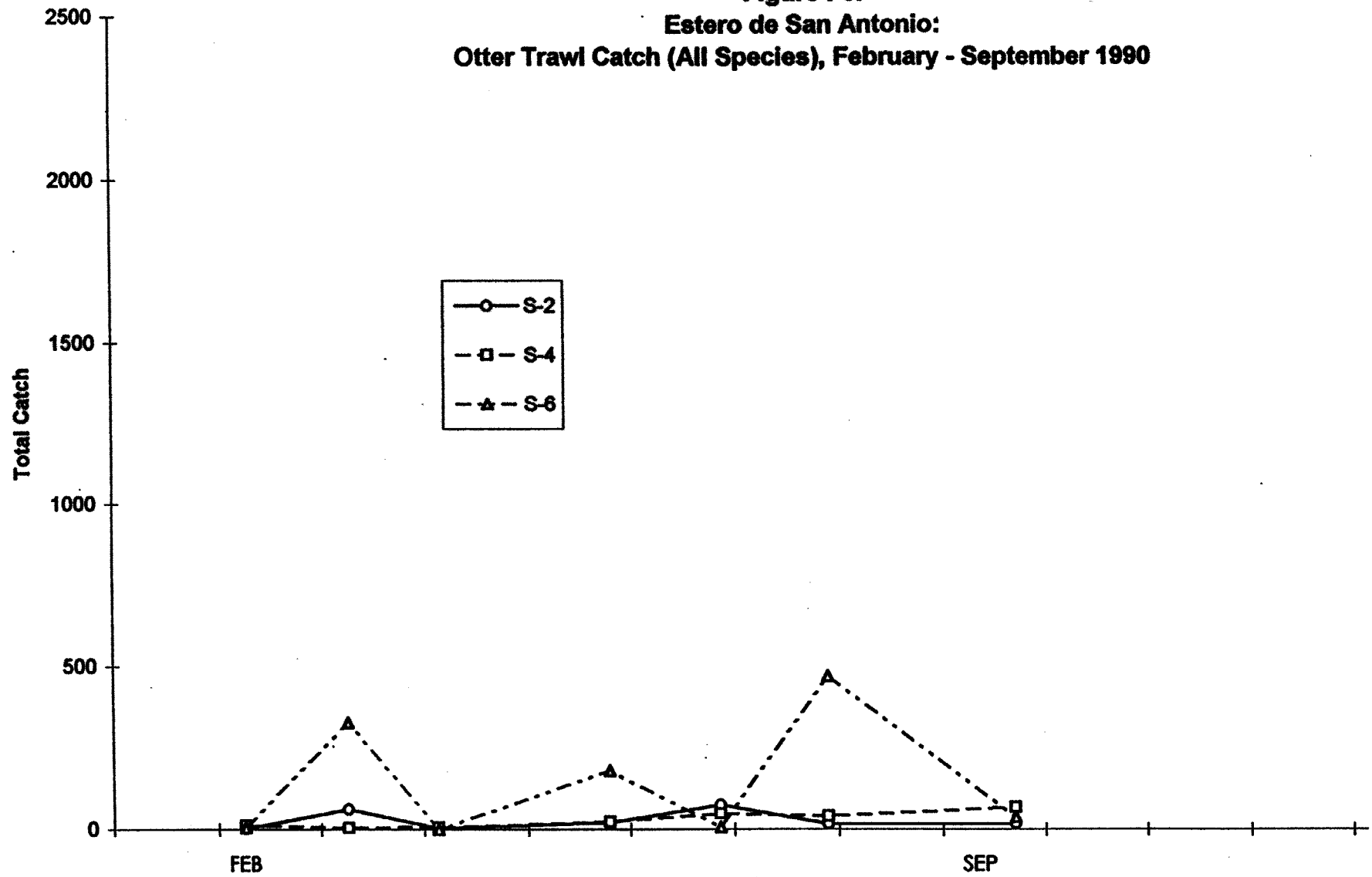


Figure F4.
Estero de San Antonio:
Gillnet Catch (All Species), February - September 1990

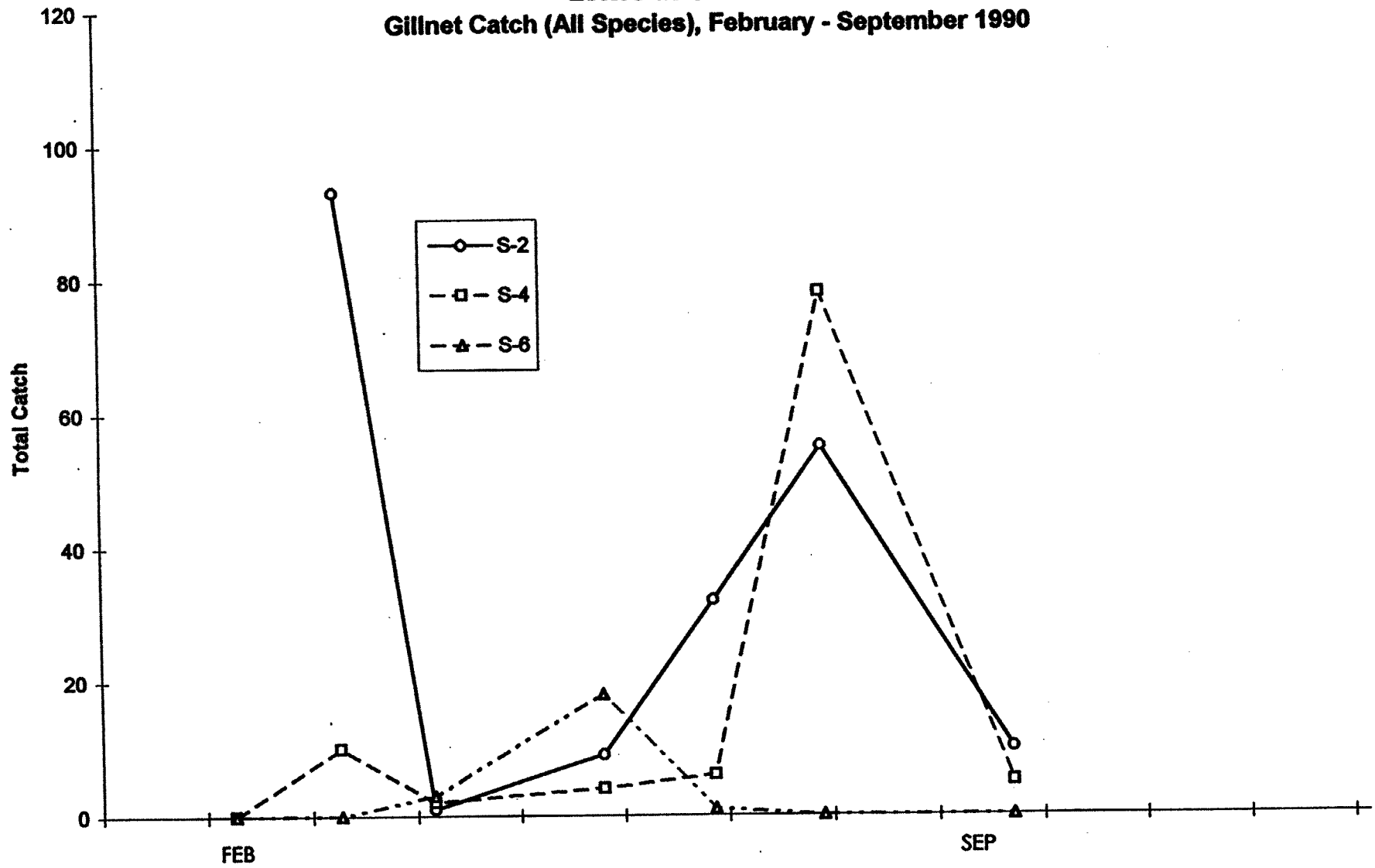


Figure F5.

**Estero de San Antonio: Total Catch (All Species) in Otter Trawls,
July 1989 - September 1990.**

Solid symbols: bar closed; Open symbols: bar open.

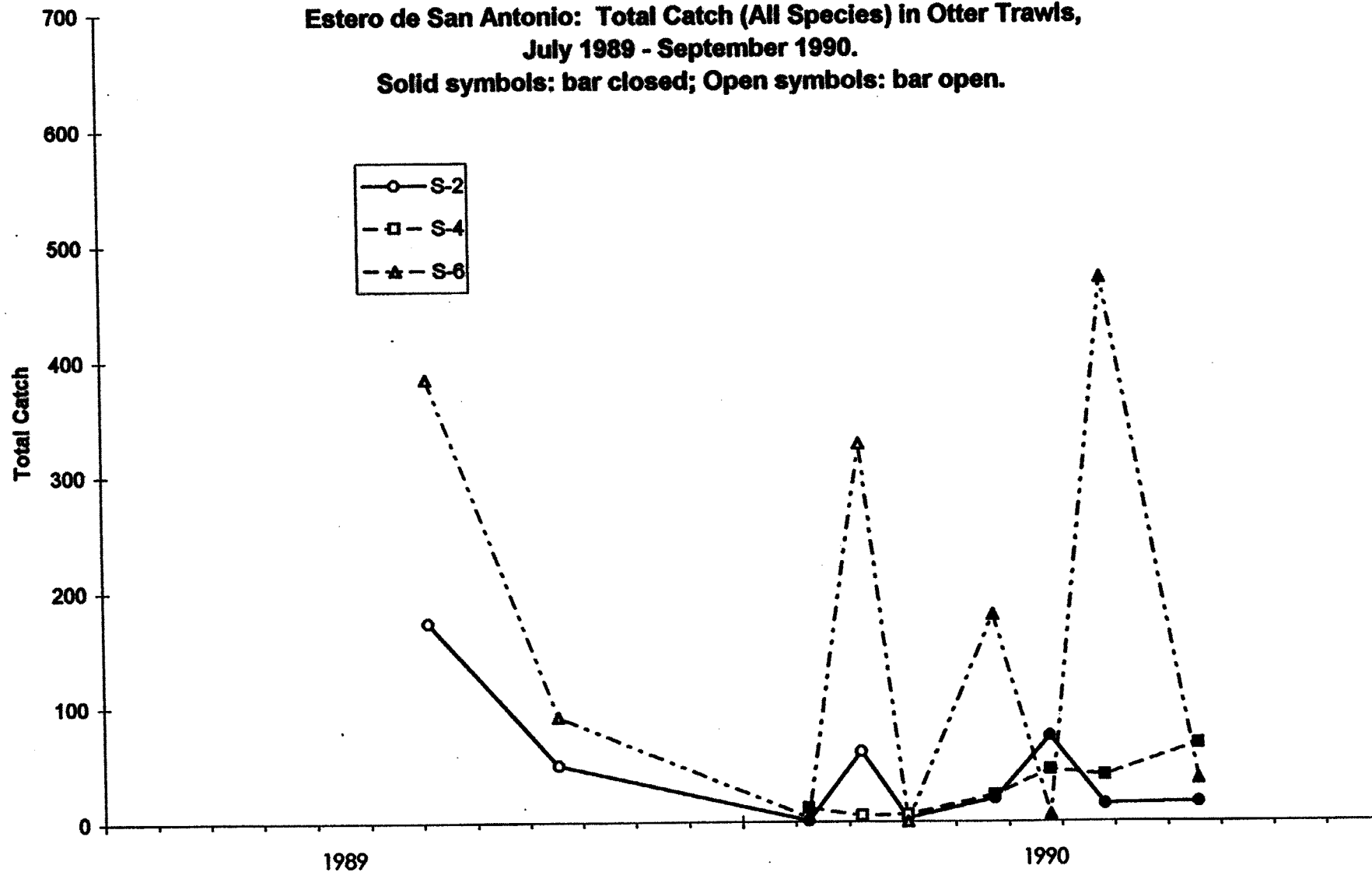
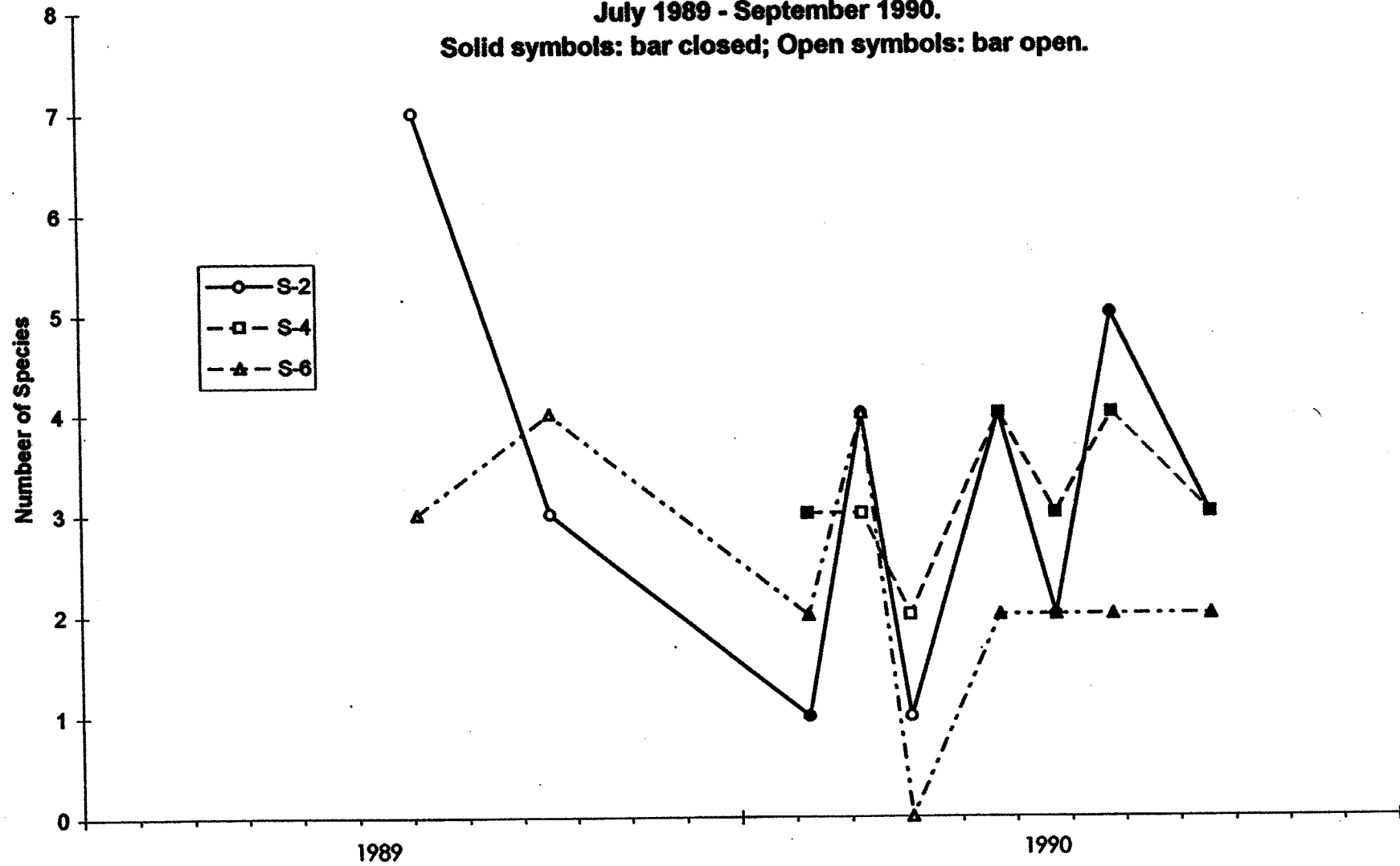


Figure F6.
Estero de San Antonio:
Number of Fish Species in Otter Trawls,
July 1989 - September 1990.
Solid symbols: bar closed; Open symbols: bar open.



WATER QUALITY APPENDIX

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 Detectable

| Station | Date | Temp.
°C | Salinity
ppt | Conduct. | DO
ppm | pH | Turbid.
FTU | Secchi
cm | Chla
mg/L | F.Coli
MPN/100ml | TDS | TSS | TOC | NO3
mg-N/L | NH3
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 * | 0.06 |
| 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 | | 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-Jan-89 | 9.5 | 34.1 | | 8.5 | 7.8 | 6.3 | 100 | 0.030146 | | | | | 0.06 | 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 | | | | | | | |
| E-1 | 6-Mar-89 | 10 | 32.7 | | | 7.7 | 2.8 | 170 | 0.010006 | | | | | 0.22 | 0.025 * |
| E-1 | 9-Apr-89 | 15 | 31 | | 9.1 | | | >175 | | | | | | | |
| E-1 | 4-May-89 | 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 | | | | | | | | | |
| 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 | | | 28 | | 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 | | 0.098 | 0.025 * |
| E-2 | 30-Mar-88 | 12 | 31.5 | | 8.4 | | | 65 | 0.0613 | | 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 | 78.7 | 0.108273 | | | | | 0.1 | 0.14 |
| E-2 | 21-Jul-88 | 17 | 32.3 | | 9.9 | 7.04 | 4.5 | 109 | | | | | | 0.015 * | 0.06 |
| 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 | 0.020067 | | | 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 | 8.8 | 33.1 | | 10.3 | 7.8 | 1.9 | >200 | 0.029555 | | | | | 0.05 | 0.025 * |
| E-2 | 2-Mar-89 | 11 | 4.8 | 5500 | 9.3 | 6.8 | 78 | 15 | 0.187427 | | | | | | |

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

| Station | Date | un-ionized
NH3
mg-N/L | Total P
mg-P/L | Diss P
mg-P/L | DOC
mg/L | Cd
mg/L | dissCd
mg/L | Cr
mg/L | a=acute c=chronic violations
dissCr
mg/L | Cu
mg/L | dissCu
mg/L | Pb
mg/L | dissPb
mg/L | total Ni
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 | 0.08 | | | | | | | | | | |
| 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 | |
| E-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 | | | | | | | | | | | | | |
| E-1 | 7-Jun-89 | | 0.47 | 0.02 | 0.5 * | 0.01 * | 0.01 | 0.0025 * | 0.0025 * | 0.001 * | 0.001 * | 0.0025 * | 0.0025 | |
| E-1 | 5-Jul-89 | | 0.04 | 0.07 | 2.2 | 0.005 * | 0.005 | 0.02 | 0.01 * | 0.001 * | 0.001 * | 0.1 * | 0.1 | |
| E-1 | 18-Sep-89 | | 0.07 | 0.06 | 1.4 | 0.01 * | 0.01 | 0.025 * | 0.025 * | 0.001 * | 0.001 * | 0.001 * | 0.001 | |
| E-1 | 28-Nov-89 | 0.000438 | 0.1 * | 0.1 * | 0.5 * | 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 | 0.0082 | 0.0084 | 0.00005 * | 0.00005 * | 0.00005 * | 0.00005 | |
| E-1 | 9-Mar-90 | 0.000165 | 0.1 | 0.06 | 1 | 0.067 | 0.062 | 0.0031 | 0.0028 | 0.0007 | 0.00005 * | 0.00005 * | 0.00005 | |
| E-1 | 5-Apr-90 | 0.00021 | 0.01 * | 0.01 * | 1.4 | 0.00005 * | 0.00005 | 0.0009 | 0.0057 | 0.002 | 0.00005 * | 0.0006 | 0.00005 | |
| E-1 | 24-May-90 | 0.000235 | 0.12 | 0.08 | 0.5 * | 0.00005 * | | 0.0014 | | 0.00005 * | | 0.01 | | |
| E-1 | 25-Jun-90 | 0.000227 | 0.09 | 0.05 | 0.5 * | 0.0006 | | 0.0061 | | 0.00005 * | | 0.00005 * | | |
| E-1 | 28-Jul-90 | 0.000418 | 0.09 | 0.06 | 1.3 | 0.00005 * | | 0.005 | | 0.007 | | 0.00005 * | | |
| E-1 | 18-Sep-90 | 0.00784 | 0.08 | 0.07 | 0.5 * | 0.00005 * | | 0.041 | | 0.0028 | | 0.00005 * | | |
| E-1 | 15-Nov-90 | | 0.08 | 0.03 | 3.6 | 0.0031 | | 0.0005 * | | 0.00005 * | | 0.0027 | | |
| E-2 | 30-Mar-88 | | 0.13 | 0.13 | | | | | | | | | | |
| E-2 | 14-Apr-88 | | 0.08 | 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 | 0.08 | | | | | | | | | | |
| 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 | | | | | | | | | | | | | |

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 | dissSilica
µg/l |
|---------|-----------|------------|----------------|------------|----------------|------------|------------|----------------|------------|----------------|----------------|--------------------|
| E-1 | 29-Feb-88 | | | 0.005 * | | | | | | | | |
| E-1 | 30-Mar-88 | | | | | | | | | | | |
| E-1 | 14-Apr-88 | | | | | | | | | | | |
| E-1 | 16-May-88 | | | 0.01 * | | | | | | | | |
| E-1 | 15-Jun-88 | | | | | | | | | | | |
| 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 * | | | | | | | |
| E-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 * | | 0.089 | 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 | 0.000025 * | 0.000025 * | 0.0062 | 0.0051 | | | | | | | |
| E-1 | 24-May-90 | 0.0007 | | 0.0005 * | | | | | | | | |
| E-1 | 25-Jun-90 | 0.000025 * | | 0.0005 * | | | | | | | | |
| E-1 | 26-Jul-90 | 0.0008 | | 0.0005 * | | | | | | | | |
| E-1 | 18-Sep-90 | 0.000025 * | | 0.0005 * | | | | | | | | |
| E-1 | 15-Nov-90 | 0.000025 * | | 0.018 | | | | | | | | |
| 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 | | | | | | | | | | | |

**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 Detectable

| Station | Date | Temp.
°C | Salinity
ppt | Conduct. | DO
ppm | pH | Turbid.
FTU | Secchi
cm | Chla
mg/L | F Cell
MPN/100ml | TDS | TSS | TOC | NO3
mg-N/L | NH3
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 | 0.008983 | | | 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 | 80 | 0.0314 | | | 36 | | 0.05 | 0.08 |
| E-2 | 25-Jun-90 | 14.3 | 33.9 | | 6.8 | 7.6 | 6.2 | 70 | 0.0519 | | | 32 | | 0.06 | 0.11 |
| E-2 | 26-Jul-90 | 12.7 | 32 | | 8 | 8 | 2.2 | 100 | 0.0359 | | | 53 | | 0.24 | 0.025 * |
| E-2 | 18-Sep-90 | 10.4 | 30 | | 8 | 7.8 | 2.2 | 180 | 0.099 | | | 9.2 | | 0.09 | 0.025 * |
| E-2 | 15-Nov-90 | 10.8 | 32.3 | | 9.6 | 7.8 | | 185 | 0.13 | | | 16 | | 0.11 | 0.083 |
| 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 | 48500 | 6.9 | 7.5 | 22 | 35.8 | 0.095931 | | | | | 0.13 | 0.19 |
| E-3 | 21-Jul-88 | 18.1 | 33 | | 10 | 7.89 | 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 | 0.08 |
| 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 | 7.8 | 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 | 0.0533 | | | 180 | | 0.015 * | 0.11 |
| E-3 | 26-Jul-90 | 16.4 | 32 | | 8.4 | 8.5 | 8.8 | 65 | 0.0441 | | | 64 | | 0.015 * | 0.025 * |
| E-3 | 18-Sep-90 | 14 | 30.3 | | 7.6 | 7.3 | 8.8 | 65 | 0.05 | | | 28 | | 0.1 | 0.05 |

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

| Station | Date | un-ionized | Total P
mg-P/L | Diss P
mg-P/L | DOC
mg/L | Cd
mg/L | dissCd
mg/L | Cr
mg/L | a=acute c=chronic violations | | | Pb
mg/L | dissPb
mg/L | total Ni
mg/L |
|---------|-----------|---------------|-------------------|------------------|-------------|------------|----------------|------------|------------------------------|------------|----------------|------------|----------------|------------------|
| | | NH3
mg-N/L | | | | | | | dissCr
mg/L | Cu
mg/L | dissCu
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 | | 0.06 | 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 | 0.08 | | | | | | | | | | |
| E-2 | 15-Nov-90 | | 0.09 | 0.04 | | | | | | | | | | |
| E-3 | 29-Feb-88 | | 0.12 | 0.10 | | 0.005 * | | 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 | 28-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 | 28-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 * | 0.01 | 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 * | 0.00005 | 0.006 | 0.006 | 0.003 | 0.002 | 0.009 | 0.0005 | |
| E-3 | 7-Feb-90 | 0.00486 | 0.59 | 0.52 | 8.7 | 0.00005 * | 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 | 0.001746 | 0.63 | 0.01 * | 2.9 | 0.00005 * | 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 * | | |

**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 | 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 | | | | | | | | | | | |
| 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 | | | | | | | | | | | |
| E-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 | 22-Nov-88 | | | | | | | | | | | |
| E-3 | 20-Dec-88 | | | | | | | | | | | |
| E-3 | 20-Jan-89 | | | | | | | | | | | |
| E-3 | 17-Feb-89 | | | 0.07 | 0.01 * | | | | | | | |
| E-3 | 6-Mar-89 | | | 0.04 | 0.04 | | | | | | | |
| E-3 | 9-Apr-89 | | | | | | | | | | | |
| 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 |
| E-3 | 5-Jul-89 | | | 0.11 | 0.085 | | | | | | | |
| 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 * | | | | | | | | |

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 Detectable

| Station | Date | Temp.
°C | Salinity
ppt | Conduct. | DO
ppm | pH | Turbid.
FTU | Secchi
cm | Chla
mg/L | F Coll
MPN/100ml | TDS | TSS | TOC | NO3
mg-N/L | NH3
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 | 23.9 | | 11.8 | 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 | 1.27906 | | | | | 0.05 * | 0.73 |
| E-4 | 21-Jul-88 | 25 | 38.8 | | 10.8 | 7.98 | 20 | 41 | 0.297565 | | | | | 0.03 | 0.18 |
| E-4 | 29-Aug-88 | 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 | 0.095828 | | | | | 0.15 * | 0.08 |
| E-4 | 25-Oct-88 | 13.5 | 31.8 | | 6.2 | 7.9 | 12 | 65 | 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 | 28 | 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 | | | 18 | | 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 | | 1210 | 8.7 | 7.1 | 24 | 25 | 0.0653 | | | 25 | | 0.72 | 3.3 |
| E-4 | 5-Apr-90 | 13.4 | 10.5 | | 5.2 | 7.7 | 18 | 30 | 0.1188 | | | 52 | | 0.7 | 0.16 |
| E-4 | 24-May-90 | 17.1 | 26.2 | | 7.3 | 8.2 | 28 | 37 | 0.1281 | | | 58 | | 0.34 | 0.29 |
| E-4 | 25-Jun-90 | 22 | 30 | | 4.9 | 7.9 | 92 | 10 | 0.4473 | | | 460 | | 0.27 | 1.4 |
| E-4 | 26-Jul-90 | 21 | 35 | | 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 * | 0.08 |
| E-4 | 15-Nov-90 | 9.5 | 32.6 | | 8.4 | 7.7 | | 75 | 0.021 | | | 18 | | 0.015 * | 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 | | 16.8 | 6.9 | 26 | 22.9 | 5.5539 | 26 | 21000 | | | 0.06 | 0.09 |
| E-5 | 15-Jun-88 | | | | | | 347 | 22.9 | 1.42494 | | 29000 | | | 0.05 * | 0.67 |
| E-5 | 21-Jul-88 | 24 | 36.5 | | 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 | 0.080522 | | 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 | | 17 | | 0.100487 | | 13000 | | | 0.84 | 6 |
| E-5 | 17-Feb-89 | 10 | 5.5 | | 4.9 | 7.5 | 17 | 25 | 0.078025 | >2400 | 7500 | | | 0.39 | 10 |

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

| Station | Date | un-ionized
NH3
mg-N/L | Total P
mg-P/L | Diss P
mg-P/L | DOC
mg/L | Cd
mg/L | dissCd
mg/L | Cr
mg/L | a=acute c=chronic violations | | | Pb
mg/L | dissPb
mg/L | total Ni
mg/L |
|---------|-----------|-----------------------------|-------------------|------------------|-------------|------------|----------------|------------|------------------------------|---------|---------|------------|----------------|------------------|
| E-3 | 15-Nov-90 | | 0.06 | 0.05 | 5.5 | 0.0018 | | 0.0005 * | | | | 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 | 0.003812 | 0.1 * | 0.1 * | | | | | | | | | | |
| E-4 | 22-Nov-88 | 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-89 | 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 | 0.83 | 0.2 | | | | | | | | | | |
| E-4 | 7-Feb-90 | 0.00812 c | 2.1 | 1.8 | | | | | | | | | | |
| E-4 | 9-Mar-90 | 0.006105 | 2.4 | 1.9 | | | | | | | | | | |
| E-4 | 5-Apr-90 | 0.001398 | 1.1 | 0.99 | | | | | | | | | | |
| E-4 | 24-May-90 | 0.009857 | 0.73 | 0.37 | | | | | | | | | | |
| E-4 | 25-Jun-90 | 0.03374 | 1.5 | 0.76 | | | | | | | | | | |
| 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 | | 0.16 | 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 | 0.28 | | | | | | 0.01 * | 0.01 * | 0.005 * | 0.005 | |
| E-5 | 22-Nov-88 | 0.010368 | 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 | | | | | | | | | | |
| 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 | | | | | | | | | | |
| E-5 | 17-Feb-89 | 0.0459 c | 3.7 | 2.3 | 20 | 0.005 * | 0.005 | 0.01 * | 0.01 * | 0.005 | 0.003 | 0.0025 * | 0.0025 | |

**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 | dissSilica
µg/l |
|---------|-----------|------------|----------------|------------|----------------|------------|------------|----------------|------------|----------------|----------------|--------------------|
| E-3 | 15-Nov-80 | 0.000025 * | | 0.0005 * | | | | | | | | |
| E-4 | 28-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 | | | | | | | | | | | |
| E-4 | 17-Feb-89 | | | | | | | | | | | |
| E-4 | 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 | | | | | | | | | | | |
| 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 | 28-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 | | | 0.009 | 0.032 | | | | | | | |
| E-5 | 20-Jan-89 | | | | | | | | | | | |
| E-5 | 17-Feb-89 | | | 0.05 | 0.01 * | | | | | | | |

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 Detectable

| Station | Date | Temp.
°C | Salinity
ppt | Conduct. | DO
ppm | pH | Turbid.
FTU | Secchi
cm | Chla
mg/L | F Coll
MPN/100ml | TDS | TSS | TOC | NO3
mg-N/L | NH3
mg-N/L |
|---------|-----------|-------------|-----------------|----------|-----------|------|----------------|--------------|--------------|---------------------|-------|-----|-----|---------------|---------------|
| E-5 | 2-Mar-89 | 10.5 | 0 | 332 | 4.7 | 7.6 | 66 | 7 | 0.83157 | | | | | 1.4 | 5 |
| E-5 | 6-Mar-89 | 11 | 0 | 315 | 4.2 | 7.5 | 52 | 18 | 0.434022 | | 360 | | | 0.85 | 3.6 |
| E-5 | 10-Apr-89 | | | | | | | | 0.048474 | | | | | | |
| 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-90 | 7 | 1 | 900 | 7.2 | 7.5 | 16 | 45 | 0.080596 | 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-5 | 5-Apr-90 | 14 | 5 | 5800 | 5.8 | 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 | 6.196 | | 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 | | 1.702391 | | 1100 | | | 0.59 | 24 |
| E-6 | 21-Dec-88 | | 1.2 | 1700 | 1.2 | 7.8* | v.high | | 6.056749 | | 1500 | | | 0.015 * | 110 |
| E-6 | 20-Jan-89 | 10.8 | 0 | 700 | 2.3 | 7.65 | 27 | | 0.358387 | | 640 | | | 0.03 | 18 |
| E-6 | 17-Feb-89 | 13.9 | 0.2 | 700 | 11.2 | 7.5 | 15 | | 0.546174 | >1=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 | | 0.805219 | | 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 | 4.6 |
| 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 |

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

| Station | Date | un-ionized | Total P
mg-P/L | Diss P
mg-P/L | DOC
mg/L | a=acute c=chronic violations | | | | | | Pb
mg/L | dissPb
mg/L | total Ni
mg/L |
|---------|-----------|---------------|-------------------|------------------|-------------|------------------------------|----------------|------------|----------------|------------|----------------|------------|----------------|------------------|
| | | NH3
mg-N/L | | | | Cd
mg/L | dissCd
mg/L | Cr
mg/L | dissCr
mg/L | Cu
mg/L | dissCu
mg/L | | | |
| E-5 | 2-Mar-89 | 0.0341 | 3.7 | 2.1 | | | | | | | | | | |
| 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 | 10-Apr-89 | | | | | | | | | | | | | |
| E-5 | 4-May-89 | 0.006206 | 1.4 | 0.97 | 17 | 0.005 * | 0.005 | 0.01 * | 0.01 * | 0.006 | 0.001 * | 0.05 * | 0.05 | |
| E-5 | 26-May-89 | | | | | | | | | | | | | |
| E-5 | 7-Jun-89 | 0.00173 | 0.68 | 0.39 | 9.3 | 0.01 * | 0.01 | 0.014 | 0.009 | 0.007 | 0.003 | 0.0025 * | 0.0025 | |
| 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 * | 0.1 | |
| 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 | 23-Oct-89 | 0.001131 | 0.42 | 0.22 | | | | | | 0.001 * | 0.001 * | | | |
| 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-5 | 16-Jan-90 | 0.00363 c | 3.5 | 2.6 | | | | | | 0.005 | 0.0043 a | | | |
| E-5 | 7-Feb-90 | 0.012276 c | 2.7 | 2.2 | 23 | 0.0001 | 0.0001 | 0.0034 | 0.0021 | 0.0051 | 0.0037 a | 0.0007 | 0.0006 | |
| 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 | 5-Apr-90 | 0.001625 c | 1.7 | 0.48 | 6.2 | 0.00005 * | 0.00005 | 0.0045 | 0.0005 * | 0.0036 | 0.0023 | 0.00005 * | 0.00005 | |
| E-5 | 24-May-90 | 0.007676 | 0.7 | 0.5 | 7.9 | 0.00005 * | | 0.0049 | | 0.0018 | | 0.012 | | |
| E-5 | 25-Jun-90 | 0.04004 c | 2.6 | 1.8 | 19 | 0.0005 | | 0.079 | | 0.014 | | 0.00005 * | | |
| E-5 | 26-Jul-90 | 0.00315 | 0.86 | 0.44 | 14 | 0.00005 * | | 0.0066 | | 0.018 | | 0.00005 * | | |
| E-5 | 18-Sep-90 | 0.000924 | 1.1 | 0.17 | 7.3 | 0.00005 * | | 0.064 | | 0.009 | | 0.00005 * | | |
| E-5 | 15-Nov-90 | | 0.29 | 0.28 | 7.1 | 0.0026 | | 0.0005 * | | 0.012 | | 0.00005 * | | |
| E-5 | 6-May-94 | | | | | 0.0005 * | | 0.005 * | | 0.005 * | | 0.002 * | | 0.009 |
| | | | | | | | | | | | | | | |
| E-6 | 29-Feb-88 | 0.07788 c | | | | | | | | | | | | |
| E-6 | 30-Mar-88 | 0.057553 c | | | | | | | | | | | | |
| E-6 | 14-Apr-88 | 1.85992 a | | | | | | | | | | | | |
| E-6 | 16-May-88 | 0.36265 a | * | | | 0.005 * | | 0.01 * | | 0.07 | | 0.006 | | |
| E-6 | 15-Jun-88 | 1.4213 a | * | | | | | | | | | | | |
| E-6 | 21-Jul-88 | 1.8069 a | * | | | | | | | | | | | |
| E-6 | 22-Nov-88 | 0.012562 c | | | | 0.005 * | 0.005 | 0.03 | 0.03 | 0.041 | 0.031 | 0.0025 * | 0.0025 | * |
| E-6 | 20-Dec-88 | 0.348 a | | | | | | | | | | | | |
| E-6 | 21-Dec-88 | 0.9623 a | * | | | | | | | 0.091 | 0.026 | | | |
| E-6 | 20-Jan-89 | 0.14292 a | * | | | | | | | | | | | |
| E-6 | 17-Feb-89 | 0.09912 c | | | 31 | 0.005 * | 0.005 | 0.01 * | 0.01 * | 0.007 | 0.001 * | 0.0025 * | 0.0025 | * |
| E-6 | 2-Mar-89 | | | | | | | | | | | | | |
| E-6 | 6-Mar-89 | 0.0112 c | | | 36 | 0.005 * | 0.005 | 0.01 * | 0.01 * | 0.011 | 0.001 * | 0.001 * | 0.001 | * |
| E-6 | 4-May-89 | 0.62475 a | | | 30 | 0.005 * | 0.005 | 0.01 * | 0.01 * | 0.015 | 0.008 | 0.05 * | 0.05 | * |
| E-6 | 7-Jun-89 | 0.026215 | | | 28 | 0.01 * | 0.01 | 0.0025 * | 0.0025 * | 0.007 | 0.003 | 0.0025 * | 0.0025 | * |
| 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 | 0.12664 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 | | | |
| E-6 | 28-Nov-89 | 0.09435 a | 7.9 | 6.9 | 100 | 0.0009 | 0.00005 | 0.014 | 0.006 | 0.032 | 0.014 c | 0.0005 * | 0.0005 | |
| E-6 | 16-Jan-90 | 0.009457 c | 4.8 | 2.3 | | | | | | 0.0061 | 0.0026 | | | |
| 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 | 0.0026 | 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 | 0.0026 | 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 | | |

**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 | dissSilica
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 | | | 0.08 | 0.04 | | | | | | | |
| E-5 | 28-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 | | | | | | | | | | | |
| E-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 * | 0.000025 * | 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 | | | | | | | | | | | |
| 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 | 0.084 | | | | | | | |
| E-6 | 20-Jan-89 | | | | | | | | | | | |
| 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 * | | | | | | ND | ND |
| E-6 | 6-Jul-89 | | | 0.06 | 0.01 * | | | | | | | |
| E-6 | 18-Sep-89 | | | 0.01 * | 0.08 | | | | | | | |
| 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 * | 0.00005 * | 0.024 | 0.005 | | | | | | | |
| E-6 | 5-Apr-90 | 0.000025 * | 0.000025 * | 0.027 | 0.016 | | | | | | | |
| E-6 | 24-May-90 | 0.000025 * | | 0.039 | | | | | | | | |

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 Detectable

| Station | Date | Temp.
°C | Salinity
ppt | Conduct. | DO
ppm | pH | Turbid.
FTU | Secchi
cm | Chla
mg/L | F Coll
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 | | 36.279 | | 1100 | 270 | | 0.06 | 1.5 |
| E-6 | 26-Jul-90 | 20.5 | | 1920 | 20 | 9.8 | | | 109.532 | 35000 | 1700 | 1200 | | 0.015 * | 3.8 |
| E-6 | 6-May-94 | 16.6 | | 700 | 3.2 | 7.8 | | | 0.017 | | 530 | 11 | 34 | 0.03 * | 2.1 |
| 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 | | 14.8885 | | 1100 | | | 0.015 * | 86 |
| E-7 | 15-Jun-88 | 14.9 | 3.2 | 35210 | 2.7 | 7.9 | | | 166 | | 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 | | 0.047679 | | 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 | 8.8 | 14 | | 0.344806 | | 380 | | | 0.58 | 0.14 |
| E-7 | 7-Jun-89 | 15.1 | 0.5 | 890 | 5.8 | 7.8 | 25 | | 1.085055 | | 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 | | 0.06 | 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 | | | | 0.0483 | | 380 | | | 0.1 | 0.18 |
| E-8 | 16-May-88 | 16.6 | 0.2 | 650 | 4.5 | 6.99 | 6.1 | | 0.068638 | | 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 | 7.8 | 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 | 6.9 | | 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 | | 0.009609 | | 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 * |

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

| Station | Date | un-ionized | Total P
mg-P/L | Diss P
mg-P/L | DOC
mg/L | Cd
mg/L | dissCd
mg/L | Cr
mg/L | a=acute c=chronic violations | | | Pb
mg/L | dissPb
mg/L | total Ni
mg/L |
|---------|-----------|---------------|-------------------|------------------|-------------|------------|----------------|------------|------------------------------|------------|----------------|------------|----------------|------------------|
| | | NH3
mg-N/L | | | | | | | dissCr
mg/L | Cu
mg/L | dissCu
mg/L | | | |
| E-6 | 25-Jun-80 | 0.3015 a | 4.9 | 2.2 | 74 | 0.00005 * | | 0.0061 | | 0.012 | | 0.0089 | | |
| E-6 | 26-Jul-80 | 0.918 a | 15 | 2.6 | 150 | 0.0001 | | 0.017 | | 0.032 | | 0.00005 * | | |
| E-6 | 6-May-84 | | | | | 0.0005 * | | 0.005 * | | 0.005 * | | 0.002 * | | 0.009 |
| E-7 | 29-Feb-88 | | * | | | | | | | | | | | |
| E-7 | 30-Mar-88 | 0.0182 c | * | | | | | | | | | | | |
| E-7 | 16-May-88 | 1.032 a | * | | | | | | | | | | | |
| E-7 | 15-Jun-88 | 2.822 a | * | | | | | | | | | | | |
| E-7 | 20-Dec-88 | 0.00072 | * | | | | | | | | | | | |
| E-7 | 20-Jan-89 | 0.013275 | * | * | * | | | | | | | | | |
| E-7 | 17-Feb-89 | 0.000258 | | | | | | | | | | | | |
| E-7 | 2-Mar-89 | | | | | | | | | | | | | |
| E-7 | 6-Mar-89 | 0.00145 | | | | | | | | | | | | |
| E-7 | 4-May-89 | 0.0198 | | | | | | | | | | | | |
| E-7 | 7-Jun-89 | 0.4738 a | | | | | | | | | | | | |
| E-7 | 6-Jul-89 | | | | | | | | | | | | | |
| E-7 | 18-Sep-89 | | | | | | | | | | | | | |
| E-7 | 23-Oct-89 | 0.005598 | 2.2 | 1.7 | | | | | | 0.004 | 0.002 | | | |
| E-7 | 28-Nov-89 | 0.014884 c | 2.9 | 2.3 | | | | | | | | | | |
| E-7 | 16-Jan-90 | 0.000269 | 1.7 | 0.41 | | | | | | 0.0012 | 0.0002 | | | |
| E-7 | 8-Feb-90 | 0.00027 | 1 | 0.78 | | | | | | | | | | |
| E-7 | 9-Mar-90 | 0.001848 | 0.97 | 0.82 | | | | | | | | | | |
| E-7 | 5-Apr-90 | 0.00312 | 1 | 0.6 | | | | | | | | | | |
| E-7 | 24-May-90 | 0.003398 | 1.7 | 0.84 | | | | | | | | | | |
| E-7 | 25-Jun-90 | 0.13867 a | 9.7 | 7.1 | | | | | | | | | | |
| E-7 | 26-Jul-90 | | | | | | | | | | | | | |
| E-8 | 29-Feb-88 | | 0.44 | 0.40 | | | | | | | | | | |
| E-8 | 30-Mar-88 | 0.000443 | 0.45 | 0.45 | | | | | | | | | | |
| E-8 | 16-May-88 | 0.00104 | 0.8 | 0.74 | | | | | | | | | | |
| E-8 | 22-Nov-88 | 0.0089 | 1.5 | 1.2 | | | | | | | | | | |
| 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 | | | | | | | | | | | | | |
| E-8 | 6-Mar-89 | 0.003629 | 0.88 | 0.86 | 21 | 0.005 * | 0.005 | 0.01 * | 0.01 * | 0.005 | 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 * | 0.05 * | 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 | |
| E-8 | 6-Jul-89 | 0.015007 c | | | | | | | | | | | | |
| E-8 | 18-Sep-89 | 0.003008 | | | | | | | | | | | | |
| E-8 | 23-Oct-89 | 0.000235 | 6.4 | 5.8 | | | | | | 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 | 8-Feb-90 | 0.00005 | 0.43 | 0.24 | 11 | 0.0003 | 0.0001 | 0.0005 * | 0.0005 * | 0.0017 | 0.0017 | 0.0005 | 0.00005 | |
| 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 | |

**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 | dissSilica
µg/l |
|---------|-----------|------------|----------------|------------|----------------|------------|------------|----------------|------------|----------------|----------------|--------------------|
| E-6 | 25-Jun-90 | 0.000025 * | | 0.023 | | | | | | | | |
| E-6 | 28-Jul-90 | 0.0003 | | 0.3 | | | | | | | | |
| E-6 | 6-May-84 | 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 | 17-Feb-89 | | | | | | | | | | | |
| E-7 | 2-Mar-89 | | | | | | | | | | | |
| E-7 | 6-Mar-89 | | | | | | | | | | | |
| E-7 | 4-May-89 | | | | | | | | | | | |
| E-7 | 7-Jun-89 | | | | | | | | | | ND | ND |
| E-7 | 6-Jul-89 | | | | | | | | | | | |
| 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 * | | | | | | ND | ND |
| E-8 | 6-Jul-89 | | | | | | | | | | | |
| E-8 | 18-Sep-89 | | | | | | | | | | | |
| E-8 | 23-Oct-89 | | | | | <1 | | | | | | |
| E-8 | 28-Nov-89 | 0.00005 * | 0.00005 * | 0.03 | 0.018 | | | | | | | |
| E-8 | 16-Jan-90 | | | | | | | | | | | |
| E-8 | 8-Feb-90 | 0.000025 * | 0.000025 * | 0.02 | 0.012 | | | | | | | |
| E-8 | 9-Mar-90 | 0.00005 * | 0.00005 * | 0.0063 | 0.0078 | | | | | | | |

**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 Detectable

| Station | Date | Temp.
°C | Salinity
ppt | Conduct.
µmhos/cm | DO
ppm | pH | Turbid.
FTU | Secchi
cm | Chla
mg/L | F Cell
MPN/100ml | TDS | TSS | TOC | NO3
mg-N/L | NH3
mg-N/L |
|---------|-----------|-------------|-----------------|----------------------|-----------|-----|----------------|--------------|--------------|---------------------|-----|-----|-----|---------------|---------------|
| E-8 | 5-Apr-90 | 12.5 | | 500 | 7.8 | 7 | 4 | | 0.016 | | 380 | 2 * | | 0.04 | 0.025 * |
| E-8 | 24-May-90 | 11.9 | | 510 | 6.8 | 7.3 | 4.2 | | 0.0271 | | 440 | <10 | | 0.28 | 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 | 28-Jul-90 | dry | | | | | | | | | | | | | |

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

| Station | Date | un-ionized | Total P
mg-P/L | Diss P
mg-P/L | DOC
mg/L | Cd
mg/L | dissCd
mg/L | Cr
mg/L | a=acute c=chronic violations | | | Pb
mg/L | dissPb
mg/L | total Ni
mg/L |
|---------|-----------|---------------|-------------------|------------------|-------------|------------|----------------|------------|------------------------------|------------|----------------|------------|----------------|------------------|
| | | NH3
mg-N/L | | | | | | | dissCr
mg/L | Cu
mg/L | dissCu
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-90 | 0.0001 | 0.77 | 0.66 | 8.2 | 0.00005 * | | 0.0021 | | 0.001 | | 0.0003 | | |
| E-8 | 25-Jun-90 | 0.014616 c | 1.5 | 1.2 | 9.2 | 0.0002 | | 0.0005 * | | 0.0021 | | 0.00005 * | | |
| E-8 | 26-Jul-90 | | | | | | | | | | | | | |

**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 | dissSilica
µg/l |
|---------|-----------|------------|----------------|------------|----------------|------------|------------|----------------|------------|----------------|----------------|--------------------|
| E-8 | 5-Apr-90 | 0.000025 * | 0.000025 * | 0.014 | 0.0073 | | | | | | | |
| E-8 | 24-May-90 | 0.000025 * | | 0.008 | | | | | | | | |
| E-8 | 25-Jun-90 | 0.000025 * | | 0.0048 | | | | | | | | |
| E-8 | 26-Jul-90 | | | | | | | | | | | |

**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 | pH | Turbid. | Secchi
cm | Flow
cfs |
|---------|-----------|-----------|--------------------------|------------------|-------------|-----------------|----------|------|----|---------|--------------|-------------|
| E-1 | 29-Feb-88 | | | | 12 | 27 | | 9.0 | | | 30.5 | |
| E-3 | 29-Feb-88 | | | | 14 | 23 | | 7.5 | | | 91.5 | |
| E-4 | 29-Feb-88 | | | | 15 | 7 | | 4.0 | | | 61 | |
| E-5 | 29-Feb-88 | | | | 15 | 6 | | 3.0 | | | 61 | |
| E-6 | 29-Feb-88 | | | | 14 | | | 1.6 | | | | |
| E-7 | 29-Feb-88 | | | | 13 | | | 5.5 | | | | |
| E-8 | 29-Feb-88 | | | | 12 | | | 6.4 | | | | |
| E1 | 30-Mar-88 | 11:10 AM | 70 | 0 | 10.5 | 32 | | 8.5 | | | 70 | |
| E1 | 30-Mar-88 | 11:10 AM | | 70 | 10.5 | 32 | | 8.5 | | | | |
| E2 | 30-Mar-88 | 7:11:30 A | 152 | 0 | 12 | 31.5 | | 8.4 | | | 65 | |
| E2 | 30-Mar-88 | 7:11:30 A | | 152 | 12 | 31.5 | | 9.8 | | | | |
| 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 | >100cm | 0 | 16 | 18 | | 8.8 | | | 51 | |
| E4 | 30-Mar-88 | 12:40 PM | | >1m | 14 | 21 | | 8.5 | | | | |
| E5 | 30-Mar-88 | 1:00 PM | 100 | 0 | 17 | 12.5 | | 14 | | | 30 | |
| E5 | 30-Mar-88 | 1:00 PM | | 100 | 16 | 13.5 | | 14 | | | | |
| E6 | 30-Mar-88 | 2:35 PM | 20 | 0 | 17 | 0.2 | | 9.8 | | | 9 | |
| 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 | 0 | 12 | 32 | | 9.5 | | | 137 | |
| 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 | | 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 | | | | | | |
| E3 | 13-Apr-88 | 10:00 AM | 61 | 0 | 13.3 | 29.3 | 39900 | 9.5 | | | | |
| 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 | | | | | | | | | 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 | 26 | | 6 | | | | |
| E4 | 13-Apr-88 | 12:55 PM | | 122 | 16 | 27.9 | | 5 | | | | |
| 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 | | | | | | | |
| E5 | 14-Apr-88 | 1:00 PM | | | | | | | | | 35.6 | |
| E5 | 14-Apr-88 | 3:00 PM | | 0 | | 19.7 | | 3.9 | | | | |
| E6 | 13-Apr-88 | 4:04 PM | | 0 | 15 | 0.7 | 900 | 10.8 | | | | |

**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 | pH | Turbid. | Secchi
cm | Flow
cfs |
|---------|-----------|----------|--------------------------|------------------|-------------|-----------------|----------|------|------|---------|--------------|-------------|
| E6 | 13-Apr-88 | 7:20 PM | | 0 | 14.6 | 0.5 | 900 | 10 | | | | |
| E6 | 13-Apr-88 | 11:10 PM | | 0 | 13.7 | 0.8 | | 5.8 | | | | |
| E6 | 14-Apr-88 | 3:30 AM | | 0 | 13 | 2.5 | 2900 | 2.1 | | | | |
| E6 | 14-Apr-88 | 6:35 AM | | 0 | 13.5 | 7.5 | | 0.7 | | | | |
| E6 | 14-Apr-88 | 2:50 PM | | 0 | | 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 | | 9.8 | 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 | 18.8 | | 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 | |
| E1 | 15-Jun-88 | 4:20 PM | | 0 | 14.5 | 33 | 40000 | 11.5 | 7.2 | | | |
| E2 | 15-Jun-88 | 2:55 PM | | 0 | 16 | 33 | 42000 | 10 | 7.1 | 4.2 | 78.7 | |
| 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 |
| E6 | 16-Jun-88 | | | | | | | | | | | |
| E7 | 15-Jun-88 | 9:55 AM | | 0 | 14.9 | 3.2 | 3520 | 2.7 | 7.9 | | | 0 |
| | 16-Jun-88 | | | | | | | | | ??? | | |
| E8 | 15-Jun-88 | | completely dry | | | | | | | | | |
| | 15-Jun-88 | | | | | | | | | | | |
| E1 | 21-Jul-88 | 5:00 PM | | 0 | 15.8 | 32.6 | | 11 | 8.39 | 1.7 | 152 | |

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 | pH | 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 | | 198 | 198 | 18.5 | 32.1 | | | | | | |
| E3 | 21-Jul-88 | 5:55 PM | | 0 | 18.1 | 33 | | 10 | 7.99 | 16 | 58 | |
| E3 | 21-Jul-88 | | 61 | 61 | 18.1 | 33 | | | | | | |
| E4 | 21-Jul-88 | 6:23 PM | | 0 | 25 | 38.8 | | 10.8 | 7.96 | 20 | 41 | |
| E4 | 21-Jul-88 | | 127 | 127 | 25.5 | 38.2 | | | | | | |
| E5 | 21-Jul-88 | 6:42 PM | | 0 | 24 | 38.5 | | 12 | 8.53 | 17 | 33 | |
| E5 | 21-Jul-88 | | | | | 38.5 | | | | | | |
| E6 | 21-Jul-88 | (~1:00 PM) | | 0 | 25.5 | 3.2 | 4230 | >20 | 9.35 | 0.9* | | |
| E7 | 21-Jul-88 | | completely dry | | | | | | | | | |
| E8 | 21-Jul-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 | | 152 | 15.1 | 31.8 | | 9.9 | | | | |
| E1 | 30-Aug-88 | 2:10 PM | | 0 | | | | | | 1.8 | | |
| E2 | 29-Aug-88 | 2:45 PM | 110 | 0 | 15.2 | 32 | | 8.9 | 7.72 | | | |
| E2 | 29-Aug-88 | 2:45 PM | | 110 | 15.1 | 31.5 | | 8.9 | | | | |
| E2 | 30-Aug-88 | 2:30 PM | | 0 | | | | | | 4.2 | | |
| E3 | 29-Aug-88 | 3:05 PM | 90 | 0 | 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 | | | | | | 8.4 | | |
| E4 | 29-Aug-88 | 3:30 PM | 150 | 0 | 21 | 34.2 | | 6.05 | 7.53 | | 50 | |
| E4 | 29-Aug-88 | 3:30 PM | | 150 | 21 | 34.9 | | 6 | | | | |
| E4 | 30-Aug-88 | 3:15 PM | | 0 | | | | | | 20 | | |
| E5 | 29-Aug-88 | 3:50 PM | 140 | 0 | 22.5 | 37.3 | | 9.2 | 7.94 | | 50 | |
| E5 | 29-Aug-88 | 3:50 PM | | 140 | 23 | 37.2 | | 9.3 | | | | |
| E5 | 30-Aug-88 | 3:35 PM | | 0 | | | | | | 23 | | |
| E6 | 29-Aug-88 | | completely dry | | | | | | | | | |
| 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 | 0 | 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 | | |

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 | pH | 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 | | >80 | |
| 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 | | | | | | |
| E6 | 22-Nov-88 | 10:20 AM | | 0 | 13 | | 650 | 5.1 | 7.35 | 14 | | |
| E7 | 22-Nov-88 | completely dry | | | | | | | | | | |
| E8 | 22-Nov-88 | 3:40 PM | | 0 | 13.2 | | 600 | 7.25 | | 12 | | |
| 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 | 23 | | | | | | |
| E4 | 21-Dec-88 | 11:15 AM | | 150 | 6.5 | 25.5 | | | | | | |
| 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 | 7 | 13.9 | | | | | | |
| E5 | 21-Dec-88 | 11:50 AM | | 50 | 7 | 14.2 | | | | | | |
| E5 | 21-Dec-88 | 11:50 AM | | 100 | 7 | 15 | | | | | | |

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 | pH | 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 | | 0 | | 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-Jan-89 | 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 | | 195 | 9 | 35.8 | | 12.3 | | | | |
| E1 | 18-Feb-89 | ~10:30AM | | 0 | | | | | | 1.3 | | |
| E2 | 17-Feb-89 | 9:40 AM | 200 | 0 | 8.8 | 33.1 | | 10.3 | 7.8 | | >200 | |
| E2 | 17-Feb-89 | 9:40 AM | | 200 | 9 | 32.9 | | 10.3 | | | | |
| E2 | 17-Feb-89 | 2:10 PM | | 0 | 12 | 33.5 | | | | | | |
| E2 | 17-Feb-89 | 2:10 PM | | 213 | 12 | 34 | | | | | | |
| E2 | 18-Feb-89 | ~10:30AM | | 0 | | | | | | 1.9 | | |
| bay up from 2 | 17-Feb-89 | 2:30 PM | | | | 29 | | | | | | |
| bay up from 2 | 17-Feb-89 | 2:40 PM | | | 14 | 25 | | | | | | |
| bay up from 2 | 17-Feb-89 | 2:45 PM | | | 15 | 28 | | | | | | |
| 2-3 pier | 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 | | 135 | 9.5 | 32 | | 8.8 | | | | |
| E3 | 17-Feb-89 | 4:00 PM | 35 | 0 | 12.7 | 18.4 | | | | | >35 | |
| E3 | 18-Feb-89 | ~10:30AM | | 0 | | | | | | 5.3 | | |
| E4 | 17-Feb-89 | 10:55 AM | 130 | 0 | 9 | 12.4 | | 5 | 7.4 | | 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 | | | | | 45 | |
| E4 | 17-Feb-89 | 3:25 PM | | 82 | 14.5 | 7.6 | | | | | | |
| E4 | 17-Feb-89 | 5:05 PM | 70 | 0 | 11 | 5.5 | | | | | 45 | |
| E4 | 17-Feb-89 | 5:05 PM | | 70 | 10.5 | 7 | | | | | | |

**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 | pH | Turbid. | Secchi
cm | Flow
cfs |
|----------|-----------|----------|--------------------------|------------------|-------------|-----------------|----------|-------|------|---------|--------------|-------------|
| E4 | 18-Feb-89 | ~10:30AM | | 0 | | | | | | 15 | | |
| E5 | 17-Feb-89 | 8:20 AM | | 0 | 9 | 7.2 | 8800 | 4.7 | 7.3 | | | |
| E5 | 17-Feb-89 | 11:30 AM | 90 | 0 | 10 | 5.5 | | 4.9 | 7.5 | | 25 | |
| E5 | 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 | | |
| E6 | 17-Feb-89 | 1:40 PM | | 0 | 13.9 | 0.2 | 700 | 11.2 | 7.5 | 15 | | some |
| E6 | 17-Feb-89 | 6:00 PM | | 0 | | | | | | | | 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 | 5.87 | 3.1 | | |
| E1 | 2-Mar-89 | 1:35 PM | 170 | 0 | 10.8 | 6.5 | 8100 | 9.6 | 7.3 | | 15 | |
| E1 | 2-Mar-89 | 1:35 PM | | 170 | 10 | 6.5 | 8000 | | | | | |
| 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 | 10.2 | 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 | 7-Mar-89 | 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 | |

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 | pH | 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 | | | | | | |
| 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 | 0 | | 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 | 0 | 292 | | | | | |
| E5 | 6-Mar-89 | 1:15 PM | 120 | 0 | 11 | 0 | 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 | 0 | | | | | | |
| E5 | 7-Mar-89 | 10:00 AM | | bottom | | 0 | | | | | | |
| E6 | 6-Mar-89 | 3:08 PM | 50 | 0 | | 0 | 250 | 5.1 | 7.4 | 46 | | 58 |
| E7 | 6-Mar-89 | 4:00 PM | 65 | 0 | | 0 | 218 | 8.8 | 7.5 | 13 | | 10 |
| E8 | 6-Mar-89 | 4:15 PM | | 0 | 11.5 | 0 | 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 | | | | | | | | | | |
| 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 | |

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 | pH | Turbid. | Secchi
cm | Flow
cfs |
|---------|-----------|----------|--------------------------|------------------|-------------|-----------------|----------|------|-----|------------|--------------|-------------|
| E4 | 4-May-89 | 12:57 PM | | 107 | 22.5 | 18 | | 8.4 | | | | |
| 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 | | 800 | 9 | 8.3 | 30 | | .5cfs |
| E7 | 4-May-89 | 6:00 PM | | 0 | 21.8 | | 500 | 10.5 | 8.6 | 14 | | |
| E8 | 4-May-89 | 6:10 PM | | 0 | 19.2 | | 490 | 7.4 | 8.3 | 5.7 | | |
| E1 | 26-May-89 | 4:15 PM | | | 15 | 31.5 | | 8.9 | 8 | | | |
| E3 | 26-May-89 | 3:42 PM | 40 | | 18 | 35 | | 7.3 | 8.1 | | 20 | |
| E5 | 26-May-89 | 5:30 PM | | | 23 | 16 | | 7 | 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 | | |
| E8 | 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 | | |

**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 | pH | 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 | | 0 | 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 | | 8.9 | | | | |
| 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 | 38.4 | | 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 | dry | | | | | | | | | | |
| 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 | 1:10 PM | | 0 | 16.1 | | 770 | 8.2 | 7.5 | | | |
| E8 | 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 | |

**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 | pH | 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 | | 7.9 | 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 |
| E5 | 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" for |
| 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-Feb-90 | 1:05 PM | | | | | | | | | | |
| E3A | 7-Feb-90 | | | | | | | | | | | |
| E4 | 7-Feb-90 | 1:50 PM | 120 | 0 | 6 | 1.4 | 1120 | 7.6 | 7.4 | 23 | 30 | |
| E4 | 7-Feb-90 | 1:50 PM | | 120 | 6 | 2 | 1620 | 6.8 | | | | |
| 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 | | 95 | 6.5 | 1 | 900 | 7.2 | | | | |
| E6 | 8-Feb-90 | 4:40 PM | | 0 | 7 | | 457 | 9.4 | 7.8 | 22 | | 12 |
| E7 | 8-Feb-90 | 5:00 PM | | 0 | 7 | | 360 | 12.8 | 7.4 | 8 | | |
| E8 | 8-Feb-90 | 5:10 PM | | 0 | 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 | 28 | | 11.0** | 7.4 | 12 | 45 | |
| E3 | 9-Mar-90 | 10:50 AM | | 70 | 9 | 27 | | 13.0** | | | | |

**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 | pH | 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 | 10:58 AM | | 0 | 9.2 | 0.1 | 1210 | 8.7 | | | | |
| 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 | | |
| E6 | 10-Mar-90 | 4:00 PM | | 0 | | | | | | | | 17 |
| E7 | 9-Mar-90 | 3:00 PM | | 0 | 13 | | 383 | 12** | 8.1 | 6.5 | | |
| E8 | 9-Mar-90 | 3:15 PM | | 0 | 10 | | 340 | 12.5** | 7.9 | 6.4 | | |
| ** DO meter erratic | | | | | | | | | | | | |
| 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 | | 7.9 | 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 | 13.8 | 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 | 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 |
| E8 | 5-Apr-90 | 1:50 PM | | 0 | 12.5 | | 500 | 7.6 | 7 | 4 | | none |

**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 | pH | 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 | 0 | 11.8 | 35.4 | | 7.5 | 8 | 5.8 | 80 | |
| E3 | 24-May-90 | 2:40 PM | 95 | 0 | 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 | | 0 | 10.8 | | 570 | 5 | 7.2 | 8.3 | | 0.5 |
| E8 | 24-May-90 | 9:35AM | | 0 | 11.9 | | 510 | 6.8 | 7.3 | 4.2 | | 0 |
| E5 | 31-May-90 | 8:08AM | | 0 | | 1 | | 2.9 | | | | |
| E5 | 31-May-90 | 8:42AM | | 0 | | | | 2.6 | | | | |
| E6 | 31-May-90 | 6:30AM | | 0 | | | | 0.6 | | | | 1.1 |
| E6 | 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 | | | | |
| 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 | | |
| E8 | 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 | 84 | 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 | 26-Jul-90 | 11:35 AM | | 0 | 20.5 | | 1920 | >>20 | 9.8 | | | |
| E7 | 26-Jul-90 | | dry | | | | | | | | | |
| E8 | 26-Jul-90 | | 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 | | | | |

**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 | pH | 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 | | 8.8 | 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 | | 7.8 | 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 | | | | | | |

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

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

| Station | Date | Time | bar open
or closed | depth
cm | sample
depth | sechi
cm | Temp
°C | Sal
ppt | Conduct. | DO
ppm | pH | Turbid
FTU | Chla
µg/l | Flow
cfs | F Coli
MPN/100ml | TDS |
|---------|-----------|----------|-----------------------|-------------|-----------------|-------------|--------------------------|------------|----------|-----------|------|---------------|--------------|-------------|---------------------|-------|
| S-2 | 5-Jul-89 | 10:20 AM | o | 195 | surface | 170 | 18.4 | 29 | | 8.4 | 8.2 | 4.4 | 2.69 | | | |
| S-2 | 5-Jul-89 | 10:20 AM | o | | bottom | | 17 | 29.5 | | 9.2 | | | | | | |
| S-2 | 18-Sep-89 | 10:05 AM | o | | bottom | | 15.3 | 37 | | 7.4 | | | | | | |
| S-2 | 18-Sep-89 | 10:05 AM | o | | 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 | o | | 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 | o | 200 | 0 | 55 | 11 | 17.2 | | 9 | 7.7 | 10 | 5.3 | | | |
| S-2 | 10-Mar-90 | 1:28 PM | o | | 50 | | | 17 | | | | | | | | |
| S-2 | 10-Mar-90 | 1:28 PM | o | | 100 | | | 30 | | 7.4 | | | | | | |
| S-2 | 10-Mar-90 | 1:28 PM | o | | 200 | | 9 | 31 | | 7.3 | | | | | | |
| S-2 | 6-Apr-90 | 1:04 PM | o | 195 | 0 | 140 | 13.7 | 10.5 | 12500 | 7.9 | 8.3 | 3.8 | 11.76 | | | |
| S-2 | 6-Apr-90 | 1:04 PM | o | | 195 | | 12.9 | 30.2 | | 2 | | 2.4 | 5.3 | | | |
| S-2 | 25-May-90 | 11:10 AM | c | 250 | 0 | 100 | 15 | 18.7 | | 8.9 | 8.3 | 5 | 9.42 | | | |
| S-2 | 25-May-90 | 11:10 AM | c | | 100 | | 14 | 19.2 | | 7.6 | | | | | | |
| S-2 | 25-May-90 | 11:10 AM | c | | 200 | | 13.8 | 19.2 | | 7.2 | | | | | | |
| S-2 | 26-Jun-90 | 3:00 PM | c | >200 | 0 | 120 | 18.5 | 15.3 | | 8.8 | 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 | | 8.8 | | | | | | |
| 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 | 9:05 AM | ? | | 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-Jul-88 | 12:07 PM | ? | | 0 | | 21.1 | 21 | | 5.9 | 8.07 | 4.1 | lost | | | 23000 |
| S-4 | 29-Aug-88 | 5:25 PM | ? | | 0 | | 22 | 23.2 | | 6.3 | 7.95 | 7.5 | 4.16 | | ND | 30000 |
| S-4 | 28-Sep-88 | 10:30 AM | ? | | 0 | | 18.8 | 28.2 | | 5.4 | 8.2 | 7.1 | 4.22 | | | 30000 |
| S-4 | 25-Oct-88 | 3:40 PM | ? | | 0 | | 14.8 | 24.9 | 31800 | 5 | 8.4 | 4.7 | 4.11 | | | 29000 |
| S-4 | 22-Nov-88 | 2:25 PM | ? | | 0 | | 14.2 | 20.2 | | 18.9 | 8.8 | | | | 2400 | |
| S-4 | 20-Dec-88 | 11:20 AM | ? | | 0 | | 8.5 | 21.1 | | 11.6 | 8.7 | 12 | 177.33 | | | |
| S-4 | 20-Jan-89 | 12:10 PM | o | | 0 | | 11 | 7.8 | 10000 | 12.3 | 8.75 | 13 | 64.55 | | | |
| S-4 | 17-Feb-89 | 12:50 PM | o | | 0 | | 13 | 7 | 9000 | 20 | 8.8 | 27 | 242.35 | | | |
| S-4 | 6-Mar-89 | 2:45 PM | o | | 0 | | | 1.1 | 1600 | 7 | 7.2 | 51 | 8.54 | | | |
| S-4 | 4-May-89 | 5:23 PM | o | | 0 | | 21 | 12.2 | | 14.6 | 9.2 | 15 | 110.92 | | 380 | |
| S-4 | 7-Jun-89 | 12:58 PM | o | | 0 | | 18.5 | 22.8 | | 8.4 | 8.5 | 15 | 31.35 | | | |
| S-4 | 5-Jul-89 | 12:25 PM | o | | 0 | | additional info see note | | | | | | | | | |
| S-4 | 5-Jul-89 | 12:25 PM | o | | bottom | | 20.5 | 26.2 | | 5.7 | | | | | | |
| S-4 | 18-Sep-89 | 10:50 AM | o | | bottom | | 15.5 | 38 | | 7.5 | | | | | | |
| S-4 | 5-Jul-89 | 12:25 PM | o | | 120 | 80 | 21 | 26.2 | | 5.9 | 8.2 | 8.3 | 4.25 | | | |
| S-4 | 18-Sep-89 | 10:50 AM | o | | surface | | 15.5 | 38 | | 7.2 | 8.2 | 2.2 | 1.212 | | 79 | |
| S-4 | 28-Nov-89 | 12:50 PM | o | | 0 | | | | | | | | | | | |

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

| Station | Date | Time | TSS | NO3
mg-N/L | NH3
mg-N/L | un-ionized
NH3
mg-N/L | NO2
mg-N/L | Total P
mg-P/L | Diss P
mg-P/L | a=acute c=chronic violations
DOC
mg/l | Tot. org. C | Cd
mg/l | Cr
mg/l | Cu
mg/l |
|---------|-----------|----------|-----|---------------|---------------|-----------------------------|---------------|-------------------|------------------|---|-------------|------------|------------|------------|
| S-2 | 5-Jul-89 | 10:20 AM | | 0.03 | ND | | | 0.34 | 0.31 | | | | | |
| S-2 | 5-Jul-89 | 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 | 6-Apr-90 | 1:04 PM | 16 | 0.015 | 0.23 | 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-Jul-90 | 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 | 5:25 PM | | ND | 0.16 | 0.004384 | 0.03 | 1.9 | 1.8 | | | | | |
| S-4 | 28-Sep-88 | 10:30 AM | | | 0.11 | 0.00418 | ND | | 2.4 | | | | | |
| S-4 | 25-Oct-88 | 3:40 PM | | ND | 0.19 | 0.008493 | 0.04 | 2.6 | 2.4 | | | | | ND |
| S-4 | 22-Nov-88 | 2:25 PM | 73 | 0.12 | 8.5 | 0.85 a | ND | 4.6 | 2 | | | | | |
| S-4 | 20-Dec-88 | 11:20 AM | | 0.09 | 1.1 | 0.05995 c | ND | 2.6 | 2.2 | | | | | |
| S-4 | 20-Jan-89 | 12:10 PM | | 0.73 | 2.4 | 0.18744 a | 0.1 | 2.1 | 2 | | | | | |
| S-4 | 17-Feb-89 | 12:50 PM | | 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 | 10:50 AM | | | | | | | | | | | | |
| S-4 | 5-Jul-89 | 12:25 PM | | 0.17 | 0.05 | | | 0.69 | 0.63 | | | | | |
| S-4 | 18-Sep-89 | 10:50 AM | ND | ND | ND | | | 1.3 | 1 | | | | | |
| S-4 | 28-Nov-89 | 12:50 PM | | | | | | | | | | | | |

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

| Station | Date | Time | Pb
mg/l | Ag
mg/l | Zn
mg/l | dissCd
mg/l | dissCr
mg/l | dissCu
mg/l | dissPb
mg/l | dissAg
mg/l | dissZn
mg/l |
|---------|-----------|----------|------------|------------|------------|----------------|----------------|----------------|----------------|----------------|----------------|
| S-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 | ND | ND | 0.003 | ND | | ND |
| S-2 | 28-Nov-89 | 1:48 PM | 0.0005 * | 0.002 | 0.011 | 0.00005 * | 0.005 | 0.004 | 0.0005 * | 0.0019 | 0.0054 |
| S-2 | 28-Nov-89 | 1:48 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 | 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 | 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-Jul-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 | 28-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 | | | | | | | | | |
| 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 | | | | | | | | | |

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

* Indicates value below MDL, number to left is one half MDL

ND= Non Detectable

| Station | Date | Time | bar open
or closed | depth
cm | sample
depth | secchi
cm | Temp
°C | Sal
ppt | Conduct. | DO
ppm | pH | Turbid
FTU | Chla
µg/l | Flow
cfs | F Coil
MPN/100ml | TDS |
|---------|-----------|----------|-----------------------|-------------|-----------------|--------------|------------|------------|----------|-----------|-----|---------------|--------------|-------------|---------------------|-------|
| S-4 | 28-Nov-89 | 1:34 PM | o | 158 | 0 | 98 | 11.1 | 27 | | 4.4 | 7.1 | 6.2 | 3.16 | | | |
| S-4 | 28-Nov-89 | 1:34 PM | o | | 158 | | 11.1 | 26.8 | | 4.3 | | | | | | |
| S-4 | 8-Feb-90 | 2:50 PM | c | >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 | o | 150 | 0 | 40 | 11 | 3.1 | | 8.7 | 7.7 | 16 | 21.43 | | | |
| S-4 | 10-Mar-90 | 2:32 PM | o | | 150 | | 10 | 22 | | 2.5 | | | | | | |
| S-4 | 6-Apr-90 | 2:38 PM | o | | 0 | 60 | 14 | 4 | | 6.6 | 8.6 | 4.7 | 10.43 | | | |
| S-4 | 6-Apr-90 | 2:38 PM | o | | 50 | | 15 | 4 | | 6.5 | | | 12.25 | | | |
| S-4 | 6-Apr-90 | 2:38 PM | o | | 100 | | 15 | 19 | | 2.1 | | | | | | |
| S-4 | 6-Apr-90 | 2:38 PM | o | | 150 | | 15 | 30 | | 2.1 | | 2.6 | | | | |
| S-4 | 25-May-90 | 12:35 PM | c | 163 | 0 | 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-Jul-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-6 | 5-Jul-89 | 11:40 AM | o | 125 | 0 | 40 | 20 | 22.2 | | 10.4 | 9 | 22 | 80.42 | | | |
| S-6 | 5-Jul-89 | 11:40 AM | o | | bottom | | 20 | 23 | | 7.2 | | | | | | |
| S-6 | 18-Sep-89 | 11:15 AM | o | | bottom | | 17 | 35.8 | | 4.1 | | | | | | |
| S-6 | 5-Jul-89 | 11:40 AM | o | | 125 | 40 | 20 | 22.2 | | 10.4 | 9 | 22 | 80.42 | | | |
| S-6 | 18-Sep-89 | 11:15 AM | o | | surface | | 17 | 35.8 | | 4.1 | 8.2 | 5.4 | 9.096 | | | |
| S-6 | 28-Nov-89 | 1:15 PM | o | 145 | 0 | 45 | 10.1 | 19.2 | | 2.1 | 7 | 16 | 36.73 | | | |
| S-6 | 28-Nov-89 | 1:15 PM | o | | 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 | c | | 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 | c | | 200 | | 8.2 | 26.2 | | 0.3 | | | | | | |
| S-6 | 10-Mar-90 | ~1:00 PM | o | 160 | 0 | 30 | 11 | | 700 | 8.8 | 7.6 | 24 | 22.17 | | | |
| S-6 | 10-Mar-90 | ~1:00 PM | o | | 160 | | 11 | | 750 | 8.6 | | | | | | |
| S-6 | 6-Apr-90 | 7:00 AM | o | | 0 | | 14 | 1.5 | 2300 | 4 | | | | | | |
| S-6 | 6-Apr-90 | 2:00 PM | o | 170 | 0 | 65 | 14.5 | 2 | 2580 | 8.3 | 8.2 | 4.5 | 22.97 | | | |
| S-6 | 6-Apr-90 | 2:00 PM | o | | 170 | | 14 | 29 | | 0.65 | | 2.3 | 17.67 | | | |
| S-6 | 25-May-90 | 11:55 AM | c | 194 | 0 | 60 | 18 | 13.5 | | >20 | 9.4 | 6.6 | 88.67 | | 41 | |
| S-6 | 25-May-90 | 11:55 AM | c | | 100 | | 15 | 15 | | 8 | | | | | | |
| S-6 | 25-May-90 | 11:55 AM | c | | 194 | | 15 | 15 | | 6.7 | | | | | | |
| S-6 | 26-Jun-90 | 3:48 PM | c | >200 | 0 | 50 | 22 | 8.4 | | 16.2 | 9.2 | 15 | 91.11 | | | |
| S-6 | 26-Jun-90 | 3:48 PM | c | | 100 | | 19 | 9 | | 2.5-3.0 | | | | | | |
| S-6 | 26-Jun-90 | 3:48 PM | c | | >200 | | 17.5 | 13 | | 0.3 | | 88 | 96.44 | | | |
| S-6 | 27-Jul-90 | 12:25 PM | c | 210 | 0 | 40 | 18 | 11.3 | 15500 | 16.5 | 9.3 | 6.4 | 168.59 | | | |

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

| Station | Date | Time | TSS | NO3
mg-N/L | NH3
mg-N/L | un-ionized
NH3
mg-N/L | NO2
mg-N/L | Total P
mg-P/L | Diss P
mg-P/L | a=acute c=chronic violations | | Cd
mg/l | Cr
mg/l | Cu
mg/l |
|---------|-----------|----------|-----|---------------|---------------|-----------------------------|---------------|-------------------|------------------|------------------------------|-------------|------------|------------|------------|
| | | | | | | | | | | DOC
mg/l | Tot. org. C | | | |
| S-4 | 28-Nov-89 | 1:34 PM | 9.6 | 0.35 | 1.3 | 0.0022346 | | | | | | | | |
| 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 | 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 |
| 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 |
| S-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 * |
| 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 * | 0.0025 * | 0.0025 * |
| S-6 | 5-Jul-89 | 11:40 AM | | 0.03 | ND | | | 1.2 | 0.88 | | | | | |
| S-6 | 5-Jul-89 | 11:40 AM | | | | | | | | | | | | |
| S-6 | 18-Sep-89 | 11:15 AM | | | | | | | | | | | | |
| S-6 | 5-Jul-89 | 11:40 AM | | 0.03 | ND | | | 1.2 | 0.88 | | | | | |
| S-6 | 18-Sep-89 | 11:15 AM | 14 | 0.05 | 0.78 | | | 2.2 | 1.5 | 12 | | ND | ND | 0.002 |
| S-6 | 28-Nov-89 | 1:15 PM | 24 | 0.65 | 3.3 | 0.0042653 | | 2.5 | 1.7 | 22 | | 0.00005 * | 0.004 | 0.00025* |
| S-6 | 28-Nov-89 | 1:15 PM | | | | | | | | | | | | |
| S-6 | 8-Feb-90 | 2:12 PM | 37 | 1.5 | 2.8 | 0.0087057 | | 1.8 | 1.5 | 35 | | 0.00005 * | 0.0078 | 0.01200 |
| 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 | 23 | 1.2 | 0.95 | 0.0059022 | | 1.4 | 1.2 | 21 | | 0.0005 | 0.0026 | 0.0056 |
| S-6 | 10-Mar-90 | ~1:00 PM | | | | | | | | | | | | |
| S-6 | 6-Apr-90 | 7:00 AM | | | | | | | | | | | | |
| S-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 |
| S-6 | 6-Apr-90 | 2:00 PM | 50 | 0.015 * | 1.2 | 0.0314519 | | 1.6 | 1.2 | 4.8 | | 0.0003 | 0.0038 | 0.00005 * |
| S-6 | 25-May-90 | 11:55 AM | 28 | 0.015 * | 0.06 | 0.0230808 | | 1.7 | 1.4 | 14 | | 0.00005 * | 0.0029 | 0.0013 |
| S-6 | 25-May-90 | 11:55 AM | | | | | | | | | | | | |
| S-6 | 25-May-90 | 11:55 AM | | | | | | | | | | | | |
| 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 | 3:48 PM | | | | | | | | | | | | |
| S-6 | 26-Jun-90 | 3:48 PM | 2 * | 0.015 * | 4.4 | 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 |

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

| Station | Date | Time | Pb
mg/l | Ag
mg/l | Zn
mg/l | dissCd
mg/l | dissCr
mg/l | dissCu
mg/l | dissPb
mg/l | dissAg
mg/l | 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 | 0.0006 | 0.000025 * | 0.0005 * | | | | | | |
| 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 * | | | | | | |
| 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 * | | | | | | |
| | | | | | | | | | | | |
| S-6 | 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 | 0.0064 | 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 | 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 * | 0.000025 * | 0.0003 | 0.00005 * | 0.0005 * | 0.0019 | 0.00005 * | 0.000025 * | 0.0005 * |
| 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 | 0.0006 | 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 | 0.00005 * | 0.000025 * | 0.0005 * | | | | | | |
| S-6 | 27-Jul-90 | 12:25 PM | 0.00005 * | 0.000025 * | 0.0005 * | | | | | | |

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

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

| Station | Date | Time | bar open
or closed | depth
cm | sample
depth | secchi
cm | Temp
°C | Sal
ppt | Conduct. | DO
ppm | pH | Turbid
FTU | Chla
µg/l | Flow
cfs | F Coli
MPN/100ml | TDS |
|---------|-----------|----------|-----------------------|-------------|-----------------|--------------|------------|------------|----------|-----------|------|---------------|--------------|-------------|---------------------|------|
| 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 | c | 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 | o | | 0 | | 10.9 | | 700 | 9.6 | 7.5 | 7.8 | 5.02 | 0.1 | | 580 |
| S-8 | 16-Jan-90 | AM | o | | | | 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 | o | | 0 | | 9.8 | | 388 | 9.8 | 8 | 21 | 21.55 | 8 | | 320 |
| S-8 | 6-Apr-90 | 6:55 AM | o | | 0 | | 14 | | 550 | 1.1 | | | | | | |
| S-8 | 6-Apr-90 | 3:45 PM | o | | 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 |
| S-8 | 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 | 987.4 | | 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 | o | | 0 | | 7.5 | 0.2 | 810 | 2.3 | 7.5 | 23 | 10.88 | | | 870 |
| S-10 | 17-Feb-89 | 7:38 AM | o | | 0 | | 9.8 | 0 | 810 | 3.5 | 7.6 | 27 | 81.34 | | >2400 | 750 |
| S-10 | 6-Mar-89 | 3:45 PM | o | | 0 | | | 0 | 462 | 1.15* | 7.5 | 58 | 98.86 | | | 610 |
| S-10 | 4-May-89 | 6:25 PM | o | | 0 | | 21 | | 980 | 9.2 | 8.7 | 33 | 200.13 | | 3020 | 750 |
| S-10 | 7-Jun-89 | 11:25 AM | o | | 0 | | 14.8 | 0.7 | 990 | 5.8 | 7.9 | 35 | 301.40 | | | 780 |
| S-10 | 5-Jul-89 | 7:40 AM | o | | 0 | | 14.7 | 0.8 | 103 | 3.7 | 7.8 | 51 | 383.75 | | | 860 |
| S-10 | 18-Sep-89 | 8:50 AM | o | | 0 | | 13.5 | | 1080 | 2.6 | 7.7 | 54 | 725 | | 4600 | 970 |
| S-10 | 23-Oct-89 | 5:52 PM | o | | 0 | | 14.1 | | 322 | 7.4 | 7.4 | | | | | 280 |
| S-10 | 28-Nov-89 | 8:53 AM | o | | 0 | | 8 | | 680 | 1.6 | 7.3 | 260 | 41.14 | | | 900 |
| S-10 | 16-Jan-90 | AM | o | | | | 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 | | 18000 | 610 |
| S-10 | 10-Mar-90 | 4:20 PM | o | | 0 | | 12 | | 900 | 4.4 | 8 | 23 | 38.18 | | | 700 |
| S-10 | 6-Apr-90 | 4:05 PM | o | | 0 | | 13 | | 1000 | 2.8 | 7.9 | 20 | 23.4 | 0 | | 750 |
| S-10 | 25-May-90 | 2:30 PM | c | | 0 | | 12 | 0.8 | 1080 | | 8.2 | 50 | | | 350 | 850 |
| S-10 | 26-Jun-90 | 6:28 PM | c | | 0 | | 14.1 | | 970 | 7.3 | 8.3 | 38 | 492.43 | | | 830 |
| S-10 | 26-Jul-90 | 10:55 AM | c | | 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 |

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

| Station | Date | Time | TSS | NO3
mg-N/L | NH3
mg-N/L | un-ionized
NH3
mg-N/L | NO2
mg-N/L | Total P
mg-P/L | Diss P
mg-P/L | a=acute c=chronic violations | | Cd
mg/l | Cr
mg/l | Cu
mg/l |
|---------|-----------|----------|-----|---------------|---------------|-----------------------------|---------------|-------------------|------------------|------------------------------|-------------|------------|------------|------------|
| | | | | | | | | | | DOC
mg/l | Tot. org. C | | | |
| 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 | 0.0041088 | | 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 | | | | 0.00089 | | | | | | | | |
| S-8 | 6-Apr-90 | 3:45 PM | 13 | 0.1 | 0.025 * | | | 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 | 0.0606 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 |

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

| Station | Date | Time | Pb
mg/l | Ag
mg/l | Zn
mg/l | dissCd
mg/l | dissCr
mg/l | dissCu
mg/l | dissPb
mg/l | dissAg
mg/l | dissZn
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 | 0.00005 * | 0.000025 * | 0.0005 * | | | | | | |
| S-6 | 19-Sep-90 | 6:35 PM | | | | | | | | | |
| S-6 | 16-Nov-90 | 4:00 PM | 0.00005 * | 0.0005 * | 0.000025 * | | | | | | |
| S-6 | 16-Nov-90 | 4:00 PM | | | | | | | | | |
| S-8 | 28-Nov-89 | 5:15 PM | | | | | | | | | |
| S-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 * | 0.0062 | 0.0052 | 0.0001 | 0.013 |
| S-8 | 10-Mar-90 | 3:40 PM | 0.001 | 0.0007 | 0.025 | 0.0005 * | 0.0008 | 0.0038 | 0.00005 * | 0.00005 * | 0.003 |
| S-8 | 6-Apr-90 | 6:55 AM | | | | | | | | | |
| S-8 | 6-Apr-90 | 3:45 PM | 0.0063 | 0.000025 * | 0.013 | 0.0004 | 0.0005 * | 0.002 | 0.0015 | 0.000025 * | 0.01 |
| S-8 | 25-May-90 | 1:45 PM | 0.0037 | 0.000025 * | 0.005 | | | | | | |
| S-8 | 26-Jun-90 | 6:05 PM | 0.0073 | 0.000025 * | 0.014 | | | | | | |
| S-8 | 26-Jul-90 | 12:00 PM | | | | | | | | | |
| 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 | | 0.08 |
| S-10 | 23-Oct-89 | 5:52 PM | | | | | | 0.004 | | | |
| S-10 | 28-Nov-89 | 8:53 AM | 0.0005 * | 0.00005 * | 0.055 | 0.00005 * | 0.01 | 0.026 | 0.0005 * | 0.00005 * | 0.027 |
| S-10 | 16-Jan-90 | AM | | | | | | 0.0029 | | | |
| S-10 | 7-Feb-90 | 7:45 AM | 0.001 | 0.0002 | 0.025 | 0.0001 | 0.0027 | 0.0048 | 0.0009 | 0.0002 | 0.015 |
| S-10 | 10-Mar-90 | 4:20 PM | 0.0021 | 0.00005 * | 0.037 | 0.0005 * | 0.0009 | 0.0049 | 0.00005 * | 0.00005 * | 0.012 |
| S-10 | 6-Apr-90 | 4:05 PM | 0.002 | 0.000025 * | 0.012 | 0.0002 | 0.0005 * | 0.0029 | 0.00005 * | 0.000025 * | 0.0013 |
| S-10 | 25-May-90 | 2:30 PM | 0.0054 | 0.000025 * | 0.0018 | | | | | | |
| S-10 | 26-Jun-90 | 6:28 PM | 0.0047 | 0.000025 * | 0.045 | | | | | | |
| S-10 | 26-Jul-90 | 10:55 AM | 0.00005 * | 0.000025 * | 0.068 | | | | | | |
| S-10 | 6-May-94 | | 0.001 * | 0.0005 * | 0.005 * | | | | | | |
| S-10 | 6-May-94 | | 0.001 * | 0.0005 * | 0.005 * | | | | | | |

ZOOPLANKTON AND FISH LARVAE APPENDIX

| | Station E-1 | | | | | | | | | |
|------------------------------|-------------|-----------|-----------|-----------|-----------|-----------|----------|----------|----------|----------|
| | 14-Apr-88 | 15-Jun-88 | 30-Aug-88 | 28-Oct-88 | 21-Dec-88 | 17-Feb-89 | 6-Mar-89 | 4-May-89 | 8-Jun-89 | 5-Jul-89 |
| Protozoa | | | | | | | | | | |
| Tintinnids | | | | | | | 2.895 | 0.515 | | |
| Foraminifera | | | | | | | | | | |
| Noctiluca | | | | 0.668 | | | | | | |
| Ctenophore | | | | | | 0.625 | | | | |
| Cnidaria | | | | | | | | | | |
| Leptomedusa type | 0.743 | | | 1.526 | 0.342 | | 0.312 | | | |
| Anthomedusa type | | | 0.142 | | 0.136 | 1.182 | 6.724 | | | |
| other medusae | 0.557 | | | | | | | | | |
| Hydroid polyp | | | | | 2.797 | | | 0.258 | | |
| Leptomedusa polyp | | | | | | | | | | |
| Coral polyp | | | | | | | | | | |
| Siphonophore | | 0.260 | | | | 0.299 | | | | |
| Aschelminthes | | | | | | | | | | |
| roundworm | | | | | 0.682 | | | 0.139 | | |
| Unknown "worm" | | | | | | | | | | |
| Rotifera | | | | | | | | | | |
| Brachionus | | | | | | | | | | |
| Synchaeta | | | | | | | | | | |
| Mollusca | | | | | | | | | | |
| Bivalves | 0.186 | 0.520 | | | | | 0.268 | | 0.332 | 0.148 |
| Monticulitidae | | | | | | | | | | |
| 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 | | | | | | | | | | |
| Phoronida actinotroch | | | | | | | | | | |
| Bryozoa larvae | | | | | | | | | | |
| Bryozoan colony | | | | | | | | | | |
| Annelida | | | | | | | | | | |
| Hirudinea | | | | | | | 0.134 | | | |
| Nemertean | | | | | | | | | | |
| Polychaetes | | | | | | | 0.268 | | 0.664 | |
| Polychaete larvae | 0.371 | 0.338 | | 0.228 | 0.136 | 0.892 | | 0.694 | | |
| Oligochaete | | | | | | | | | | |
| Nemertea | | | | | | | | | | |
| Arthropoda | | | | | | | | | | |
| Crustacea | | | | | | | | | | |
| nauplii | 0.186 | | 0.142 | | | | | | | 0.297 |
| Cladocera | | | | | | | | | | |
| Evadne | | | 7.195 | 0.222 | | | | | 0.664 | |
| Podon | 0.168 | | 4.797 | 0.238 | 0.682 | | | | | |
| Copepoda | | | | | | | | | | |
| Corycaeus | | | | | | | | | | |
| Oithona | | 0.168 | | | | 0.299 | | | | |
| Oncaea | | | | | | | | | | |
| unk. cyclopoid | | | | | | | 0.134 | | | |
| Cyclopoid copepodites | | | | | | | | | | |
| Acartia clausi | 0.278 | | 14.954 | 42.917 | 4.940 | 36.662 | 2.368 | 0.515 | 0.332 | 0.445 |
| Acartia danae | | | | | | | 0.517 | | | 0.148 |
| Calanus sp. | | | | | | 0.892 | | | | |
| Metridia lucens | 0.835 | | | | | | | | | |
| Epilabidocera longipedata | | | | 0.459 | | | | | | |
| Eucalanus | 0.186 | | | | | | | | | |
| Eurytemora americana | | | | | | | | | | |
| Pseudodiaptomus euryhalinus | | | | | | | | | | |
| Temorites sp(p) | | | | | | | | | | |
| Rhincalanus nasutus | | | | 0.891 | | | | | | |
| Tortanus discaudatus | | | | 0.484 | 0.682 | | | | | |
| Mostrillidae, unident. | | | | | | | | | | |
| unknown calanoid | | | 0.142 | | | | | | | |
| Calanoid copepodites | 0.743 | 0.520 | | | | | | 0.139 | | |
| Cal. copepodites w/long rami | | | | | | | | 0.139 | | |
| Harpacticoid "A" | | 0.260 | | | | | | | | |
| Harpacticoid "B" | | | | | | | | | | |
| Harpacticoid "C" | | | | | | | | | | |
| Schizopera knabeni | | | | | | | | | | |
| Caligus | | 0.260 | | | | | | | | |
| other parasitic copepods | | 0.613 | | | | | | | | |
| unknown copepodites | | | | | | | | | | |
| Ostracoda | 0.371 | 0.446 | | | | | 0.414 | 0.139 | | |
| Podocopa | | | | | | | | | | |
| Leptostraca | 0.186 | | | | | | | | | |

| | 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 | 6-Jun-89 | 5-Jul-89 |
| Cirripedia | | | | | | | | | | |
| Barnacle nauplii | 0.130 | 0.260 | | 0.228 | 0.273 | 2.366 | | | | 0.148 |
| Barnacle cypris | | | | | | | | | | |
| Isopoda | 0.186 | 0.780 | | | 0.136 | | 0.134 | | | 0.297 |
| Sphaeromatidae | | | | | | | | | | |
| Idoteidae | | | | | | | | | | |
| Amphipoda | | | | | | | | | | |
| Anisogammarus confervicolus | 0.186 | | | | | | 0.134 | | 0.332 | 0.148 |
| Corophium | 0.186 | | | | | 0.892 | | | | |
| Caprellidae | | | | | | | | | | |
| Grandidiella japonica | | | | | | | | | | |
| Amphithoidae | | | | | | | | | | 0.148 |
| Aoridae | | | | | | | | | 0.332 | |
| Atylidae | | | | | | | 7.348 | | | |
| Hyalidae | | | | | | | 0.134 | | 0.332 | |
| Ischyroceridae | | | | | | | | | | |
| Photidae | | | | | | | | | | |
| Pleustidae | | | | | | | 0.414 | | | 0.148 |
| Ampeliscidae | | | | | | | | | | |
| Talitridae | | | | | | | | | | |
| unk. amphipods | 0.743 | 0.130 | | 0.446 | 4.524 | 0.446 | | 0.130 | | |
| Cumacea | | | | | | 0.178 | 2.585 | | | 0.445 |
| Mysidacea | | | | | | | | | | |
| Neomysis mercedis | | | | 0.222 | | | 1.345 | | | |
| Euphausiacea | | | | | | 0.535 | | | | |
| Decapoda | | | | | | | | | | |
| Brachyura | | | | | | | | | | |
| Cancer antennarius/gracilis(1) | 1.114 | | 0.282 | | | 1.464 | | | | |
| Cancer antennarius stg 2 zoea | 0.316 | | | | | | | | | |
| Cancer antennarius stg 3 zoea | 0.371 | | | | | | | | | |
| Cancer productus stg 1 zoea | 0.371 | | | | | 0.892 | | | | |
| Grapsidae zoea | 0.186 | | | | | 0.892 | 0.517 | | | 0.297 |
| Majidae zoea | 0.149 | | | 0.238 | | 0.318 | | | | |
| Pinnotheridae zoea | 0.965 | 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 | | | | |
| Unk. Megalopa | | | | | | | | | | |
| Megalopa A | | | | | | | | | | |
| Megalopa B | | | | | | | | | | |
| Megalopa C | | | | | | | | | | |
| Megalopa D | | | | | | 0.892 | | | | |
| very young crab | | | 0.142 | | | 0.268 | | | | |
| Hemigrapsis oregonensis | | | | | | | | | | |
| Hemigrapsus nudus | | | | | | | | | | |
| Pachygrapsus crassipes | | | | | | | | | | |
| Anomura | | | | | | | | | | |
| Anomuran megalopa | | | | | | | | | | |
| Porcellanidae zoea | 0.334 | | | 0.178 | | | | 0.515 | | |
| Hippidae zoea | | | | 0.228 | | | | | | |
| Emerita analoga zoea | | | | | | | | | | |
| Paguridae zoea | | | | 0.222 | | | | | | |
| Paguridae megalopa | | | | | | | | | | |
| Thalassinidea zoea | 0.334 | | | 0.891 | | | | | | |
| Callinassidae | | | | | | 0.892 | | | | |
| Caridea | | | | | | | | | | |
| Peneidae | | | | | | | | | | |
| Crangonidae(zoea and older) | | | 0.468 | | | | | | | |
| Caridean zoea and older | | | | 0.267 | | | 0.312 | | 0.332 | 0.445 |
| Hippolytidae zoea | | | | | | 0.268 | | | | |
| Crangon nigromaculata | | | | | | | | | | |
| Heptacarpus pictus | | | | | | | | | | |
| Heptacarpus taylori | | | | 0.891 | | | | | | |
| Unknown caridean type zoea | 0.186 | | | | | 0.299 | | | | |
| Unknown zoea | 0.557 | 0.780 | | | | 0.300 | | | | |
| Arachnid | | | | | | | | | | |
| Pyonogonid | | | | | | | | | | 0.148 |
| Halecaridea | | | | | | | | | | 0.148 |
| Insect larvae | | | | | | | 0.268 | | | |
| Echinodermata | | | | | | | | | | |
| bipinnaria larvae | | | | | | | | | | |
| pluteus larvae | | | | | | | | | | |
| Chaetognatha | 0.557 | | | | | | | | | |
| Urochordata | | | | | | | | | | |
| Larvacea | | 0.140 | 0.423 | 0.222 | 0.247 | 1.746 | | | | |

| | | | | | | | | | | |
|-----------------------------|--------|-------|--------|--------|--------|--------|--------|-------|-------|-------|
| 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 | 7.213 | 0.342 | 7.960 | 3.207 | 0.773 | 1.028 | 2.408 |
| Mysidacea per m3 | 0.000 | 0.000 | 0.000 | 0.222 | 0.000 | 0.000 | 1.345 | 0.000 | 0.000 | 0.000 |
| Other per m3 | 5.142 | 3.340 | 12.981 | 4.227 | 10.384 | 12.156 | 23.166 | 2.468 | 3.318 | 2.966 |

| | 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 | | | | | | | | | |
| Tintinnids | | | | | | | | | |
| Foraminifera | | | | | | 0.427 | 0.192 | 0.767 | |
| Noctiluca | | | | | | | | | |
| Ctenophore | | | | | | | | | |
| Cnidaria | | | | | | | | | |
| Leptomedusa type | 0.187 | 0.625 | | | | | | | |
| Anthomedusa type | | 0.375 | 0.176 | 1.730 | 2.246 | | | | |
| other medusae | | | | | | 0.641 | | | |
| Hydroid polyp | | P | P | | | P | P | | |
| Leptomedusa polyp | | | | | | | | | |
| Coral polyp | | | | | | | | | |
| Siphonophore | | | | | | | | | |
| Aschelminthes | | | | | | | | | |
| roundworm | | | | | 0.287 | | | | |
| Unknown "worm" | | | | | | | | | |
| Rotifera | | | | | | | | | |
| Brachionus | | | | | | | | | |
| Synchaeta | | | | | | | | | |
| Mollusca | | | | | | | | | |
| Bivalves | | | | | | | | | |
| Monticulitidae | | | | 0.192 | | 0.150 | | | 0.194 |
| Modiolus sp(p). | | 0.125 | 0.423 | | | | | | 0.136 |
| Gastropods | | 0.125 | | 0.192 | | 0.214 | 0.768 | | |
| Gastropod eggs | | | | | | P | P | | |
| Nudibranchs | | | | | | | | | 0.194 |
| Phoronida actinotroch | | | | | | | | | |
| Bryozoa larvae | | | | | | | | | |
| Bryozoan colony | | | | | | | | | |
| Annelida | | | | | | | | | |
| Hirudinea | | | | 0.192 | | | | | |
| Nemertean | | | | | | | | | |
| Polychaetes | | | | | | | 0.115 | | 0.969 |
| Polychaete larvae | | 0.375 | 0.176 | | | | | | |
| Oligochaete | | | | | | | | | |
| Nemertea | | | | | | | 0.192 | | |
| Arthropoda | | | | | | | | | |
| Crustacea | | | | | | | | | |
| nauplii | | | | 14.993 | | | | | |
| Cladocera | | | | | | | | | 0.213 |
| Evdne | | | | | | | | | 0.194 |
| Podon | 0.187 | | | | | | | | |
| Copepoda | | | | | | | | | |
| Corycaeus | | 0.250 | | | | | | | |
| Oithona | | | | | | | | | 0.194 |
| Oncaea | | | | | | | | | |
| unk. cyclopoid | | | | | | | | | |
| Cyclopoid copepodites | | | | | | | | | |
| Acartia clausi | 4.785 | 16.624 | 1.234 | 66.559 | 7.862 | 1.624 | | 0.153 | 0.426 |
| Acartia danae | | | | 0.192 | | | | | |
| Calanus sp. | | 0.250 | | 0.769 | | | | 0.767 | 0.388 |
| Metridia lucens | | | | | | 0.855 | | | |
| Eplabidocera longipedata | 0.544 | | | | | 0.641 | | | |
| Eucalanus | | | | | | | | | |
| Eurytemora americana | | | | | | | | | |
| Pseudodiaptomus euryhalinus | | | | | | | | | |
| Temorites sp(p) | | | | | | | | | |
| Rhincalanus nasutus | | | | | | | | | |
| Tortanus discaudatus | 0.163 | | | | 0.287 | | | | |
| Mostrillidae, unident. | | 0.875 | 0.352 | | | 0.641 | | | |
| unknown calanoid | | | | | | | | | 0.194 |
| Calanoid copepodites | | | 0.230 | | | | | | |
| Cal. copepodites w/long rami | | | | | | 0.169 | | | |
| Harpacticoid "A" | | | | | | | | | |
| Harpacticoid "B" | | | | | | | | | |
| Harpacticoid "C" | | | | | | | | | |
| Schizopera knabeni | | | | | | 0.214 | | | |
| Caligus | | | | | | | | | |
| other parasitic copepods | | | | | | | | | |
| unknown copepodites | | | | | | | | | |
| Ostracoda | 0.163 | | | | | | | | |
| Podocopa | | | 0.176 | | | | | | |
| Leptostraca | | | | | | | | | |

| | 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 |
| Cirripedia | | | | | | 0.214 | | 0.232 | |
| Barnacle nauplii | | | | | | | | | |
| Barnacle cypris | | | | | | | | | |
| Isopoda | 0.217 | | | | | | | | |
| Sphaeromatidae | | 0.125 | 0.749 | | | | 0.384 | | 0.969 |
| Idoteidae | | | | | | 0.214 | | | |
| Amphipoda | | | | 0.192 | | 0.214 | 0.192 | | 0.388 |
| Anisogammarus confervicolus | | | | | | | | | |
| Corophium | | | | 0.192 | | 0.214 | | | |
| Caprellidae | | | | | | | | | |
| Grandidiella japonica | | | | | | 0.214 | | | |
| Ampithoidae | | | | | | | | | 0.194 |
| Aoridae | | | | | | 0.214 | | | 0.388 |
| Atylidae | 0.217 | | | | | | 0.192 | | |
| Hyalidae | | | | 0.192 | | | 0.192 | | |
| Ischyroceridae | | | 0.749 | | | | | | |
| Photidae | | | | | 0.287 | | 0.192 | | |
| Pleustidae | | | | | | | 0.192 | | |
| Ampeliscidae | | | | | | 0.214 | | | |
| Talitridae | 0.217 | | 0.529 | | | | | | |
| unk. amphipods | | | | | | 0.192 | 0.192 | | |
| Cumacea | | | | | | | | | |
| Mysidacea | | | | | | 0.192 | 0.576 | | |
| Neomysis mercedis | | | | | | | | | |
| Euphausiacea | | | 0.352 | | | | | | |
| Decapoda | | | | | | | | | |
| Brachyura | | | | | | | | 0.153 | |
| Cancer antennarius/gracilis(1) | | | | | | | | | |
| Cancer antennarius stg 2 zoea | | | | 1.538 | 3.369 | | | | 0.194 |
| Cancer antennarius stg 3 zoea | | | | | | | | | |
| Cancer productus stg 1 zoea | | | | | | | | | |
| Grapsidae zoea | 0.163 | | | | | | | | |
| Majidae zoea | | | 0.934 | 1.730 | 17.966 | 0.641 | | | |
| Pinnotheridae zoea | 6.253 | | 0.176 | | | | | | |
| Xanthidae zoea | | 8.499 | 0.546 | 0.577 | 298.687 | 0.214 | | | 0.194 |
| Unknown brachyuran zoea | | | 0.123 | | | | | 0.767 | |
| Unk. Megalopa | | | | | | | | | |
| Megalopa A | | 0.125 | | | | 0.427 | 0.192 | 0.767 | |
| Megalopa B | | | | | | | | | |
| Megalopa C | | | | | | | | | |
| Megalopa D | | | | | | | | | |
| very young crab | | | | | | | | | |
| Hemigrapsis oregonensis | | | | | | | | | |
| Hemigrapsus nudus | | | | | | | | | |
| Pachygrapsus crassipes | | | | | | | | | |
| Anomura | | | | | | | | | |
| Anomuran megalopa | | | | | | | | | |
| Porcellanidae zoea | | | | | | | | | 0.194 |
| Hippidae zoea | | | | | | | | | |
| Emerita analoga zoea | | | | | | | 0.192 | | |
| Paguridea zoea | | | | | | | | | |
| Paguridae megalopa | | | 0.176 | | 8.150 | | | | |
| Thalassinidea zoea | | | | | | | | | |
| Callinassidae | | | | | | | | | |
| Caridea | | | | | | | | | |
| Penaeidae | | | | | | 0.427 | | | |
| Crangonidae(zoea and older) | | | | | | 0.534 | | | |
| Caridean zoea and older | 0.326 | | | | | | | | |
| Hippolytidae zoea | | | 0.493 | | | | | | |
| Crangon nigromaculata | | | | | | | 0.192 | | |
| Heptacarpus pictus | | | | | | | | 0.767 | |
| Heptacarpus taylori | | | | | | | | | |
| Unknown caridean type zoea | | | | | | | | | |
| Unknown zoea | | | 0.123 | | | | | | |
| Arachnid | | | | | | | | | |
| Pycnogonid | | | | | | | | | |
| Halacaridea | | | | | | | | | |
| Insect larvae | | | | | | | | | |
| Echinodermata | | | | | | | | | |
| bipinnaria larvae | | | | | | | | | |
| pluteus larvae | | | | | | | | | |
| Chaetognatha | | | | | | | | | |
| Urochordata | | 0.250 | 0.150 | | | | | | |
| Larvacea | | | | | | 0.214 | | | |

| | | | | | | | | | |
|-----------------------------|--------|--------|-------|--------|---------|-------|-------|-------|-------|
| Number of Invertebrate taxa | 12 | 14 | 20 | 14 | 9 | 27 | 17 | 8 | 18 |
| Total Invertebrates per m3 | 13.424 | 28.623 | 7.869 | 89.241 | 339.141 | 9.915 | 3.958 | 4.376 | 6.201 |
| Copepoda per m3 | 5.492 | 17.998 | 1.818 | 67.520 | 8.149 | 4.144 | 0.000 | 0.921 | 1.201 |
| Decapoda per m3 | 6.742 | 8.624 | 2.573 | 3.844 | 328.172 | 2.244 | 0.576 | 2.455 | 0.581 |
| Mysidacea per m3 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.192 | 0.576 | 0.000 | 0.000 |
| Other per m3 | 1.190 | 2.000 | 3.480 | 17.876 | 2.820 | 3.334 | 2.805 | 1.000 | 4.418 |

| | 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 |
| Protozoa | | | | | | | | | | |
| Tintinnids | | | | | | | | | | |
| Foraminifera | | | | | | | | | 0.316 | |
| Noctiluca | | | | 1.975 | 0.390 | | | | | |
| Ctenophore | | | | | | 0.243 | | | | |
| Cnidaria | | | | | | | | | | |
| Leptomedusa type | 0.743 | 0.149 | | 1.947 | 0.835 | 0.273 | | | | |
| Anthomedusa type | | 0.595 | 0.242 | | 0.371 | 2.793 | 0.217 | 0.186 | 0.316 | |
| other medusae | | | | 0.996 | | | | | | |
| Hydroid polyp | | | | | | | | | | |
| Leptomedusa polyp | | | | | | | | | | |
| Coral polyp | | | | | | | | | | |
| Siphonophore | | | | | 0.278 | 0.132 | | | | |
| Aschelminthes | | | | | | | | | | |
| roundworm | | | | | | | | | | |
| Unknown "worm" | | | | | | | | | | |
| Rotifera | | | | | | | | | | |
| Brachionus | | | | | | | | | | |
| Synchaeta | | | | | | | | | | |
| Mollusca | | | | | | | | | | |
| Bivalves | 0.186 | | | | | | | | | |
| Macoma sp. | | | | | | | | | | |
| Modiolus sp. (p) | | | | | | | | | | |
| Gastropods | 0.743 | 0.427 | | 0.457 | 0.195 | 1.251 | 0.255 | 0.186 | | 0.157 |
| Gastropod eggs | | | | | | | | | | |
| Nudibranch | | | | | | | | | | |
| Phoronida actinotroch | | | | | | | | | | 0.261 |
| Bryozoa larvae | | | | | | | | | | |
| Bryozoan colony | | | 0.242 | | | | | | | |
| Annelida | | | | | | | | | | |
| Hirudinea | | | | | | | | | | |
| Nemertean | | | | | | | | | | |
| Polychaetes | | | | | | | | | 0.316 | 0.261 |
| Polychaete larvae | 0.371 | 0.149 | | 0.183 | 0.557 | 0.132 | | | | |
| Oligochaete | | | | | | | | | | 0.522 |
| Arthropoda | | | | | | | | | | |
| Crustacea | | | | | | | | | | |
| nauplii | | 0.149 | | 0.183 | | | | | | 0.261 |
| Ciadicera | | | | | | | | | | |
| Evadne | | | 3.268 | | | | | | | |
| Podon | 0.557 | | 3.471 | | | | | | | |
| Copepoda | | | | | | | | | | |
| Corycaeus | | | | | | | | | | |
| Oithona | | 0.297 | | | | | | | | |
| Oncaea | | | | | | | | | | |
| unk. cyclopoid | | | | | | | | | | |
| Cyclopoid copepodites | | | | | | | | | | |
| Acartia clausi | 0.928 | | 19.623 | 15.547 | 6.422 | 28.298 | 3.326 | | 0.631 | 0.261 |
| Acartia danae | | | | | | | 0.128 | | | |
| Calanus sp. | | | | 0.996 | | 0.282 | | | | |
| Metridia lucens | 0.111 | | | | | | 0.128 | | | |
| Epilabidocera longipedata | | | 0.484 | 0.191 | 0.278 | | | | | |
| Eucalanus | | 0.149 | 0.242 | | | 0.142 | | | | |
| Eurytemora affinis | | | | | | | | | | |
| Eurytemora americana | | | 0.242 | | | | | | | |
| Pseudodiaptomus euryhalinus | | | | | | | | | | |
| Temorites sp(p) | | | | | | | | | | |
| Rhincalanus nasutus | | | | | | | | | | |
| Tortanus discaudatus | | | | 0.183 | | | | | | |
| unknown calanoid | | | | 0.366 | | | | | | |
| Calanoid copepodites | | | | | | | | | | |
| Cal. copepodites w/long rami | 0.371 | | | | | | | | | |
| Harpacticoida unident. | | | | | | | | | | |
| Harpacticoid "A" | | | | | | | | | | |
| Harpacticoid "B" | | | | | | | | | | |
| Harpacticoid "C" | | | | | | | | | | |
| Caligus | | 0.297 | | 0.182 | | | | | | |
| other parasitic copepods | | | | | | | | | | |
| unknown copepodites | | | | | | | | | | |
| Ostracoda | | | | | | | | 0.615 | 0.316 | |
| Podocopida | | | | | | | | | | |

| | Station E-2 | | | | | | | | | |
|--------------------------------|-------------|-----------|-----------|-----------|-----------|-----------|----------|----------|----------|----------|
| | 14-Apr-88 | 15-Jun-88 | 30-Aug-88 | 28-Oct-88 | 21-Dec-88 | 17-Feb-89 | 6-Mar-89 | 4-May-89 | 8-Jun-89 | 5-Jul-89 |
| Leptostraca | | | | | | | | | | 0.261 |
| Cirripedia | | | | | 0.278 | 9.187 | | | | |
| Barnacle nauplii | 0.928 | | | | | | | | | |
| Barnacle cypris | | | | | | | | | 0.316 | |
| Isopoda | | 0.297 | | | | | | | | |
| Idoteidae | | | | | | | | | | |
| Amphipoda | | | | | | | | | 0.126 | 0.261 |
| Anisogammarus confervicolus | | | | | | | | | 0.379 | |
| Corophium | | | | | | | 0.128 | | | |
| Caprellidae | | | | | | | | | 0.126 | 0.261 |
| Amphithoidae | | | | | | | | | 0.316 | |
| Aoridae | | | | | | | 0.128 | | | |
| Atylidae | | | | | | | 0.128 | | | |
| Hyalidae | 1.000 | | | | | | 0.519 | | | |
| Pleustidae | | | | | | | 0.153 | | 0.316 | |
| Ampeliscidae | | | | | | | | | | |
| unk. amphipods | | | | | | | | | | |
| Talitridae | | | | | | | | | | |
| unk. amphipods | | 0.149 | | 0.191 | 0.418 | | | 17.228 | | |
| Cumacea | | | | | | | | 0.154 | 0.631 | |
| Mysidacea | | | | | 0.278 | | 1.584 | | | |
| Neomysis mercedis | | | | | | | | 1.182 | 0.126 | |
| Euphausiacea | | | | | | 0.447 | 0.383 | | | |
| Decapoda | | | | | | | | | | |
| Brachyura | | | | | | | | | | |
| Cancer antennarius/gracilis(1) | 0.817 | | | | | | | | | |
| Cancer antennarius stg 2 zoea | 0.260 | 0.149 | | | | | | | | |
| Cancer antennarius stg 3 zoea | | | | | | | | | | |
| Cancer productus stg 1 zoea | 0.186 | | | | | | | | | |
| Grapelidae zoea | | 0.149 | | | | 0.142 | | | | 0.261 |
| Majidae zoea | 0.743 | 0.149 | | 0.183 | | 0.154 | | | | |
| Pinnotheridae zoea | 0.613 | 0.470 | 0.484 | 1.284 | 0.111 | 2.664 | | 0.461 | 0.600 | 0.289 |
| Xanthidae zoea | | | | | | 0.527 | | | | |
| Unknown brachyuran zoea | | | | 0.183 | | | | | | |
| Unk. Megalopa | | | | | | 0.928 | | | | |
| Megalopa A | | | | | | | | | | |
| Megalopa B | | | | | | | | | | |
| Megalopa C | | | | | | | | | | |
| Megalopa D | | | | | | | | | | |
| very young crab | | | 0.242 | | | | | | | |
| Hemigrapsus oregonensis | | | | | | | | | | |
| Hemigrapsus nudus | | | | | | | | | | |
| Pachygrapsus crassipes | | | | | | | | | | |
| Anomura | | | | | | | | | | |
| Anomuran megalopa | | | | | | | | | | |
| Porcellanidae zoea | 0.130 | | | 0.966 | | | | | | |
| Hippidae zoea | 0.186 | 0.149 | | 0.366 | | | | | | |
| Emerita analoga zoea | | | | | | | | | | |
| Paguridae zoea | | | | 0.271 | | | | | | |
| Paguridae megalopa | | | | | | | | | | |
| Thalassinidea zoea | 0.743 | 0.130 | | | | | | | | |
| Callinassidae | | | | | | | | | | |
| Caridea | | | | | | | | | | |
| Crangonidae(zoea and older) | | | 0.371 | | | | | | | |
| Peneidae | | | | | | | | | | |
| Caridean zoea and older | | | 0.484 | 0.182 | | 0.928 | | | 0.126 | |
| Hippolytidae zoea | | | | | | | | | | |
| Crangon nigromaculata | | | | | | | | | | |
| Heptacarpus pictus | | | | | | | | | | |
| Heptacarpus taylori | | | | | | | | | | |
| Unknown caridean type zoea | 0.186 | | | 0.633 | | 0.659 | | 0.154 | | |
| Unknown zoea | 0.743 | 0.149 | | | | 0.132 | | | | |
| Arachnid | | | | | | | | | | |
| Pycnogonid | | | | | | | | | | |
| Halacaridae | | | | | | | | | | |
| Insect larvae | | | | | | | | | | |
| Echinodermata | | | | | | | 0.519 | | | |
| biplinnaria larvae | | | | | | | | | | |
| pluteus larvae | | | | | | | | | | |
| Chaetognatha | | | | | | | | | | |
| Urochordata | | | | | | | | | | |
| Larvacea | | | 0.242 | | 0.278 | 0.264 | | | | |

| | | | | | | | | | | |
|------------------------------|--------|-------|--------|--------|--------|--------|-------|--------|-------|-------|
| Number of Invertebrate taxa | 20 | 17 | 13 | 21 | 13 | 20 | 13 | 8 | 15 | 11 |
| Total # invertebrates per m3 | 10.541 | 3.999 | 28.637 | 27.494 | 10.891 | 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 | 1.342 | 1.581 | 4.087 | 0.111 | 6.133 | 0.000 | 0.615 | 0.726 | 0.550 |
| Mysidacea per m3 | 0.000 | 0.000 | 0.000 | 0.000 | 0.278 | 0.000 | 1.584 | 1.182 | 0.126 | 0.000 |
| Other per m3 | 4.527 | 1.914 | 7.465 | 5.931 | 3.601 | 14.721 | 2.429 | 18.370 | 3.472 | 2.246 |

| | 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 |
| Protozoa | | | | | | | | |
| Tintinnids | | | | | | 0.183 | | |
| Foraminifera | | | | | | | | |
| Noctiluca | | 0.129 | | | | | | |
| Ctenophore | | | | | | | | |
| Cnidaria | | | | | | | | |
| Leptomedusa type | | 0.485 | | 0.468 | | | | 0.189 |
| Anthomedusa type | 0.267 | 0.220 | | 0.693 | 0.126 | 0.721 | | 0.170 |
| other medusae | | | | | | | | |
| Hydroid polyp | | P | | | | | | P |
| Leptomedusa polyp | | | | | | | | |
| Coral polyp | | | | | | | | |
| Siphonophore | | | | | | | | |
| Aschelminthes | | | | | | | | |
| roundworm | | | | | | | | |
| Unknown "worm" | | | | | | | | |
| Rotifera | | | | | | | | |
| Brachionus | | | | | | | | |
| Synchaeta | | | | | | | | |
| Mollusca | | | | | | | | |
| Bivalves | 0.345 | | | | | | | |
| Macoma sp. | | | 0.493 | | | | | |
| Modiolus sp. (p) | | 0.162 | | | | | | |
| Gastropods | 0.267 | 0.162 | | | | | | |
| Gastropod eggs | | | | 0.937 | P | P | | P |
| Nudibranch | | | | | | | | |
| Phoronida actinotroch | | | | | | | | |
| Bryozoa larvae | | | | | | | | |
| Bryozoan colony | | | | | | | | |
| Annelida | | | | | | | | |
| Hirudinea | | | | | | | | |
| Nemertean | | | | | | | | |
| Polychaetes | | | | 0.234 | | | 0.713 | |
| Polychaete larvae | | | | | | | | |
| Oligochaete | | | | | | | | |
| Arthropoda | | | | | | | | |
| Crustacea | | | | | | | | |
| nauplii | | | | | | | | |
| Cladocera | | | | | | | | |
| Evdne | 0.689 | | | | | | | 0.159 |
| Podon | | | | | | | | |
| Copepoda | | | | | | | | |
| Corycaeus | | 0.162 | | | | | | |
| Oithona | | | | | | 0.183 | 0.713 | 0.755 |
| Oncaea | | | | | | | | |
| unk. cyclopoid | | | | | | | | |
| Cyclopoid copepodites | | | | | | | | |
| Acartia clausi | 1.723 | 4.687 | 0.856 | 1.454 | | 0.366 | | 0.264 |
| Acartia danae | | 0.646 | | | | | | |
| Calanus sp. | | 0.162 | | 0.468 | | | | |
| Metridia lucens | | | | | | | | |
| Epilabidocera longipedata | | | | | | | | |
| Eucalanus | | | | | | | | |
| Eurytemora affinis | | | | | | 0.342 | | |
| Eurytemora americana | | | | | | | | |
| Pseudodiaptomus euryhalinus | | | | | | | | |
| Tamorites sp(p) | | | | | | | | |
| Rhincalanus nasutus | | | 0.164 | | | | | |
| Tortanus discaudatus | | 0.178 | 0.164 | | | | | |
| unknown calanoid | | | 0.329 | | | | | |
| Calanoid copepodites | | | | | | | | |
| Cal. copepodites w/long rami | | | | | | | | |
| Harpacticoida unident. | | | | | | 0.198 | | |
| Harpacticoid "A" | | | | | | | | |
| Harpacticoid "B" | | | | | | | | |
| Harpacticoid "C" | | | | | | | | |
| Caligus | | | | | | 0.183 | 0.713 | |
| other parasitic copepods | | | | | | | | |
| unknown copepodites | | | | | | | | |
| Ostracoda | | | | | | | | |
| Podocopa | | | | 0.468 | | | | |

| | 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 |
| Leptostraca | | | | | | | | |
| Cirripedia | | | | | | | | |
| Barnacle nauplii | | | | | | | | |
| Barnacle cypris | | | | | | | | |
| Isopoda | | | | | | | 0.178 | |
| Idoteidae | | | | | | | | |
| Amphipoda | | | | | | | | |
| Anisogammarus confervicolus | | 0.162 | | 0.234 | | | | |
| Corophium | | 0.226 | 0.164 | | | | | |
| Caprellidae | | | | | | | | |
| Ampithoidae | | | | | | | | |
| Aoridae | | | | | | | | |
| Atylidae | | | | | | | | |
| Hyalidae | 0.138 | | 0.329 | | | | | |
| Pleustidae | | | | | | | | |
| Ampeliscidae | | | | | | | | |
| unk. amphipods | | 0.162 | | | | | | |
| Talitridae | 0.689 | | | 0.234 | 0.632 | 0.366 | | |
| unk. amphipods | | | | | | | | |
| Cumacea | 0.689 | | | 0.234 | | | | |
| Mysidacea | | | 0.164 | | | | | |
| Neomysis mercedis | 0.276 | | | | | 0.183 | | |
| Euphausiacea | | | | | | | | |
| Decapoda | | | | | | | | |
| Brachyura | | | | | | | | |
| Cancer antennarius/gracilis(1) | | | | 0.937 | | | | |
| Cancer antennarius stg 2 zoea | | | | | | | | |
| Cancer antennarius stg 3 zoea | | | | | | | | |
| Cancer productus stg 1 zoea | | | | | | | | |
| Grapsidae zoea | 0.689 | 0.299 | 0.822 | 0.345 | 0.253 | 0.721 | | 0.189 |
| Majidae zoea | | | | 0.234 | | | | |
| Pinnotheridae zoea | 1.999 | 0.517 | 0.116 | | 0.126 | 0.144 | | 0.328 |
| Xanthidae zoea | | 0.162 | 0.987 | | | | | |
| Unknown brachyuran zoea | | | | | | | | |
| Unk. Megalopa | | | | | | | | |
| Megalopa A | | | | | | | | |
| Megalopa B | | | | | | | | |
| Megalopa C | | | | | | | | |
| Megalopa D | | | | | | | | |
| very young crab | | | | | | | | |
| Hemigrapsus oregonensis | | | | | | | | |
| Hemigrapsus nudus | | | | | | | | |
| Pachygrapsus crassipes | | | | | | | | |
| Anomura | | | | | | | | |
| Anomuran megalopa | | | | | | | | |
| Porcellanidae zoea | | | 0.329 | | | | 0.183 | |
| Hippidae zoea | | | | | | | | |
| Emerita analoga zoea | | | 0.164 | | | | | |
| Paguridae zoea | | | | 0.234 | | 0.182 | | |
| Paguridae megalopa | | | | | 0.632 | | | |
| Thalassinidea zoea | | | | | | | | |
| Callinassidae | | | | | | | | |
| Caridea | | | | | | | | |
| Crangonidae(zoea and older) | | 0.162 | 0.362 | | | | | |
| Peneidae | | | | | 0.316 | | | |
| Caridean zoea and older | | | | | | 0.183 | | |
| Hippolytidae zoea | | 0.646 | | | | | | |
| Crangon nigromaculata | | | | | | | | |
| Heptacarpus pictus | | | | | | | | |
| Heptacarpus taylori | | | | | | | | |
| Unknown caridean type zoea | | 0.323 | 0.987 | | | | | |
| Unknown zoea | | | | | | | | |
| Arachnid | | | | | | | | |
| Pycnogonid | | | | | | | | |
| Halacaridae | | | | | | | | |
| Insect larvae | 1.337 | | | | | | | |
| Echinodermata | | | | | | | | |
| bipinnaria larvae | | | | | | | | |
| pluteus larvae | | | | | | | | |
| Chaetognatha | | 0.162 | 0.164 | 0.234 | | | | |
| Urochordata | | | | | | | | |
| Larvaceae | | 0.162 | | | | | | 0.189 |
| Number of invertebrate taxa | 12 | 22 | 16 | 15 | 7 | 15 | 4 | 10 |
| Total # invertebrates per m3 | 9.108 | 9.973 | 6.595 | 7.411 | 2.085 | 4.138 | 2.318 | 2.242 |
| Copepoda per m3 | 1.723 | 5.834 | 1.513 | 1.923 | 0.000 | 1.272 | 1.427 | 1.019 |
| Decapoda per m3 | 2.688 | 2.109 | 3.766 | 1.751 | 1.327 | 1.412 | 0.000 | 0.516 |
| Mysidacea 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 |

| | 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 |
| Protozoa | | | | | | | | | |
| Tintinnids | | | | | | | | | |
| Foraminifera | 0.223 | 0.171 | 3.425 | | 15.567 | | 0.365 | 0.138 | |
| Noctiluca | | 1.289 | | | | | | | |
| Ctenophore | | | | | | | | | |
| Cnidaria | | | | | | | | | |
| Leptomedusa type | | 1.335 | | | | | | | |
| Anthomedusa type | 0.149 | 0.891 | | 0.142 | 0.184 | 0.183 | 0.459 | | |
| other medusae | | | | | | | | | |
| Hydroid polyp | | | | | | | | | |
| Leptomedusa polyp | | | | | | | | | |
| Coral polyp | | | | | | | | | |
| Siphonophore | | 0.184 | | | | | | | |
| Aschelminthes | | | | | | | | | |
| roundworm | | | | 0.710 | | | | | |
| Unknown "worm" | | | | | | | | | |
| Nemertea unident. | | | | | | | | | |
| Rotifera | | | | | | | | | |
| Brachionus | | | | | | | | | |
| Synchaeta | | | | | | | | | |
| Mollusca | | | | | | | | | |
| Bivalves | | | | | | | | | 0.132 |
| Modiolus sp. (p) | | | | | | | | | |
| Monticulitidae | | | | | | | | | |
| Gastropods | 0.743 | | 0.342 | 0.426 | | | | 0.466 | |
| Gastropod eggs | | | | | | | | | |
| Nudibranch | | | 0.114 | | | | | | |
| Phoronida actinotroch | | | | | | | | | |
| Bryozoa larvae | | 0.171 | | | | | | | |
| Bryozoan colony | | | | | | | | | |
| Annelida | | | | | | | | | |
| Hirudinea | | | | | | | | | |
| Nemertean | | | | | | | | | |
| Polychaetes | | | | | 0.367 | | | 0.233 | |
| Polychaete larvae | 0.446 | 0.176 | 0.114 | 0.303 | | | | | |
| Oligochaete | | | | 0.284 | 0.459 | 0.183 | 0.688 | 0.415 | |
| Arthropoda | | | | | | | | | |
| Crustacea | | | | | | | | | |
| naupili | 0.743 | | | | | | | | |
| Cladocera | | | | | | | | | |
| Evadne | 0.743 | | | | 0.826 | | | | |
| Podon | 0.446 | 0.171 | | | | | | | |
| Copepoda | | | | | | | | | |
| Corycaeus | | 0.171 | | | | | | | |
| Oithona | | | | | | | | | |
| Oncaea | | | | | | | | | |
| unk. cyclopoid | | | | | | | | | |
| Cyclopoid copepodites | | | | | | | | | |
| Acartia clausi | 5.950 | 39.442 | 14.519 | 20.591 | | | 0.459 | 0.138 | 1.355 |
| Acartia danae | | | | | | | | | |
| Calanus sp. | | | | | | | | | |
| Metridia lucens | | | | | | | | | |
| Epilabidocera longipedata | 0.743 | 0.891 | | | | | | | |
| Eucalanus | | | | | | | | | |
| Eurytemora affinis | | | | | | | | | |
| Eurytemora americana | | | | | 0.275 | | | | |
| Pseudodiaptomus euryhalinus | | | | | 0.919 | | | 0.466 | |
| Temorites sp(p) | | | | | 1.118 | | | | |
| Rhincalanus nasutus | | | | | | | | | |
| Tortanus discaudatus | | | | | | | | | |
| unknown calanoid | 0.743 | | | | | | | | |
| Calanoid copepodites | 0.149 | | | | | | | | |
| Cal. copepodites w/long rami | | | 0.161 | | | | | | |
| Harpacticoid "A" | | | 0.114 | | | | | | |
| Harpacticoid "B" | | | | | | | | | |
| Harpacticoid "C" | | | | | | | | | |
| Caligus | | 0.891 | | | | | | | |
| other parasitic copepods | | | | | | | 0.459 | | |
| unknown copepodites | | | | | | | | | |
| Ostracoda | 0.595 | | 3.197 | | 24.697 | 6.712 | 2.598 | 0.276 | |
| Podocopa | | | | | | | | | |
| Leptostraca | | | | | | | | | |

| | Station E-3 | | | | | | | | |
|--------------------------------|-------------|-----------|-----------|-----------|----------|----------|----------|----------|-----------|
| | 30-Aug-88 | 26-Oct-88 | 21-Dec-88 | 17-Feb-89 | 6-Mar-89 | 4-May-89 | 6-Jun-89 | 5-Jul-89 | 18-Sep-89 |
| Cirripedia | | | | | | | | | |
| Barnacle nauplii | 0.743 | 0.171 | 0.114 | 0.142 | | | | | |
| Barnacle cypris | | | | 0.142 | | | | | |
| Isopoda | | | 0.928 | | | | | | |
| Amphipoda | | | | | | | | | |
| Anisogammarus confervicolus | | | | | 0.184 | | 0.182 | 1.290 | 0.132 |
| Corophium spinicorne | | | | | | | | | |
| Corophium | 0.650 | | | | 3.397 | | 3.653 | 0.322 | |
| Caprellidae | | | | | | | | | 0.263 |
| Amphithoidae | | | | | 2.754 | | 0.459 | 0.876 | |
| Aoridae | | | | | | | | | |
| Atylidae | | | | | | | | | |
| Hyalidae | | | | | | | | | |
| Pleustidae | | | | | | | | 0.466 | |
| Ampeliscidae | | | | | 0.184 | | | 0.466 | |
| Talitridae | | | | | | | | | |
| unk. amphipods | 0.928 | 0.343 | 1.377 | | | 1.628 | | | |
| Cumacea | | | 19.293 | 0.568 | 1.990 | | | | |
| Campylaspis sp(p). | | | | | | | | | |
| Cyclops sp(p). | | | | | | | | | |
| Mysidacea | | | | | | | | | |
| Neomysis mercedis | | | 0.353 | | 0.826 | 0.529 | 0.244 | 1.746 | |
| Acanthomysis sp(p) | | | | | | | | | |
| Euphausiacea | | | | | | | | | |
| Decapoda | | | | | | | | | |
| Brachyura | | | | | | | | | |
| Cancer antennarius/gracilis(1) | 0.223 | | 0.161 | | | | | | |
| Cancer antennarius stg 2 zoea | | | | | | | | | |
| Cancer antennarius stg 3 zoea | | | | | | | | | |
| Cancer productus stg 1 zoea | | | | | | | | | |
| Grapsidae zoea | 0.743 | | | | | | 0.459 | 1.746 | 0.395 |
| Majidae zoea | 0.743 | | | | | | | | |
| Pinnotheridae zoea | 1.114 | 1.236 | | | | 1.173 | 0.459 | 0.566 | 0.152 |
| Xanthidae zoea | | | | | | | | | |
| Unknown brachyuran zoea | | | 0.114 | | | | | | |
| Unk. Megalopa | | | | 0.009 | | | | | |
| Megalopa A | | 0.176 | | | | | | | |
| Megalopa B | | 0.891 | | | | | | | |
| Megalopa C | | | | | | | | | |
| Megalopa D | | | | | | | | | |
| very young crab | | | 0.114 | | | | | | |
| Hemigrapsus oregonensis | | | | | | | | | |
| Hemigrapsus nudus | | | | | | | | | |
| Pachygrapsus crassipes | | | | | | | | | |
| Anomura | | | | | | | | | |
| Anomuran megalopa | | | | | | | | | |
| Porcellanidae zoea | | 0.343 | | | | 0.163 | | | 0.132 |
| Hippidae zoea | 0.743 | | | | | | | | 0.132 |
| Emerita anisoga zoea | | | | | | | | | |
| Paguridea zoea | | | | | | | | | |
| Thalassinidea zoea | 0.743 | | | 0.710 | | | | | |
| Callinassidae | | | | | | | | | |
| Caridea | | | | | | | | | |
| Crangonidae(zoea and older) | 0.176 | | | | | | | 0.466 | 0.263 |
| Caridean zoea and older | | | | | | | | | |
| Hippolytidae zoea | | | | | | | | | |
| Crangon nigromaculata | | | 0.928 | 0.009 | | | | | |
| Heptacarpus pictus | | | | | | | | | |
| Heptacarpus taylori | | | | | | | | | |
| Palaemon ritteri | | | | | | | | | |
| Unknown caridean type zoea | | 0.176 | 0.928 | 0.142 | | 0.236 | | | |
| Unknown zoea | | | | | | | | | |
| Arachnid | | | | | | | | | |
| Pycnogonid | | | | | | | | | |
| Halacaridae | | | | | | | | | |
| Insect larvae | | | | | 1.118 | | | | |
| Echinodermata | | | | | | | | | |
| bipinnaria larvae | | | | | | | | | |
| pluteus larvae | | | | | | | | | |
| Chaetognatha | | | | | | | | | |
| Urochordata | | | | | | | | | |
| Larvacea | 0.743 | 0.171 | | | | | | | |
| Number of Invertebrate taxa | 23 | 20 | 18 | 13 | 16 | 8 | 12 | 16 | 9 |
| Total # Invertebrates per m3 | 19.214 | 49.294 | 46.298 | 24.178 | 54.864 | 10.827 | 10.462 | 10.074 | 2.954 |
| Copepoda per m3 | 7.584 | 41.395 | 14.795 | 20.591 | 2.312 | 0.000 | 0.917 | 0.604 | 1.355 |
| Decapoda per m3 | 4.483 | 2.823 | 2.246 | 0.870 | 0.000 | 1.592 | 0.917 | 2.778 | 1.073 |
| Mysidacea per m3 | 0.000 | 0.000 | 0.353 | 0.000 | 0.826 | 0.529 | 0.244 | 1.746 | 0.000 |
| Other per m3 | 7.148 | 5.076 | 28.904 | 2.717 | 51.726 | 8.706 | 8.384 | 4.946 | 0.527 |

| | 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 |
| Protozoa | | | | | | | | |
| Tintinnids | | | | | | | | |
| Foraminifera | | | 0.144 | | | 0.815 | | 1.527 |
| Noctiluca | | | | | | | | |
| Ctenophore | 0.185 | | | | | | | |
| Cnidaria | | | | | | | | |
| Leptomedusa type | | | | 0.282 | | | | 0.741 |
| Anthomedusa type | 0.370 | | 0.144 | 0.282 | 0.189 | 0.815 | | 3.185 |
| other medusae | | | | | | | | |
| Hydroid polyp | 0.185 | | | | P | P | | |
| Leptomedusa polyp | | | | | | | | |
| Coral polyp | | | | | | | | |
| Siphonophore | | | | | | | | |
| Aschelminthes | | | | | | | | |
| roundworm | | | | | | | | |
| Unknown "worm" | | | | | | | | |
| Nemertea unident. | | 0.147 | | | | | | |
| Rotifera | | | | | | | | |
| Brachionus | | | | | | | | |
| Synchaeta | | | | | | | | |
| Mollusca | | | | | | | | |
| Bivalves | | | 0.144 | | | | | |
| Modiolus sp. (p) | 0.185 | | | | | | | 0.436 |
| Monticulitidae | | | | | | | | |
| Gastropods | | 0.147 | | | | | | |
| Gastropod eggs | | | P | | P | P | | |
| Nudibranch | | | | | | | | |
| Phoronida actinotroch | | | | | | | | |
| Bryozoa larvae | | | | | | | | |
| Bryozoan colony | | | | | | | | |
| Annelida | | | | | | | | |
| Hirudinea | | | | | | | | |
| Nemertean | | | | | | | | |
| Polychaetes | | 0.736 | 0.528 | 0.313 | | | 0.859 | |
| Polychaete larvae | 0.185 | | | | | | | |
| Oligochaete | | | | 0.313 | | | 0.429 | |
| Arthropoda | | | | | | | | |
| Crustacea | | | | | | | | |
| nauplii | | | | | | | | |
| Cladocera | | | | | | | | |
| Evadne | | | 0.481 | | | | | |
| Podon | | | | | | | | |
| Copepoda | | | | | | | | |
| Corycaeus | | | | | | | | |
| Oithona | | | | | | | | |
| Oncaea | | | | | | | | |
| unk. cyclopoid | | | | | | | | |
| Cyclopoid copepodites | | | | | | | | |
| Acartia clausi | 3.954 | 0.633 | | 0.188 | | 0.815 | | 1.385 |
| Acartia danse | | | | | | | | |
| Calanus sp. | | | | | | | | |
| Metridia lucens | | | | | | | | |
| Epilabidocera longipedata | | | | | | | | |
| Eucalanus | | | | | | | | |
| Eurytemora affinis | | | | | 0.189 | | | |
| Eurytemora americana | | | | | | | | |
| Pseudodiaptomus euryhalinus | | | | | | 0.122 | | |
| Temorites sp(p) | | | | | 0.189 | | | |
| Rhincalanus nasutus | | | | | | | | |
| Tortanus discaudatus | 0.554 | 0.147 | | | | | | |
| unknown calanoid | | 0.147 | | | | | 0.429 | |
| Calanoid copepodites | 0.370 | | | | | | | |
| Cal. copepodites w/long rami | | | | | | | | |
| Harpacticoid "A" | | | | | | | | |
| Harpacticoid "B" | | | | | | | | |
| Harpacticoid "C" | | | | | | | | |
| Caligus | | | | | | | 0.859 | 0.436 |
| other parasitic copepods | | | | | | | | 0.139 |
| unknown copepodites | | | | | | | | |
| Ostracoda | | | | | | | | |
| Podocoppida | | | 0.481 | 0.313 | 0.378 | 0.326 | 0.344 | 0.353 |
| Leptostraca | | | | | | | | |

| | 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 |
| Cirripedia | | | | | | | | |
| Barnacle nauplii | | | | | | | | |
| Barnacle cypris | | | | | | | | |
| Isopoda | | 0.147 | | | | 0.475 | | |
| Amphipoda | | | | | | | | |
| Anisogammarus confervicolus | 0.185 | | 0.528 | | 0.378 | 0.285 | | |
| Corophium spinicorne | | | 0.481 | 0.157 | 0.568 | 0.122 | 0.859 | |
| Corophium | 0.924 | 1.155 | | | | | | |
| Caprellidae | | | | | | | | |
| Amphithoidae | | | | | | | | |
| Aoridae | | | | | | | | |
| Atylidae | | 0.441 | | | | | | |
| Hyalidae | | 0.235 | | | | | | |
| Pleustidae | | | | | | | | |
| Ampeliscidae | | | | | | | | |
| Talitridae | | | 0.144 | | | | | |
| unk. amphipods | | | | | | | | |
| Cumacea | | | 0.481 | | | 0.575 | 0.215 | 0.219 |
| Campylaspis sp(p). | 0.777 | 1.559 | | | | | | |
| Cyclops sp(p). | | | | | | | | |
| Mysidacea | | | | | | | | |
| Neomysis mercedis | 1.213 | | 0.289 | | | 1.182 | 0.172 | 1.439 |
| Acanthomysis sp(p) | | 0.147 | | | | | | |
| Euphausiacea | | | | | | | | |
| Decapoda | | | | | | | | |
| Brachyura | | | | | | | | |
| Cancer antennarius/gracilis(1) | | | | 0.940 | | | | 0.139 |
| Cancer antennarius stg 2 zoea | | | | | | | | |
| Cancer antennarius stg 3 zoea | | | | | | | | |
| Cancer productus stg 1 zoea | | | | | | | | |
| Grapidae zoea | | | | | 0.114 | | 0.429 | 0.139 |
| Majidae zoea | 0.129 | | | | | | | |
| Pinnotheridae zoea | 0.352 | 0.883 | | 1.859 | 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 | | | | | | | | |
| very young crab | | | | | | | | |
| Hemigrapsus oregonensis | | | | | | | | |
| Hemigrapsus nudus | | | | | | | | |
| Pachygrapsus crassipes | | | | | | | | |
| Anomura | | | | | | | | |
| Anomuran megalopa | | | | | | | | |
| Porcellanidae zoea | 0.185 | 0.588 | | | | 0.475 | | 0.219 |
| Hippidae zoea | | | | | | | | |
| Emerita analoga zoea | 0.166 | | | | | 0.475 | | 0.219 |
| Paguridae zoea | | | | 0.344 | | 0.122 | 0.129 | |
| Thalassinidea zoea | | | | | | | | |
| Callinassidae | | | | | | | | |
| Caridea | | | | | | | | |
| Crangonidae(zoea and older) | | 0.839 | | | | | | |
| Caridean zoea and older | | 0.633 | | | | | | |
| Hippolytidae zoea | | | | | | | | |
| Crangon nigromaculata | | | | | | | | |
| Heptacarpus pictus | | | | | | | | |
| Heptacarpus taylori | | | | | | | | |
| Palaeomon ritteri | | 0.147 | | | | | | |
| Unknown caridean type zoea | | | | | | | | |
| Unknown zoea | | | | | | | | |
| Arachnid | | | | | | | | |
| Pycnogonid | | | | | | | | |
| Halscaridea | | | | | | | | |
| Insect larvae | 0.185 | | | | | | | |
| Echinodermata | | | | | | | | |
| bipinnaria larvae | | | | | | | | |
| pluteus larvae | | | | | | | | |
| Chaetognaths | 0.185 | 0.147 | | | | | | |
| Urochordata | | | | | | | | |
| Larvacea | | 0.280 | | | | | | |
| Number of invertebrate taxa | 20 | 21 | 12 | 10 | 10 | 16 | 11 | 16 |
| Total # invertebrates per m3 | 11.599 | 9.450 | 3.848 | 4.791 | 2.384 | 6.851 | 5.153 | 11.666 |
| Copepoda per m3 | 4.878 | 0.927 | 0.000 | 0.188 | 0.378 | 0.938 | 1.288 | 1.960 |
| Decapoda per m3 | 2.144 | 3.361 | 0.000 | 2.943 | 0.492 | 1.317 | 0.968 | 1.806 |
| Mysidacea per m3 | 1.213 | 0.000 | 0.289 | 0.000 | 0.000 | 1.182 | 0.172 | 1.439 |
| Other per m3 | 3.363 | 5.142 | 3.559 | 1.660 | 1.514 | 3.415 | 2.705 | 6.461 |

| | Station E-4 | | | | | | | | | |
|------------------------------|-------------|-----------|-----------|-----------|-----------|-----------|----------|----------|----------|----------|
| | 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 | | | 0.175 | | | | 0.913 | | | |
| Noctiluca | | | | | 0.458 | | | | | |
| Ctenophore | | | | | | | | | | |
| Cnidaria | | | | | | | | | | |
| Leptomedusa type | 0.371 | | | | | | | | | |
| Anthomedusa type | | | 0.354 | | | | | | | |
| other medusae | | | | | | | | | | |
| Hydroid polyp | | | | | | | | | | |
| Leptomedusa polyp | | | | | | | | | | |
| Coral polyp | | | | | | | | | | |
| Siphonophore | | | | | | | | | | |
| Aschelminthes | | | | | | | | | | |
| roundworm | | 0.241 | | | | | | | | |
| Unknown "worm" | | | | | | | | | | |
| Rotifera | | | | | | | | | | |
| Brachionus | | | | | | | | | | |
| Synchaeta | | | | | | | | | | |
| Mollusca | | | | | | | | | | |
| Bivalves | | 0.965 | | | | | | | | |
| Gastropods | 0.186 | | | 0.697 | | 0.427 | | 0.179 | | |
| Nudibranch | | | | | | | | | | |
| Phoronida actinotroch | | | | | | | | | | |
| Bryozoa larvae | | | | | | | | | | |
| Bryozoan colony | | | | | | | | | | |
| Annelida | | | | | | | | | | |
| Hirudinea | | | | | | | | | | |
| Nemertean | | | | | | | | | | |
| Polychaetes | | | | | | | | | 1.187 | |
| Polychaete larvae | 0.186 | 0.965 | | | 0.119 | 0.186 | | | | |
| Oligochaete | | | | | | | 3.660 | | 0.494 | 0.264 |
| Arthropoda | | | | | | | | | | |
| Crustacea | | | | | | | | | | |
| nauplii | | | | | | | | | | |
| Cladocera | | | | | | | | | | |
| Evdne | | | | | | | 22.279 | | | |
| Podon | | | | | | | | | | |
| Copepoda | | | | | | | | | | |
| Corycaeus | | | | | | | | | | |
| Oithona | | | | | | | | | | |
| Oncaea | | | | | | | | | | |
| unk. cyclopoid | | | | | | | 1.552 | | | |
| Cyclopoid copepodites | | | | | | | | | | |
| Acartia clausi | | 0.145 | 0.385 | 2.592 | | 1.538 | | | 0.247 | |
| Acartia danae | | | | | | | | | | |
| Calanus sp. | | | | | | | | | | |
| Metridia lucens | | | | | | | | | | |
| Epilabidocera longipedata | | | | | | | | | | |
| Eucalanus | | | | | | | | | | |
| Eurytemora affinis | | | | | | | | | | |
| Eurytemora americana | | | | | | | 0.456 | | | |
| Pseudodiaptomus euryhalinus | | | | 0.179 | | | | | | |
| Temorites sp(p) | | | | | | | 1.917 | | | |
| c.f. Temorites | | | | | | | | | | |
| Rhincalanus nasutus | | | | | | | | | | |
| Tortanus discaudatus | | | | 0.697 | | | | | | |
| unknown calanoid | | | | | | | | | | |
| Calanoid copepodites | | | 0.175 | 0.179 | 3.652 | | | | | |
| Cal. copepodites w/long rami | | | | | 0.458 | | | | | |
| Harpacticoida | | | | | | | | | | |
| Harpacticoid "A" | | | | | | | | | | |
| Harpacticoid "B" | 0.371 | 0.965 | | | | | | | | |
| Harpacticoid "C" | 0.186 | | | | | | | | | |
| Caligus | | 0.897 | 0.875 | 0.188 | | | | | | |
| other parasitic copepods | | 0.557 | | | | | | | | |
| unknown copepodites | | | | | | | | | | |
| Ostracoda | | 0.194 | | | | | | | | |
| Podocopida | | | | | | 0.137 | 0.821 | 0.179 | 0.594 | |
| Leptostraca | | | | | | | | | | |

| | Station E-4 | | | | | | | | | |
|--------------------------------|-------------|-----------|-----------|-----------|-----------|-----------|----------|----------|----------|----------|
| | 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 | | | | 0.897 | | | | | | |
| Barnacle nauplii | | 0.928 | | | | | | | | |
| Barnacle cypris | | 0.483 | | | | | | | | 0.632 |
| Isopoda | | | | | | | | | | |
| Amphipoda | | | | | | | | | | |
| Anisogammarus confervicolus | 0.743 | 0.173 | | | | | 0.183 | | 0.615 | 0.796 |
| Corophium | | 0.965 | | | | | | | 0.368 | 0.218 |
| Corophium spinicorne | | | | | | | | | | |
| Grandilierella japonica | | | | | | | | | | |
| Caprellidae | | | | | | | | | | |
| Amphithoidae | | | | | | | | | | |
| Aoridae | | | | | | | | | | |
| Atylidae | | | | | | | | | | |
| Hyalidae | | | | | | | | | | |
| Pleustidae | | | | | | | | | | |
| Ampeliscidae | | | | | | | | | | |
| Amphithoidae | | | | | | | | | | |
| Talitridae | | | | | | | | | | |
| unk. amphipods | | | | | 0.371 | | | | | |
| Cumacea | | | | | | 0.854 | | | | |
| Campylaspis sp. (p). | | | | | | | | | | |
| Mysidacea | | | | | | | | | | |
| Neomysis mercedis | | 1.351 | | 0.897 | 0.244 | | | 0.985 | 0.963 | 0.527 |
| Euphausiacea | | | | | | | | | | |
| Decapoda | | | | | | | | | | |
| Brachyura | | | | | 0.458 | | | | | |
| Cancer antennarius/gracilis(1) | | | | | | | | | | |
| Cancer antennarius stg 2 zoea | | | | | | | | | | |
| Cancer antennarius stg 3 zoea | | | | | | | | | | |
| Cancer productus stg 1 zoea | | | | | | | | | | |
| Grapsidae zoea | | 1.689 | | 0.897 | | | 0.913 | | 0.494 | 0.264 |
| Majidae zoea | | | | | 0.135 | | | | | |
| Pinnotheridae zoea | 0.371 | | 0.567 | 0.413 | 0.183 | | 0.274 | | 0.164 | |
| Xanthidae zoea | | | | | | | | | | |
| Unknown brachyuran zoea | | | | | 0.458 | | | | | |
| Unk. Megalopa | | | 0.560 | | | | | | | |
| Megalopa A | | | | 0.179 | 0.135 | 0.928 | | | | |
| Megalopa B | | | | | | | | | | |
| Megalopa C | | | | 0.897 | | | | | | |
| Megalopa D | | | | | 0.458 | | | | | |
| very young crab | | | | | | | | | | |
| Hemigrapsis oregonensis | | | | | | | | | | |
| Hemigrapsus nudus | | 0.278 | | | | | | | | |
| Pachygrapsus crassipes | | 0.928 | | | | | | | | |
| Anomura | | | | | | | | | | |
| Anomuran megalopa | | | | | 0.458 | | | | | |
| Porcellanidae zoea | | | | | | | | | | |
| Hippidae zoea | | | 0.354 | 0.897 | | | | | | |
| Emerita analoga zoea | | | | | | | | | | |
| Paguridea zoea | | | | 0.897 | | | | | | |
| Thalassinidea zoea | | 0.483 | | 0.179 | | 0.854 | | | | |
| Callinassidae | | | | | | | | | | |
| Caridea | | | | | | | | | | |
| Crangonidae(zoea and older) | | | 0.928 | | | | | | | |
| Caridean zoea and older | | | | | | | | | | |
| Hippolytidae zoea | | | | | | | | | | |
| Crangon nigromaculata | | | | | | | | | | |
| Heptacarpus pictus | | | | | | | | | | |
| Heptacarpus taylori | | | | | | | | | | |
| Unknown caridean type zoea | | | | 0.448 | | | | | | |
| Unknown zoea | | | | | | | | | | |
| Arachnid | | | | | | | 0.913 | | | 0.264 |
| Pycnogonid | | | | | | | | | | |
| Halacaridae | | | | | | | | | | |
| Insect larvae | | | | | | | 2.647 | 0.179 | | 0.264 |
| Corbidae, unident. | | | | | | | | | | |
| Echinodermata | | | | | | | | | | |
| biplinnaria larvae | | | | | | | | | | |
| pluteus larvae | | | | | | | | | | |
| Chaetognatha | | | | | | | | | | |
| Urochordata | | | | | | | | | | |
| Larvacea | | | | | | | | | | |
| 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 | 36.527 | 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 |
| Decapoda per m3 | 0.371 | 3.378 | 2.409 | 4.807 | 2.268 | 1.782 | 1.187 | 0.000 | 0.658 | 0.264 |
| Mysidacea per m3 | 0.000 | 1.351 | 0.000 | 0.897 | 0.244 | 0.000 | 0.000 | 0.985 | 0.963 | 0.527 |
| Other per m3 | 1.465 | 4.914 | 0.529 | 1.794 | 0.949 | 1.604 | 31.415 | 0.538 | 3.258 | 2.437 |

| | 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 | | | | | | 0.177 | | | 0.219 |
| Anthomedusa type | | | | | | | | | |
| other medusae | | | | | | | | | |
| Hydroid polyp | | | | | | | | | |
| Leptomedusa polyp | | | | | | | | | |
| Coral polyp | | | | | | | | | |
| Siphonophore | | | | | | | | | |
| Aschelminthes | | | | | | | | | |
| roundworm | | | | | | | | | |
| Unknown "worm" | | | | | | | | | |
| Rotifera | | | | | | | | | |
| Brachionus | | | | | | | | | |
| Synchaeta | | | | | | | | | |
| Mollusca | | | | | | | | | |
| Bivalves | | | | | | | | | |
| Gastropods | | | | | | | | | |
| Nudibranch | | | | | | | | | |
| Phoronida actinotroch | | | | | | | | | |
| Bryozoa larvae | | | | | | | | | |
| Bryozoan colony | | | | | | | | | |
| Annelida | | | | | | | | | |
| Hirudinea | | | | | | | | | |
| Nemertean | | | | | | | | | |
| Polychaetes | 0.168 | 0.339 | 0.349 | | | | 0.674 | | |
| Polychaete larvae | | | | | | | | | |
| Oligochaete | | | | | | | | | |
| Arthropoda | | | | | | | | | |
| Crustacea | | | | | | | | | |
| nauplii | | | | | | | | | |
| Cladocera | | | | | | | | | |
| Evadne | | | 0.376 | 0.134 | | | | | |
| Podon | 0.168 | | | | | | | | |
| Copepoda | | | | | | | | | |
| Corycaeus | | | | | | | | | |
| Oithona | | | | 0.425 | 0.194 | | | | |
| Oncaea | | | 0.152 | | | | | | |
| unk. cyclopoid | | | | | | | | | |
| Cyclopoid copepodites | | | | | | | | | |
| Acartia clausi | 1.294 | 22.615 | | 0.224 | | | 0.518 | | 0.654 |
| Acartia danae | | | | | | | | | |
| Calanus sp. | | | | | | | | | |
| Metridia lucens | | | | | | | | | |
| Epiabidocera longipedata | | | | | | | | | |
| Eucalanus | | | | | | | | | |
| Eurytemora affinis | | | | 1.588 | | | 0.518 | | |
| Eurytemora americana | | | 0.349 | | | | 44.617 | 1.322 | |
| Pseudodiaptomus euryhalinus | | | | | | | | | |
| Temorites sp(p) | | | | | | | | | |
| c.f. Temorites | | | | 0.693 | | | | | |
| Rhincalanus nasutus | | | | | | | | | |
| Tortanus discaudatus | | | 0.152 | | | | | | |
| unknown calanoid | | | 0.457 | | | | | | |
| Calanoid copepodites | | | | | | | | | |
| Cal. copepodites w/long rami | | | | | | | | | |
| Harpacticoida | | | | | | | 0.518 | | |
| Harpacticoid "A" | | | | | | | | | |
| Harpacticoid "B" | | | | | | | | | |
| Harpacticoid "C" | | | | | | | | | |
| Caligus | | | | | | | | 0.449 | |
| other parasitic copepods | | | | | | | | 0.630 | 0.872 |
| unknown copepodites | | | | | | | | | 0.654 |
| Ostracoda | | | | | | | | | |
| Podocopida | | | | 0.678 | | 0.778 | | | |
| Leptostraca | | | | | | | | | |

| | 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 |
| Cirripedia | | | | | | | | | |
| Barnacle nauplii | | | | | | | | | |
| Barnacle cypris | | | | | | | | | |
| Isopoda | 0.168 | | 0.152 | | | | | 0.126 | 0.219 |
| Amphipoda | | | | | | | | | |
| Anisogammarus confervicolus | | 0.339 | 0.152 | 0.224 | | | 0.136 | 0.126 | |
| Corophium | | | 0.751 | | | | | | |
| Corophium spinicorne | | | | 0.224 | | 0.177 | 0.622 | 3.715 | |
| Grandidierella japonica | | | | | | | 0.518 | 0.630 | |
| Caprellidae | | | | | | | | | |
| Amphithoidae | | | | | | | | | |
| Aoridae | | | | | | | | | |
| Atylidae | | | | | | | | | |
| Hyalidae | | | | | | | | | |
| Pleustidae | | 0.677 | | | | | | | |
| Ampeliscidae | | | | | | | | | |
| Amphithoidae | | | | | | | 0.155 | 0.126 | |
| Talitridae | | | | | | | | | |
| unk. amphipods | | | | | | | | | |
| Cumacea | | | | | | | 0.518 | 0.630 | |
| Campylaspis sp. (p). | | | 0.183 | | | | | | |
| Mysidacea | | | | | | | | | |
| Neomysis mercedis | | 0.226 | | | 0.388 | 1.221 | 1.882 | 0.882 | 0.219 |
| Euphausiacea | | | | | | | | | |
| Decapoda | | | | | | | | | |
| Brachyura | | | | | | | | | |
| Cancer antennarius/gracilis(1) | | | | | | | | | |
| Cancer antennarius stg 2 zoea | | | | | | | | | |
| Cancer antennarius stg 3 zoea | | | | | | | | | |
| Cancer productus stg 1 zoea | | | | | | | | | |
| Grapsidae zoea | 0.168 | | | | | | | | |
| Majidae zoea | | | | | | | | | |
| Pinnotheridae zoea | 0.555 | 0.135 | | | | 0.177 | | 0.567 | 0.219 |
| Xanthidae zoea | | | 0.152 | | | | | | |
| Unknown brachyuran zoea | | | | | | | | | |
| Unk. Megalopa | | 1.354 | | | | 0.177 | 0.518 | 0.630 | 0.872 |
| Megalopa A | | | | | | | | | |
| Megalopa B | | | | | | | | | |
| Megalopa C | | | | | | | | | |
| Megalopa D | | | | | | | | | |
| very young crab | | | | | | | | | |
| Hemigrapsis oregonensis | | | | | | | | | |
| Hemigrapsus nudus | | | | | | | | | |
| Pachygrapsus crassipes | | | | | | | | | |
| Anomura | | | | | | | | | |
| Anomuran megalopa | 0.543 | | | | | | | | |
| Porcellanidae zoea | | | 0.152 | | | | | | |
| Hippidae zoea | | | | | | | | | |
| Emerita analoga zoea | 0.845 | | | | | | | | |
| Paguridea zoea | | | | | | | | | |
| Thalassinidea zoea | | | | | | | | | |
| Callinassidae | | | | | | | | | |
| Caridea | | | | | | | | | |
| Crangonidae(zoea and older) | | | 0.698 | | | | | | |
| Caridean zoea and older | 0.168 | | | | | | | | |
| Hippolytidae zoea | | | | | | | | | |
| Crangon nigromaculata | | | | | | | | | |
| Heptacarpus pictus | | | | | | | | | |
| Heptacarpus taylori | | | | | | | | | |
| Unknown caridean type zoea | | | 0.349 | | | | | | |
| Unknown zoea | | | | | | | | | |
| Arachnid | | | | | | | | | |
| Pycnogonid | | | | | | | | | |
| Halacaridae | | | | 0.224 | | | | | |
| Insect larvae | | | | 0.179 | 0.317 | | | | |
| Corixidae, unident. | | | 0.183 | | | | | | |
| Echinodermata | | | | | | | | | |
| bipinnaria larvae | | | | | | | | | |
| pluteus larvae | | 0.169 | | | | | | | |
| Chaetognatha | | | | | | | | | |
| Urochordata | | | | | | | | | |
| Larvacea | | | | | | | | | |

| | | | | | | | | | |
|-----------------------------|-------|--------|-------|-------|-------|-------|--------|-------|-------|
| Number of Invertebrate taxa | 9 | 8 | 15 | 10 | 3 | 6 | 12 | 12 | 8 |
| Total 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 | 48.172 | 2.401 | 2.181 |
| Decapoda per m3 | 2.280 | 1.490 | 1.352 | 0.000 | 0.000 | 0.354 | 0.518 | 1.196 | 1.081 |
| Mysidacea per m3 | 0.000 | 0.226 | 0.000 | 0.000 | 0.388 | 1.221 | 1.882 | 0.882 | 0.219 |
| Other per m3 | 0.504 | 1.524 | 2.147 | 1.662 | 0.317 | 1.132 | 2.624 | 5.353 | 0.438 |

| | 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 |
| Protozoa | | | | | | | | |
| Tintinnids | | | | | 0.179 | | | |
| Foraminifera | | | | | | | | |
| Noctiluca | | | | | | | | |
| Ctenophore | | | | | | | | |
| Cnidaria | | | | | | | | |
| Leptomedusa type | | | | | | | | |
| Anthomedusa type | | 0.132 | | | | | | |
| other medusae | | | | | | | | |
| Hydroid polyp | | | | | | | | |
| Leptomedusa polyp | | | | | | | | |
| Coral polyp | | | | | | | | |
| Siphonophore | | | | | | | | |
| Ascheimminthes | | | | | | | | |
| roundworm | | | | | | | | |
| Unknown "worm" | 0.876 | | | | | | | |
| Rotifera | | | | | | | | |
| Brachionus | | | | | | | | |
| Synchaeta | | | | | | | | |
| Mollusca | | | | | | | | |
| Bivalves | | | | | | | | |
| Gastropods | | | | | | | | |
| Nudibranch | | | | | | | | |
| Phoronida actinotroch | | | | | | | | |
| Bryozoa larvae | | | | | | | | |
| Bryozoan colony | | | | | | | | |
| Annelida | | | | | | | | |
| Hirudinea | | | | | | | | |
| Nemertean | | | | | 0.179 | | | |
| Polychaetes | | | | | 0.359 | | | 0.466 |
| Polychaete larvae | | | 0.186 | 0.371 | | | | |
| Oligochaete | | | | 0.215 | 12.378 | 0.832 | 6.486 | 5.895 |
| Arthropoda | | | | | | | | |
| Crustacea | | | | | | | | |
| nauplii | | | | | | | | |
| Cladocera | | | | | | | | |
| Evadne | | | | | 25.114 | | | |
| Podon | | | | | 0.897 | | | |
| Copepoda | | | | | | | | |
| Corycaeus | | | | | | | | |
| Oithona | | | | | | | | |
| Oncaea | | | | | | | | |
| unk. cyclopoid | | | | | 1.794 | | | |
| Cyclopoid copepodites | | | | | | | | |
| Acartia clausi | | 5.850 | 0.477 | 0.775 | 0.179 | | | |
| Acartia danae | | | | | | | | |
| Calanus sp. | | | | | | | | |
| Metridia lucens | | | | | | | | |
| Epilabidocera longipedata | | | | | | | | |
| Eucalanus | | | | | | | | |
| Eurytemora affinis | | | | | | | | |
| Eurytemora americana | | | | 1.472 | 0.179 | | 0.463 | |
| Pseudodiaptomus euryhalinus | | 1.687 | 0.159 | | | | | |
| Temorites sp(p) | | | | | 2.153 | | | |
| c.f. Temorites sp. | | | | | | | | |
| Rhincalanus nasutus | | | | | | | | |
| Tortanus discaudatus | | | | | | | | |
| unknown calanoid | | | | | | | | |
| Calanoid copepodites | | | | | | | | |
| Cal. copepodites w/long rami | | | | 0.141 | | | | |
| Harpacticoida unident. | | | | | | | | |
| Harpacticoid "A" | | | | | | | | |
| Harpacticoid "B" | | | | | | | | |
| Harpacticoid "C" | | | | | | | | |
| Caligus | | | | | | | | |
| other parasitic copepods | | | | | | | | |
| unknown copepodites | | | | | | | | |
| Ostracoda | 0.876 | | | 0.775 | 0.179 | 243.948 | 15.165 | 2.643 |
| Podocopa | | | | | | | | |
| Leptostraca | | | | | | | | |

| | 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 |
| Cirripedia | | | | | | | | |
| Barnacle nauplii | | | | | | | | |
| Barnacle cypris | | | | | | | | |
| Isopoda | | | | | | 98.617 | | 0.116 |
| Amphipoda | | | | | | | | |
| Anisogammarus confervicolus | 7.885 | | | | | | 0.463 | 0.233 |
| Corophium spinicorne | | | | | | | | |
| Corophium | 6.133 | | | 0.173 | | | 13.312 | 0.915 |
| Grandidierella japonica | | | | | | | | |
| Caprellidae | | | | | | | | |
| Amphithoidae | | | | | | | | 0.233 |
| Aoridae | | | | | | | | |
| Atylidae | | | | | | | | |
| Hyalidae | | | | | | | | |
| Pleustidae | | | | | | | | |
| Ampeliscaidae | | | | | | | | |
| Talitridae | | | | | | | | |
| unk. amphipoda | 0.876 | | 0.371 | 0.775 | | | | |
| Cumacea | | | 0.794 | 5.454 | | | | |
| Mysidacea | | | | | | | | |
| Neomysis mercedis | 26.775 | 0.112 | 1.569 | | | 457.792 | 8.618 | 4.778 |
| Euphausiacea | | | | | | | | |
| Decapoda | | | | | | | | |
| Brachyura | | | | | | | | |
| Cancer antennarius/gracilis(1) | | | | | | | | |
| Cancer antennarius stg 2 zoea | | | | | | | | |
| Cancer antennarius stg 3 zoea | | | | | | | | |
| Cancer productus stg 1 zoea | | | | | | | | |
| Grapsidae zoea | | | | | | | | 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 | | | | | | | | |
| Hippidae zoea | | | | | | | | |
| Emerita analoga zoea | | | | | | | | |
| Paguridea zoea | | | | | | | | |
| Thalassinidea zoea | | | | | | | | |
| Callinassidae | | | | | | | | |
| 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 | | | | | | | | |
| Halacaridae | | | | | | | | |
| Insect larvae | | | | | 2.511 | 162.978 | | |
| Corbidae, unident. | | | | | | | | |
| Echinodermata | | | | | | | | |
| biplinnaria larvae | | | | | | | | |
| pluteus larvae | | | | | | | | |
| Chaetognatha | | | | | | | | |
| Urochordata | | | | | | | | |
| Larvacea | | | | | | | | |

| | | | | | | | | |
|-----------------------------|--------|--------|-------|--------|--------|---------|--------|--------|
| Number of invertebrate taxa | 6 | 6 | 8 | 9 | 13 | 5 | 6 | 9 |
| Total invertebrates per m3 | 43.422 | 13.180 | 4.493 | 10.150 | 46.462 | 964.168 | 44.507 | 15.744 |
| Copepoda per m3 | 0.000 | 7.537 | 0.635 | 2.388 | 4.305 | 0.000 | 0.463 | 0.000 |
| Decapoda per m3 | 0.000 | 5.400 | 0.937 | 0.000 | 0.000 | 0.000 | 0.000 | 0.466 |
| Mysidacea 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 |

| | Station E-5 | | | | | | | | |
|------------------------------|-------------|-----------|----------|----------|----------|-----------|-----------|-----------|-----------|
| | 18-Sep-89 | 28-Nov-89 | 7-Feb-90 | 9-Mar-90 | 5-Apr-90 | 24-May-90 | 25-Jun-90 | 28-Jul-90 | 18-Sep-90 |
| Protozoa | | | | | | | | | |
| Tintinnids | | | | | | | | | |
| Foraminifera | | | | | | | | | |
| Noctiluca | | | | | | | | | |
| Ctenophore | | | | | | | | | |
| Cnidaria | | | | | | | | | |
| Leptomedusa type | | 0.189 | | | | | | | |
| Anthomedusa type | | | | | | | | | |
| other medusae | | P | | | | | | | 0.227 |
| Hydroid polyp | | | | | | | | | |
| Leptomedusa polyp | | | | | | | | | |
| Coral polyp | | | | | | | | | |
| Siphonophore | | | | | | | | | |
| Aschelminthes | | | | | | | | | |
| roundworm | | | | | | | | | |
| Unknown "worm" | | | | | | | | | |
| Rotifera | | | | | | | | | |
| Brachionus | | | | | | | | | |
| Synchaeta | | | | | | | | | |
| Mollusca | | | | | | | | | |
| Blivales | | | | | | | | | |
| Gastropods | 0.294 | | | 0.244 | | | | | |
| Nudibranch | | | | | | | | | |
| Phoronida actinotroch | | | | | | | | | |
| Bryozoa larvae | | | | | | | | | |
| Bryozoan colony | | | | | | | | | |
| Annelida | | | | | | | | | |
| Hirudinea | | | | | | | | | |
| Nemertean | | | | | | | | | |
| Polychaetes | | 0.378 | 0.333 | | 0.399 | 0.482 | 0.977 | | |
| Polychaete larvae | | | | | | | | 0.650 | |
| Oligochaete | 0.698 | | 0.367 | | | | | | |
| Arthropoda | | | | | | | | | |
| Crustacea | | | | | | | | | |
| nauplii | | | | 0.976 | | | | | |
| Cladocera | | | 0.833 | 0.785 | | | | | 0.819 |
| Evadne | | | | | | | | | |
| Podon | | | | | | | | | |
| Copepoda | | | | | | | | | |
| Corycaeus | | | | 2.925 | | | | | |
| Oithona | | | | | | | | | |
| Oncaea | | | | | | | | | |
| unk. cyclopoid | | | 0.167 | | | | | | |
| Cyclopoid copepodites | | | | | | | | | |
| Acartia clausi | 0.279 | 2.152 | | 0.195 | | | 0.752 | | 0.227 |
| Acartia danae | | | | | | | | | |
| Calanus sp. | | | | | | | | | |
| Metridia lucens | | | | | | | | | |
| Epilabidocera longipedata | | | | | | | | | |
| Eucalanus | | | | | | | | | |
| Eurytemora affinis | | | | 1.584 | | | 0.752 | | |
| Eurytemora americana | | | | | | | | | |
| Pseudodiaptomus euryhalinus | 0.698 | 0.132 | 0.333 | | | 0.482 | 64.724 | 0.519 | 0.162 |
| Temorites sp(p) | | | | | | | | | |
| c.f. Temorites sp. | | | | 3.315 | | | | | |
| Rhincalanus nasutus | | | | | | | | | |
| Tortanus discaudatus | | 0.378 | | | | | | | |
| unknown calanoid | | | | | | | | | |
| Calanoid copepodites | | | | | | | | | |
| Cal. copepodites w/long rami | | | | | | | | | |
| Harpacticoida unident. | | | | | | | 0.752 | | |
| Harpacticoid "A" | | | | | | | | | |
| Harpacticoid "B" | | | | | | | | | |
| Harpacticoid "C" | | | | | | | | | |
| Caligus | | | | | | | | 0.584 | 0.227 |
| other parasitic copepods | 0.698 | | | | | | | 0.650 | 0.227 |
| unknown copepodites | | | | | | | | | |
| Ostracoda | 0.698 | | | | | | | | |
| Podocopida | | | | 0.317 | 0.160 | 0.843 | | 0.130 | |
| Leptostrea | | | | | | | | | |

| | 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 | | | | | | | | | |
| Barnacle nauplii | | | | | | | | | |
| Barnacle cypris | | | | | | | | | |
| Isopoda | 0.294 | | | | | | | 0.650 | 0.682 |
| Amphipoda | | | | | | | | | |
| Anisogammarus confervicolus | | 0.189 | | | 0.997 | 0.248 | 0.153 | 0.650 | |
| Corophium spinicorne | | | | 0.976 | 0.199 | 0.248 | 0.926 | 0.650 | |
| Corophium | 0.140 | 0.378 | 0.846 | | | | 0.752 | | |
| Grandidierella japonica | | | | | | | | | |
| Caprellidae | | | | | | | | | |
| Ampithoidae | | | | | | | 0.226 | | |
| Aoridae | | | | | | | | | |
| Atylidae | | | | | | | | | |
| Hyalidae | | | | | | | | | |
| Pleustidae | | | | | | | | | |
| Ampeliscidae | | | | | | | | | |
| Talitridae | | | | 0.244 | | | | | |
| unk. amphipods | | 0.189 | | | | | | | |
| Cumacea | | | | 0.244 | | | 0.752 | | |
| Myidae | | | | | | | | | |
| Neomysis mercedis | 0.140 | 0.812 | | | | 0.193 | 1.579 | 0.584 | 0.760 |
| Euphausiacea | | | | | | | | | |
| Decapoda | | | | | | | | | |
| Brachyura | | | | | | | | | |
| Cancer antennarius/gracilis(1) | | | | 0.244 | | | | | |
| Cancer antennarius stg 2 zoea | | | | | | | | | |
| Cancer antennarius stg 3 zoea | | | | | | | | | |
| Cancer productus stg 1 zoea | | | | | | | | | |
| Grapidae zoea | 0.698 | | | | | | | | 0.455 |
| Majidae zoea | | | | | | | | | |
| 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 | | | | | | | | | |
| Hemigrapsus oregonensis | | 0.378 | | | 0.399 | | | | |
| Hemigrapsus nudus | | | | | | | | | |
| Pachygrapsus crassipes | | | | | | | | | |
| Anomura | | | | | | | | | |
| Anomuran megalopa | 0.294 | | | | | | | | |
| Porcellanidae zoea | | | | | | | | | |
| Hippidae zoea | | | | | | | | | |
| Emerita analoga zoea | | | | | | | | | |
| Paguridea zoea | | | | | | | | | |
| Thalassinidea zoea | | | | | | | | | |
| Callinassidae | | | | | | | | | |
| Caridea | | | | | | | | | |
| Crangonidae(zoea and older) | | | | | | | | | |
| Caridean zoea and older | | | | | | | | | |
| Hippolytidae zoea | | | | | | | | | |
| Crangon nigromaculata | | | | | | | | | |
| Heptacarpus pictus | | | | | | | | | |
| Heptacarpus taylori | | | | | | | | | |
| Unknown caridean type zoea | | | | | | | | | |
| Unknown zoea | | | | | | | | | |
| Arachnid | | | | | | | | | |
| Pycnogonid | | | | | | | | | |
| Halacaridae | | | | | 0.199 | | | | |
| Insect larvae | | | 0.333 | 0.146 | 0.439 | 0.248 | | | 0.227 |
| Corbidae, unident. | | 0.189 | 0.833 | | | | | | |
| Echinodermata | | | | | | | | | |
| biplinnaria larvae | | | | | | | | | |
| pluteus larvae | | | | | | | | | |
| Chaetognatha | | | | | | | | | |
| Urochordata | | | | | | | | | |
| Larvacea | | | | | | | | | |
| Number of Invertebrate taxa | 12 | 13 | 8 | 13 | 7 | 8 | 12 | 9 | 11 |
| Total invertebrates per m3 | 5.068 | 6.892 | 4.046 | 12.195 | 2.792 | 2.989 | 73.096 | 5.066 | 4.128 |
| 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 |
| Myidae per m3 | 0.140 | 0.812 | 0.000 | 0.000 | 0.000 | 0.193 | 1.579 | 0.584 | 0.760 |
| Other per m3 | 2.122 | 1.511 | 3.546 | 3.931 | 2.393 | 2.067 | 3.786 | 2.729 | 1.956 |

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.

| | 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 |
| Bay pipefish | | | | | | | | | | |
| Bay pipefish larvae | | | | | | | | | | |
| Gobiidae larvae | 0.186 | 0.520 | | | | 0.535 | | 0.466 | | |
| Arrow Goby | | | | | | | | | | |
| Bay, arrow or yellowfin goby | | | | | | | | | | |
| Tidewater goby | | | | | | | | | | |
| Clellandia/typnus/Quietula * | | | | | | | | | 0.332 | 0.297 |
| Longjaw mudsucker | | | | | | | | | | |
| Topsmelt | | | | | | | | | | 0.148 |
| Jack- or topsmelt larvae | 0.186 | | | | | | | | | |
| Northern anchovy larvae | 0.130 | 0.520 | | | 0.247 | 0.268 | | | | |
| Pacific herring | | | | | | 0.714 | | | | |
| short bellied rock fish | | 0.835 | | | | | | | | |
| 3-Spine Stickleback | | | | | | | | | | |
| 3-Spine Stickleback larvae | | | | | | | | | | |
| Shiner Surfperch | | | | | | | | | 0.995 | 0.148 |
| Osmeridae (yolksac larvae) | | | | | | | | | | |
| Staghorn sculpin | | | | | | | | 0.895 | | |
| Surfmelt larvae | | | | | | | | | | |
| Plainfin midshipman | | | | | | 0.178 | | | | |
| unknown fish larvae | | | | | | 0.299 | | 0.139 | 0.332 | |
| fish eggs | 0.334 | 1.318 | 2.963 | 0.668 | 0.760 | | | | | |
| Number of vertebrate taxa | 4 | 4 | 1 | 1 | 2 | 5 | 0 | 3 | 3 | 3 |
| Total larval and juvenile fish per m3 | 0.501 | 1.875 | 0.000 | 0.000 | 0.247 | 1.696 | 0.000 | 1.361 | 1.327 | 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.

| | 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 | | 0.875 | | | | | | | |
| Bay pipefish larvae | | | | | | | | | |
| Gobiidae larvae | | | | | 1.965 | 0.641 | | | |
| Arrow Goby | | | 0.176 | | | | | | |
| Bay, arrow or yellowfin goby | | | 0.150 | | | | | | |
| Tidewater goby | | | | | | | | | |
| Clellandia/flypnus/Quiletula * | 0.187 | 0.250 | | 0.769 | | | 0.999 | | 1.425 |
| Longjaw mudsucker | | | | | | | | | |
| Topsmelt | | | | | | | | | |
| Jack- or topsmelt larvae | | | | | | | | 0.767 | |
| Northern anchovy larvae | | | | | | | | | |
| Pacific herring | | | 0.352 | | | | | | |
| short bellied rock fish | | | 0.150 | | | | | | |
| 3-Spine Stickleback | | | | | | | | | |
| 3-Spine Stickleback larvae | | | | | | | | | |
| Shiner Surfperch | | | | | | | | | |
| Osmeridae (yolksac larvae) | | | | | | | | | |
| Staghorn sculpin | | | | | | | | | |
| Surfsmelt larvae | | | | | | | | | |
| Plainfin midshipman | | | | | | 0.855 | | | |
| unknown fish larvae | | | | | | | | 28.790 | |
| fish eggs | 0.544 | | | | | | | | |
| Number of vertebrate taxa | 2 | 1 | 4 | 1 | 1 | 2 | 1 | 2 | 1 |
| Total larval and juvenile fish per m3 | 0.187 | 1.125 | 0.828 | 0.769 | 1.965 | 1.496 | 0.999 | 0.767 | 1.425 |

| | 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 | 0.557 | 0.297 | 0.242 | 0.118 | | 0.186 | | 0.186 | | |
| Arrow Goby | | | | | | | | | | |
| Bay, arrow or yellowfin goby | | | | | | | | | | |
| Tidewater goby | | | | | | | | | | |
| Clellandia/Ilypnus/Quietula * | | | | | | | 0.383 | | 0.947 | 0.522 |
| Longjaw mudsucker | | | | | | | | | | |
| Topsmelt | | | | | | | | | | |
| Jack- or topsmelt larvae | 0.557 | | | | | | | | | |
| Northern anchovy larvae | | | | | 0.278 | 0.160 | | | | |
| Pacific herring | | | | | | 1.318 | | | | |
| Pacific Herring larvae | | | | | | | | | | |
| short bellied rock fish | | | | | | | | | | |
| 3-Spine Stickleback | | | | | | | | | | |
| 3-Spine Stickleback larvae | | | | | | | | | | |
| Shiner Surfperch | | | | | | | | | | |
| Osmeridae (yolksac larvae) | | | | | | | 0.255 | | 0.631 | |
| Staghorn sculpin | | | | | | 0.264 | | | | |
| Surfsmelt larvae | | | | | | | | | | |
| Plainfin midshipman | | | | | | | | | | |
| unknown fish larvae | | | | | 0.278 | | | | | |
| fish eggs | 0.557 | 0.689 | 4.958 | 0.183 | 0.644 | 0.395 | | | 0.631 | |
| Number of vertebrate taxa | 3 | 2 | 2 | 2 | 3 | 5 | 2 | 1 | 3 | 1 |
| Total larval and juvenile fish per m3 | 1.671 | 0.986 | 5.200 | 0.301 | 1.201 | 2.322 | 0.639 | 0.186 | 2.209 | 0.522 |

| | 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 | | | 0.329 | | 0.541 | 0.252 | 0.713 | |
| Arrow Goby | | | | | | | | |
| Bay, arrow or yellowfin goby | | | | | | | | |
| Tidewater goby | | | | | | | | |
| Clevalandia/Ilypnus/Quietula * | 0.689 | | | | | | | |
| Longjaw mudsucker | | | | | | | | |
| Topsmelt | | | | | | | | |
| Jack- or topsmelt larvae | | | | | | | | |
| Northern anchovy larvae | | | | | | | | |
| Pacific herring | | | | | | | | |
| Pacific Herring larvae | | | 0.164 | | | | | |
| short bellied rock fish | | | | | | | | |
| 3-Spine Stickleback | | | | | | | | |
| 3-Spine Stickleback larvae | | | | | | | | |
| Shiner Surfperch | | | | | | | | |
| Osmeridae (yolksac larvae) | | | | | | | | |
| Staghorn sculpin | | | | | | | | |
| Surfsmelt larvae | | | | | | | | |
| Plainfin midshipman | | | | | | | | 0.189 |
| unknown fish larvae | | | | | | | | 0.658 |
| fish eggs | 0.276 | 1.816 | 0.658 | 0.468 | 0.632 | 0.913 | 23.611 | |
| Number of vertebrate taxa | 2 | 1 | 3 | 1 | 2 | 2 | 2 | 2 |
| Total larval and juvenile fish per m3 | 0.965 | 1.816 | 1.151 | 0.468 | 1.173 | 1.165 | 24.325 | 0.847 |

| | 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 | | | | | | | | | 0.013 |
| Bay pipefish larvae | | | | | | | | | |
| Gobiidae larvae | 0.074 | 0.027 | 0.019 | | | 1.372 | | | |
| Arrow Goby | | | | | | | | | |
| Bay, arrow or yellowfin goby | | | | | | | | | |
| Tidewater goby | | | | | | | | | |
| Clellandia/tlypnus/Quietula * | | | | | | | 3.612 | 5.112 | |
| Longjaw mudsucker | | | | | | | | | |
| Topsmelt | | | | | | | | | |
| Jack- or topsmelt larvae | | | | | | 0.156 | 0.041 | | |
| Northern anchovy larvae | | | 0.009 | 0.001 | | 0.110 | | | |
| Pacific herring | | | | 0.003 | | | | | |
| short bellied rock fish | | | | | | | | | |
| 3-Spine Stickleback | | | | | | | | | |
| 3-Spine Stickleback larvae | | | | | | | | | |
| Shiner Surfperch | | | | | | | | | 0.013 |
| Osmoridae (yolksac larvae) | | | | | | | | | |
| Staghorn sculpin | | | 0.056 | | 0.241 | | | | |
| Cottidae larvae, unident. | | | | | | | | | |
| Surfsmelt larvae | | | | | | | | | |
| Plainfin midshipman | | | | | | | | | |
| unknown fish larvae | | | | | | | | | |
| fish eggs | 4.010 | 0.171 | 0.571 | 0.003 | | | 0.041 | 0.046 | 0.079 |
| Number of vertebrate taxa | 2 | 2 | 4 | 3 | 1 | 3 | 3 | 2 | 3 |
| Total larval and juvenile fish per m3 | 0.074251 | 0.198 | 0.654 | 0.007 | 0.241 | 1.637 | 3.693 | 5.158 | 0.105 |

| | Station E-3 | | | | | | | |
|---------------------------------------|-------------|----------|----------|----------|-----------|-----------|-----------|-----------|
| | 26-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 | | | | | 0.189 | | | |
| Bay pipefish larvae | | | | | | | | |
| Gobiidae larvae | | | | 0.344 | 1.760 | 4.564 | 0.730 | 0.436 |
| Arrow Goby | | | | | 0.189 | | | 0.436 |
| Bay, arrow or yellowfin goby | | | 0.481 | | 0.189 | 0.475 | | |
| Tidewater goby | | | | | | | | |
| Clevelandia/typhnus/Quietula * | | | | | | | | |
| Longjaw mudsucker | | | | | | | | |
| Topsmelt | | 0.147 | | | | | | 0.194 |
| Jack- or topsmelt larvae | | 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) | | | | | | | | |
| Staghorn sculpin | | | | | | | | |
| Cottidae larvae, unident. | | 0.147 | | | | | | |
| Surfsmelt larvae | | | 1.776 | 2.972 | 0.189 | | | 0.436 |
| Plainfin midshipman | | | | | | | | |
| unknown fish larvae | 0.185 | | | | | | | |
| 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 |

| | Station E-4 | | | | | | | | | |
|---------------------------------------|-------------|-----------|-----------|-----------|-----------|-----------|----------|----------|----------|----------|
| | 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 | | 0.028 | | | | | | | | 0.026 |
| Bay pipefish larvae | | 1.025 | | 0.161 | 0.805 | 0.084 | | 7.905 | | |
| Gobiidae larvae | | | | | 0.009 | | | | | |
| Arrow Goby | | | 1.714 | | | | | | | |
| Bay, arrow or yellowfin goby | | | 0.044 | | | | | | | |
| Tidewater goby | | | | | | | | | 9.743 | 3.742 |
| Clevalandia/Ilypnus/Quietula * | | | | | | | | | | |
| Longjaw mudsucker | | | 0.009 | | | | | | | |
| Topsmelt | | 0.019 | | | | | | 0.575 | 2.006 | 2.240 |
| Jack- or topsmelt larvae | | | | | 0.019 | 0.046 | | 1.805 | | |
| Northern anchovy larvae | | | | | | 2.090 | | | 0.061 | |
| Pacific herring | | | | | | | | | | |
| short bellied rock fish | | | | | | | | | | |
| 3-Spine Stickleback | | | | | | | | | | 0.026 |
| 3-Spine Stickleback larvae | | | | | | | | | | |
| Shiner Surfperch | | | | | | | | | | |
| Osmeridae (yolk sac larvae) | | | | | | 0.019 | | | | |
| Staghorn sculpin | | | | | | | | | | |
| Cottidae larvae | | | | | | | | | | |
| Surfsmelt larvae | | | | | | | | | | |
| Plainfin midshipman | | 0.009 | | | | | | | | |
| unknown fish larvae | | | | | | | | | | |
| fish eggs | | | | | | | | | | |
| Number of vertebrate taxa | 0 | 4 | 3 | 1 | 3 | 4 | 0 | 3 | 3 | 4 |
| Total larval and juvenile fish per m3 | 0.000 | 1.060 | 1.767 | 0.161 | 0.833 | 2.239 | 0.000 | 10.284 | 11.811 | 6.035 |

| | 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 | | 4.643 | 0.349 | | | 0.319 | 8.839 | 23.363 | 8.484 |
| Arrow Goby | | | | | | 0.778 | 1.943 | | 0.436 |
| Bay, arrow or yellowfin goby | | | | | 0.194 | | | | |
| Tidewater goby | | | | | | | | | 0.153 |
| Clevalandia/Ilypnus/Quietula * | 2.118 | | | | | | | | |
| Longjaw mudsucker | | | | | | | | | |
| Topsmelt | | | | | | 0.539 | 0.959 | 0.189 | 0.139 |
| Jack- or topsmelt larvae | 0.034 | 0.474 | | | | 0.142 | 0.777 | | |
| Northern anchovy larvae | | 0.254 | | | | | | | |
| Pacific herring | | | | | | | | | |
| short belled rock fish | | | | | | | | | |
| 3-Spine Stickleback | | | | | | | | | |
| 3-Spine Stickleback larvae | | | | | | | | | |
| Shiner Surfperch | | | | | | | | | |
| Osmoridae (yolksac larvae) | 0.017 | | | | | | | | |
| Staghorn sculpin | | | | | | | | | |
| Cottidae larvae | | 0.135 | | | | | | | |
| Surfsmelt larvae | | | | | 0.738 | | | | 0.219 |
| Plainfin midshipman | | | | | | | | | |
| unknown fish larvae | | | | | | | | | |
| fish eggs | | | | | | | | | |
| Number of vertebrate taxa | 3 | 4 | 1 | 0 | 2 | 4 | 5 | 3 | 5 |
| Total larval and juvenile fish per m3 | 2.169 | 5.506 | 0.349 | 0.000 | 0.932 | 1.777 | 13.037 | 23.709 | 9.430 |

| | 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 | | | | | | | | 0.051 |
| Bay pipefish larvae | | | | | | | | |
| Gobiidae larvae | | 1.216 | 1.008 | 0.074 | | | | |
| Arrow Goby | 0.019 | | | | | | | |
| Bay, arrow or yellowfin goby | | | | | | | | |
| Tidewater goby | | | | | | | | |
| Clellandia/lypnus/Quietula * | | | | | | | 2.316 | 7.623 |
| Longjaw mudsucker | | | | | | | | |
| Topsmelt | | | | | | | | 0.229 |
| Jack- or topsmelt larvae | | | | | | | 0.463 | 0.305 |
| Northern anchovy larvae | | | | | | | | |
| Pacific herring | | | | 0.780 | | | | |
| short bellied rock fish | | | | | | | | |
| 3-Spine Stickleback | | | | | | | | 0.102 |
| 3-Spine Stickleback larvae | | | | | | | | |
| Shiner Surfperch | | | | | | | | |
| Osmeridae (yolk sac larvae) | | | | | | | | |
| Staghorn sculpin | | | | 0.074 | | | | |
| Surfsmelt larvae | | | 0.019 | | | | | |
| Plainfin midshipman | | | | | | | | |
| unknown fish larvae | | | | | | | | |
| fish eggs | | | | | | | | |
| Number of vertebrate taxa | 1 | 1 | 2 | 3 | 0 | 0 | 2 | 5 |
| Total larval and juvenile fish per m3 | 0.019 | 1.216 | 1.027 | 0.928 | 0.000 | 0.000 | 2.780 | 8.309 |

| | 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 |
| Bay pipefish | | | | | | | 0.752 | 0.974 | |
| Bay pipefish larvae | | | | | | | | | |
| 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 | | | | | | | | 5.627 | 1.723 |
| Tidewater goby | | | | | | | | | |
| Clellandia/lypnus/Quileua * | 65.457 | | | | | | | | |
| Longjaw mudsucker | 1.745 | 0.189 | | | | | | | |
| Topsmelt | | | | | | 0.722 | 1.397 | 3.959 | 0.455 |
| Jack- or topsmelt larvae | 0.209 | | | | | 0.124 | 0.113 | 0.130 | |
| Northern anchovy larvae | | 0.945 | | | | | | | |
| Pacific herring | | | | | | | | | |
| short bellied rock fish | | | | | | | | | |
| 3-Spine Stickleback | | | | | | | | 0.650 | |
| 3-Spine Stickleback larvae | | | | | | | | | |
| Shiner Surfperch | | | | | | | | | |
| Osmeridae (yolksac larvae) | | | | | | | | | |
| Staghorn sculpin | | | | | | | | | |
| Surfsmelt larvae | | | | | | | | | 0.227 |
| Plainfin midshipman | 0.070 | | | | | | | | |
| unknown fish larvae | | | | | | | | | |
| fish eggs | | | | | | | | | |
| 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 |

| | Station S-2 | | | | | | | |
|------------------------------|-------------|----------|-----------|----------|-----------|-----------|-----------|-----------|
| | 5-Jul-89 | 8-Feb-90 | 10-Mar-90 | 6-Apr-90 | 25-May-90 | 26-Jun-90 | 27-Jul-90 | 19-Sep-90 |
| Protozoa | | | | | | | | |
| Tintinnids | | | | | | | | |
| Foraminifera | | | | | | | | |
| Noctiluca | | | | | | | | |
| Ctenophore | | | | | | | | |
| Cnidaria | | | | | | | | |
| Leptomedusa type | | | | 0.409 | | | | |
| Anthomedusa type | | | | | | | | |
| other medusae | | | | | | | | |
| Hydroid polyp | | | | | | | | |
| Leptomedusa polyp | | | | | | | | |
| Coral polyp | | | | | | | | |
| Siphonophore (gonophore) | | | | | | | | |
| Aschelminthes | | | | | | | | |
| roundworm | | | | | 0.374 | | | |
| Unknown "worm" | | | | | | | | |
| Rotifera | | | | | | | | |
| Brachionus | | | | | | | | |
| Synchaeta | | | | | | | | |
| Mollusca | | | | | | | | |
| Bivalves | | | | | | | | |
| Montacutidae | | | | 0.204 | | | | |
| Gastropods | | | | | | | | |
| Gastropoda eggs | | | | 0.102 | | | | |
| Opisthobranchia | | | | | | | | |
| Nudibranchs | | | | | | | | |
| Phoronida actinotroch | | | | | | | | |
| Bryozoa larvae | | | | | | | | |
| Bryozoan colony | | | | | | | | |
| Annelida | | | | | | | | |
| Hirudinea | | | | | | | | |
| Polychaetes | | | | | | | | |
| Polychaete larvae | | | | 0.102 | | | | |
| Oligochaete | | | | | | | | |
| Nemertean | | | | | | | | |
| Arthropoda | | | | | | | | |
| Crustacea | | | | | | | | |
| nauplii | | | | | | | | |
| Cladocera | | 0.129 | 8.049 | | | | 0.081 | |
| Evadne | | | | | | | | |
| Podon | | | | | | | | |
| Copepoda | | | | | | | | |
| Corycaeus | | | | | | | | |
| Oithona | | 0.022 | 0.033 | 0.817 | | | | |
| Oncaea | | | | | | | | 1.454 |
| unk. cyclopoid | | | | | | | | |
| Cyclopoid copepodites | | | 0.033 | | | | | |
| Acartia clausi | | | | | | | | |
| Acartia danse | | | | | | | | |
| Calanus sp. | | | | | | | | |
| Metridia lucens | | | | | | | | |
| Epilabidocera longipedata | | | | | | | | |
| Eucalanus | | | | | | | | |
| Eurytemora affinis | | | 21.695 | 133.724 | | | | |
| Eurytemora americana | | 2.544 | | | | | | |
| Eurytemora sp. "copepodites" | | 0.022 | | | | | | |
| Pseudodiaptomus euryhalinus | | 0.410 | 0.099 | | | | | |
| Temorites sp(p) | | | | | | | | |
| Rhincalanus nasutus | | | | | | | | |
| Centropages c.f. abdominalis | | | | | | | | |
| Tortanus discoidatus | | | | | | | | |
| Monstrillidae, unident. | | | | | | | | |
| unknown calanoid | | | | | | | 0.012 | |
| Calanoid copepodites | | | | | | | | |
| Cal. copepodites w/long rami | | | | | | | | |
| Parathalestria californica | | | | | | | | |
| Schizopera knabeni | | | | | 0.819 | | | |
| Zaus spp. | | | | | | | | |
| Harpacticoida unident. | | | | | | | | |
| Harpacticoid "A" | | | | | | | | |
| Harpacticoid "B" | | | | | | | | |
| Harpacticoid "C" | | | | | | | | |
| Caligus | | | | | | | | |
| other parasitic copepods | | | | 0.204 | | | | |
| unknown copepodites | | | | | | | | |
| Ostracoda | | | | | | | | |
| Podocopida | | | | | | | | |
| Leptostraca | | | | | | | | |
| Nebalia pugettensis | | | | | | | | |

| | Station S-2 | | | | | | | |
|--------------------------------|-------------|----------|-----------|----------|-----------|-----------|-----------|-----------|
| | 5-Jul-89 | 8-Feb-90 | 10-Mar-90 | 6-Apr-90 | 25-May-90 | 26-Jun-90 | 27-Jul-90 | 19-Sep-90 |
| Cirripedia | | | | | | | | |
| Barnacle nauplii | | | | | | | | |
| Barnacle cypris | | | | | | | | |
| Isopoda | | | | 0.204 | 0.071 | 0.023 | 0.093 | |
| Sphaeromatidae | | | | | | | | |
| Idoteidae | | | | | | | | |
| Amphipoda | | | | | | | | |
| Anisogammarus confervicolus | | 0.280 | 0.017 | 0.204 | 0.107 | | | 0.018 |
| Corophium | | | | | 0.659 | | | 0.036 |
| Grandidriella japonica | | | | | | | | |
| Caprellidae | | | | | | | | |
| Ampeliscidae | | | | | | | | |
| Amphithoidae | | | | | | | | |
| Aoridae | | | | | | | | |
| Atylidae | | | | | | | | |
| Hyalidae | | | | | | | | |
| Ischyroceridae | | | | | | | | |
| Photidae | | | | | | | | |
| Pleustidae | | | | | | | | |
| Talitridae | | | | | | | | |
| unk. amphipods | | | | | | | | |
| Cumacea | | | | | | | | |
| Mysidacea | | | | | | | | |
| Neomysis mercedis | | | | | | | | |
| Euphausiacea | | | | | | | | |
| Decapoda | | | | | | | | |
| Brachyura | | | | | | | | |
| 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 | | | | | | | | |
| 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 | | | | | | | | |
| Callinassidae | | | | | | | | |
| Caridea | | | | | | | | |
| Crangonidae(zoea and older) | | | | | | | | |
| Hippolytidae zoea | | | | | | | | |
| Caridean zoea and older | | | | | | | | |
| Crangon nigromaculata | | | | | | | | |
| Heptacarpus pictus | | | | | | | | |
| Heptacarpus taylori | | | | | | | | |
| Unknown caridean type zoea | | 0.022 | | | | | | |
| Unknown zoea | | | | | | | | |
| Arachnid | | | | | | | | |
| Pycnogonid | | | | | | | | |
| Halacaridea | | | | | | | | |
| Insect, unident. | 0.044 | 0.022 | | | | | 0.012 | |
| Insect larvae | | 0.043 | | | | | | |
| Corixidae, unident. | | | | | | | | |
| Echinodermata | | 0.129 | | | | | | |
| bipinnaria larvae | | | | | | | | |
| pluteus larvae | | | | | | | | |
| Chaetognatha | | | | | | | | |
| Urochordata | | | | | | | | |
| Larvacea | | | | | | | | |

| | | | | | | | | |
|-----------------------------|-------|-------|--------|---------|-------|-------|-------|-------|
| Number of invertebrate taxa | 1 | 10 | 6 | 10 | 5 | 1 | 4 | 3 |
| Total invertebrates per m3 | 0.044 | 3.623 | 29.926 | 137.300 | 2.029 | 0.023 | 0.197 | 1.507 |
| Copepoda per m3 | 0.000 | 2.997 | 21.861 | 134.746 | 0.819 | 0.000 | 0.012 | 1.454 |
| Decapoda per m3 | 0.000 | 0.022 | 0.000 | 1.328 | 0.000 | 0.000 | 0.000 | 0.000 |
| Mysidacea per m3 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Other per m3 | 0.044 | 0.604 | 8.065 | 1.226 | 1.210 | 0.023 | 0.185 | 0.054 |

| | Station S-4 | | | | | | | | |
|------------------------------|-------------|-----------|----------|-----------|----------|-----------|-----------|-----------|-----------|
| | 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-90 |
| Protozoa | | | | | | | | | |
| Tintinnids | | | | | | | | | |
| Foraminifera | | 0.016 | | | | | | | |
| Noctiluca | | | | | | | | | |
| Ctenophore | | | | | | | | | |
| Cnidaria | | | | | | | | | |
| Leptomedusa type | | 0.143 | | | | | | | |
| Anthomedusa type | | 0.413 | | | | | | 0.443 | 100.597 |
| other medusae | | | | | | | | | |
| Hydroid polyp | P | | | | | | | | |
| Leptomedusa polyp | | | | | | | | | |
| Coral polyp | | | | | | | | | |
| Siphonophore (gonophore) | | | | | | | | | |
| Aschelminthes | | | | | | | | | |
| roundworm | | | | | | | | | |
| Unknown "worm" | | | | | | | | | |
| Rotifera | | | | | | | | | |
| Brachionus | | | | | | | | | |
| Synchaeta | | | | | | | | | |
| Mollusca | | | | | | | | | |
| Bivalves | | | | | | | | | |
| Montacutidae | | | | | | | | | |
| Gastropods | | | | 0.017 | | | | | |
| Gastropoda eggs | | | | | | | | | |
| Opisthobranchia | | | | | | | | | |
| Nudibranchs | | | | | | | | | |
| Phoronida actinotroch | | | | | | | | | |
| Bryozoa larvae | | | | | | | | | |
| Bryozoan colony | P | | | | | | | | |
| Annelida | | | | | | | | | |
| Hirudinea | | | | | | | | | |
| Polychaetes | | 0.032 | | | | | | | |
| Polychaete larvae | | | | | | | | | |
| Oligochaete | | | | | | | | | |
| Nemertean | | | | | | | | | |
| Arthropoda | | | | | | | | | |
| Crustacea | | | | | | | | | |
| nauplii | | | | | | | | | |
| Cladocera | | | | | | | | | |
| Evadne | | | 2.189 | | | | | | |
| Podon | | | | | | | | | |
| Copepoda | | | | | | | | | |
| Corycaeus | | | | | | | | | |
| Oithona | | | | | 58.552 | | | | |
| Oncaea | | | | | | | | | |
| 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 | | | | 1.838 | 6475.214 | | | | |
| Eurytemora americana | | 0.064 | 8.076 | | | | | | |
| Eurytemora sp. "copepodites" | | | | | 123.993 | | | | |
| Pseudodiaptomus euryhalinus | | | | | | | | | |
| Temorites sp(p) | | | 1.962 | | | | | | |
| Rhincalanus nasutus | | | | | | | | | |
| Centropages c.f. abdominalis | | | | 0.066 | | | | | |
| Tortanus discaudatus | | | | | | | | | |
| Monstrillidae, unident. | | | | | | | | | |
| unknown calanoid | | | | | | | | | |
| Calanoid copepodites | | | | | | | | | 0.321 |
| Cal. copepodites w/long rami | | | | | | | | | |
| Parathalestris californica | | | | | | | | | |
| Schizopera knabeni | | | | | | | | | |
| Zaus spp. | | | | | | | | | |
| Harpacticoida unident. | | | | | | | | | |
| Harpacticoid "A" | | | | | | | | | |
| Harpacticoid "B" | | | | | | | | | |
| Harpacticoid "C" | | | | | | | | | |
| Caligus | | | | | | | | | |
| other parasitic copepods | | | | | | | | | |
| unknown copepodites | | | | | | | | | |
| Ostracoda | 0.083 | | | | | | | | |
| Podocopida | | | | | | | | | |

Appendix P3. Invertebrates (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-4 | | | | | | | | |
|--------------------------------|-------------|-----------|----------|-----------|----------|-----------|-----------|-----------|-----------|
| | 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-90 |
| Leptostraca | | | | | | | | | |
| Nebalia pugettensis | | | | | | | | | |
| Cirripedia | | | | | | | | | |
| Barnacle nauplii | | | | | | | | | |
| Barnacle cypris | | | | | | | | | |
| Isopoda | 0.041 | 0.191 | | | | | | | |
| Sphaeromatidae | | | | | 1.722 | | 0.012 | 0.043 | 0.481 |
| Idoteidae | | | | | | | | | |
| Amphipoda | | | | | | | | | |
| Anisogammarus confervicolus | 0.096 | 2.735 | 0.019 | 0.017 | | | | | |
| Corophium | 0.399 | 0.254 | | | | | | | |
| Grandidriella japonica | | | | | | | | | |
| Caprellidae | | | | | | | | | |
| Ampellicidae | | | | | | | | | |
| Amphithoidae | | | | | | | | | |
| Aoridae | | | | | | | | | |
| Atyidae | | | | 0.017 | | | | | |
| Hyalidae | | | | | | | | | |
| Ischyroceridae | | | | | | | | | |
| Photidae | | | | | | | | | |
| Plausitidae | | | | | | | | | |
| Talitridae | | | | | | | | | |
| unk. amphipods | | | | | | | | | |
| Cumacea | | | | | | | 0.012 | | |
| Mysidacea | | | | | | | | | |
| Neomysis mercedis | | | | | | | | | |
| Euphausiacea | | | | | | | | | |
| Decapoda | | | | | | | | | |
| Brachyura | | | | | | | | | |
| Cancer antennarius/gracilis(1) | | | | | | | | | |
| Cancer antennarius stg 2 zoea | | | | | | | | | |
| Cancer antennarius stg 3 zoea | | | | | | | | | |
| Cancer productus stg 1 zoea | | | | | | | | | |
| Grapsidae zoea | | 0.016 | | 0.116 | | | | | |
| Majidae zoea | | | | | | | | | |
| 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 | | | | | | | | | |
| Hippidae zoea | | | | | | | | | |
| Paguridea zoea | | | | | | | | | |
| Thalassinidea zoea | | | | | | | | | |
| Callinassidae | | | | | | | | | |
| Caridea | | | | | | | | | |
| Crangonidae(zoea and older) | | | | | | | | | |
| Hippolytidae zoea | | | | | | | | | |
| Caridean zoea and older | | | | | | | | | |
| Crangon nigromaculata | | | | | | | | | |
| Heptacarpus pictus | | | | | | | | | |
| Heptacarpus taylori | | | | | | | | | |
| Unknown caridean type zoea | | | | | | | | | |
| Unknown zoea | | | | | | | | | |
| Arachnid | | | 0.151 | | | | | | |
| Pycnogonid | | | | | | | | | |
| Halacaridae | | | | | | | | | |
| Insecta, unident. | | | 0.755 | | | | | | |
| Insect larvae | | | 0.094 | | | | 0.048 | 0.757 | 0.160 |
| Echinodermata | | | | | | | | | |
| bipinnaria larvae | | | | | | | | | |
| pluteus larvae | | | | | | | | | |
| Chaetognatha | | | | | | | | | |
| Urochordata | | | | | | | | | |
| Larvacea | | | | | | | | | |

| | | | | | | | | | |
|------------------------------|-------|-------|--------|-------|----------|-------|-------|-------|---------|
| 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 | 0.000 | 0.072 | 1.242 | 102.522 |
| Copepoda per m3 | 0.000 | 0.095 | 10.113 | 1.938 | 6657.760 | 0.000 | 0.000 | 0.000 | 1.284 |
| Decapoda per m3 | 0.000 | 0.016 | 0.000 | 0.116 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Mysidacea per m3 | 0.000 | 0.000 | 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 |

Appendix P3. Invertebrates (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-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 |
| Protozoa | | | | | | | | |
| Tintinnids | | | | | | | | |
| Foraminifera | | | | | | | | |
| Noctiluca | | | | | | | | |
| Ctenophore | | | | | | | | |
| Cnidaria | | | | | | | | |
| Leptomedusa type | | | | | | | | |
| Anthomedusa type | | | | 1.521 | | | | |
| other medusae | | | | | | | | |
| Hydroid polyp | P | | | | | | | |
| Leptomedusa polyp | | | | | | | | |
| Coral polyp | | | | | | | | |
| Siphonophore (gonophore) | | | | | | | | |
| Aschelminthes | | | | | | | | |
| roundworm | | | | | | | | |
| Unknown "worm" | | | | | | | | |
| Rotifera | | | | | | | | |
| Brachionus | | | | | | | | |
| Synchaeta | | | | | | | | |
| Mollusca | | | | | | | | |
| Bivalves | | | | | | | | |
| Montacutidae | | | | | | | | |
| Gastropods | | | | 0.072 | | | | |
| Gastropoda eggs | | | | | | | | |
| Opisthobranchia | | | | | | | | |
| Nudibranchs | | | | | | | | |
| Phoronida actinotroch | | | | | | | | |
| Bryozoa larvae | | | | | | | | |
| Bryozoan colony | P | | | | | | | |
| Annelida | | | | | | | | |
| Hirudinea | | | | | | | | |
| Polychaetes | | | | | | | | |
| Polychaete larvae | | | | | | | | |
| Oligochaete | | | | | | | | |
| Nemertean | | | | | | | | |
| Arthropoda | | | | | | | | |
| Crustacea | | | | | | | | |
| nauplii | | | | | | | 0.012 | |
| Cladocera | | | | | | | | |
| Evadne | | 5.019 | 4.141 | 0.579 | | | | |
| Podon | | | | | | | | |
| Copepoda | | | | | | | | |
| Corycaeus | | | | | | | 0.442 | |
| Oithona | | | | 3.187 | | | | |
| Oncaea | | | | | | | | |
| unk. cyclopoid | | | | | | | | |
| Cyclopoid copepodites | | | | | | | | |
| Acartia clausi | | | | | | | | |
| Acartia danae | | | | | | | | |
| Calanus sp. | | | | | | | | |
| Metridia lucens | | | | | | | | |
| Epilabidocera longipedata | | | | | | | | |
| Eucalanus | | | | | | | | |
| Eurytemora affinis | | | | 168.320 | | | | |
| Eurytemora americana | | | | | | | | |
| Eurytemora sp. "copepodites" | | | | | | | | |
| Pseudodiaptomus euryhalinus | | | | | | | | |
| c.f. Temorites sp. | | | 0.164 | | | | | |
| Rhincalanus nasutus | | | | | | | | |
| Centropages c.f. abdominalis | | | | | | | | |
| Tortanus discaudatus | | | | | | | | |
| Monstrillidae, unident. | | | | | | | | |
| unknown calanoid | | | | | | | 0.024 | |
| Calanoid copepodites | | | | | | | | |
| Cal. copepodites w/long rami | | | | | | | | |
| Parathalestris californica | | | | | | | | |
| Schizopera knabeni | | | | | | | | |
| Zaus spp. | | | | | | | | |
| Haracticoida unident. | | | | | | | | |
| Haracticoid "A" | | | | | | | | |
| Haracticoid "B" | | | | | | | | |
| Haracticoid "C" | | | | | | | | |
| Caligus | | | | | | | 0.012 | |
| other parasitic copepods | | | | | | | | |
| unknown copepodites | | | | | | | | |
| Ostracoda | 0.516 | | | | | | | |
| Podocopa | | | | 0.217 | 0.021 | | | |

| | Station 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 | | | | | | | | |
| Nebalia pugettensis | | | | | | | | |
| Cirripedia | | | | | | | | |
| Barnacle nauplii | | | | | | | | |
| Barnacle cypris | | | | | | | | |
| Isopoda | 0.227 | | | | | | | |
| Sphaeromatidae | | | 0.018 | 0.217 | | 0.040 | 0.048 | 0.018 |
| Idoteidae | | | | | | | | |
| Amphipoda | | | | | | | | |
| Anisogammarus confervicolus | | | 0.018 | | | 0.066 | 0.012 | 0.018 |
| Corophium | 0.547 | | | 0.072 | | | | |
| Grandidriella japonica | | | | | | | | |
| Caprellidae | | | | | | | | |
| Ampeliscaidae | | | | | | | | |
| Ampithoidae | | | | | | | | |
| Aoridae | | | | | | | | |
| Atylidae | | | | | | | | |
| Hyalidae | | | | | | | | |
| Ischyroceridae | | | | | | | | |
| Photidae | | | | | | | | |
| Pleustidae | | | | | | | 0.012 | |
| Talitridae | | | | | | | | |
| unk. amphipods | | | | | | | | |
| Cumacea | | | | | | | | |
| Mysidacea | 0.010 | | | 0.217 | | | | 0.018 |
| Neomysis mercedis | | | | | | | | |
| Euphausiacea | | | | | | | | |
| Decapoda | | | | | | | | |
| Brachyura | | | | | | | | |
| 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 | | | | | | | | |
| 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 | | | | | | | | |
| Callinassidae | | | | | | | | |
| Caridea | | | | | | | | |
| Crangonidae(zoea and older) | | | | | | | | |
| Hippolytidae zoea | | | | | | | | |
| Caridean zoea and older | | | | | | | | |
| Crangon nigromaculata | | | | | | | | |
| Heptacarpus pictus | | | | | | | | |
| Heptacarpus taylori | | | | | | | | |
| Unknown caridean type zoea | | | | | | | | |
| Unknown zoea | | | | | | | | |
| Arachnid | 0.021 | | | | | | | |
| Pycnogonid | | | | | | | | |
| Halacaridea | | | | | | | | |
| Insect larvae | 0.021 | | 0.036 | 0.072 | 0.084 | 4.294 | 2.855 | |
| Echinodermata | | | | | | | | |
| biplinnaria larvae | | | | | | | | |
| pluteus larvae | | | | | | | | |
| Chaetognatha | | | | | | | | |
| Urochordata | | | | | | | | |
| Larvacea | | | | | | | | |

| | | | | | | | | |
|-----------------------------|-------|-------|-------|---------|-------|-------|-------|-------|
| 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 |
| Mysidacea per m3 | 0.010 | 0.000 | 0.000 | 0.217 | 0.000 | 0.000 | 0.000 | 0.018 |
| Other per m3 | 1.331 | 5.019 | 4.214 | 2.752 | 0.106 | 4.400 | 2.938 | 0.035 |

| | Station S-2 | | | | | | | |
|---------------------------------------|-------------|----------|-----------|----------|-----------|-----------|-----------|-----------|
| | 5-Jul-89 | 8-Feb-90 | 10-Mar-90 | 6-Apr-90 | 25-May-90 | 26-Jun-90 | 27-Jul-90 | 19-Sep-90 |
| Bay pipefish | | | | | | | | |
| Bay pipefish larvae | | | | | | | | |
| Gobiidae larvae | | | | | | | | |
| Arrow Goby | | | | | | | | |
| Bay, arrow or yellowfin goby | | | | | | | | |
| Tidewater goby | | | | | | | | |
| Topsmelt | | | | | | | | |
| Jack- or topsmelt larvae | | | | | | | | |
| Northern anchovy larvae | | | | | | | | |
| Pacific Herring larvae | | | | | | | | |
| short bellied rock fish | | | | | | | | |
| 3-Spine Stickleback | | | | | | | | |
| 3-Spine Stickleback larvae | | | | | | | | |
| Shiner Surfperch | | | | | | | | |
| Staghorn sculpin | | | | | | | | |
| Surfmelt larvae | | | 0.050 | | | | | |
| Cyprinidae larvae | | | | | | | | |
| unknown fish larvae | | | 0.232 | | | | | |
| fish eggs | | | | | | | | |
| Clelandia/lypnus/Quietula | | | | | | | | |
| Osmeridae(yolksac larvae) | | | | | | | | |
| Number of Vertebrate taxa | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| Total larval and juvenile fish per m3 | 0.000 | 0.000 | 0.282 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

| | Station S-4 | | | | | | | | |
|---------------------------------------|-------------|-----------|----------|-----------|----------|-----------|-----------|-----------|-----------|
| | 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-90 |
| Bay pipefish | | | | | | | | | |
| Bay pipefish larvae | | | | | | | | | |
| Gobiidae larvae | | | | | | | | | |
| Arrow Goby | | | | | | | | | |
| Bay, arrow or yellowfin goby | | | | | | | | | |
| Tidewater goby | | | | | | | | | |
| Topsmelt | | | | | | | | | |
| Jack- or topsmelt larvae | 0.013761 | | | | | | | | |
| Northern anchovy larvae | | | | | | | | | |
| Pacific Herring larvae | | | | | | | | | |
| short bellied rock fish | | | | | | | | | |
| 3-Spine Stickleback | | | | | | | | | |
| 3-Spine Stickleback larvae | | | | | | | | | |
| Shiner Surfperch | | | | | | | | | |
| Staghorn sculpin | | | | 0.149 | | | | | |
| Surfsmelt larvae | | | | | | | | | |
| Cyprinidae larvae | | | | | | | | | |
| unknown fish larvae | | | 0.019 | | | | 0.012 | | |
| fish eggs | | 0.111 | | | | | | | |
| Clellandia/Ilypnus/Culetula | | | | | | | | | |
| Osmridae(yolksac larvae) | | | | | | | | | |
| 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 |

| | Station 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 |
| Bay pipefish | 0.01032 | | | | | | | |
| Bay pipefish larvae | | | | | | | | |
| Gobiidae larvae | | | | 0.145 | | 0.199 | 0.048 | |
| Arrow Goby | | | | 0.435 | | | | |
| Bay, arrow or yellowfin goby | | | | | | | | |
| Tidewater goby | | | | | | | | 1.256 |
| Topsmelt | | | | | | | | |
| Jack- or topsmelt larvae | | | | | | | | |
| Northern anchovy larvae | | | | | | | | |
| Pacific Herring larvae | | | | | | | | |
| short belled rock fish | | | | | | | | |
| 3-Spine Stickleback | 0.01032 | | | | 0.021 | | | |
| 3-Spine Stickleback larvae | | | | | | | | |
| Shiner Surfperch | | | | | | | | |
| Staghorn sculpin | | | 0.055 | | | | | |
| Surfsmelt larvae | | | | | | | | |
| Cyprinidae larvae | 0.02064 | | | | | | | |
| unknown fish larvae | | | | | | | | |
| fish eggs | P | | | | | | | |
| Clelandia/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 | 30-Mar-88 | | | | | 13-Apr-88 | | | | | 16-Jun-88 | | | | | 29-Aug-88 | | | | | 25-Oct-88 | | | | |
|--|-----------|-----|-----|------|-----|-----------|-----|-----|-----|-----|-----------|-----|------|-----|------|-----------|-----|-----|-----|-----|-----------|-----|-----|-----|-----|
| STATION NUMBER | 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-2 | E-3 | E-4 | E-5 | E-1 | E-2 | E-3 | E-4 | 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 |
| Mysidacea (mysids) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Archeomysis grebnitskii</i> | | | | | | 1 | | | | | | | | | | | | | | | 2 | | | | |
| <i>Holmesimysis costata</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Neomysis mercedis</i> | 1 | xxx | | 8500 | | 11 | xxx | xxx | xxx | | | | xxb | 24 | xxxb | | | 1 | | | | | 24 | | |
| <i>Neomysis rayi</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| Caridlia (shrimps) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Crangon alaskensis elongata</i> | 1 | | | | | 1 | | | | | | | | | | 5 | 1 | | | | 10 | | | | |
| <i>Crangon franciscorum</i> | | 7 | | 4 | | | 27 | 4 | | | 2 | 1 | | | | | | | | | | 1 | 87 | 6 | |
| <i>Crangon nigricauda</i> * | 6 | 22 | | | | 11 | 45 | | | | 12 | | | | | | 4 | 29 | 18 | 2 | 4 | 23 | 86 | 2 | |
| <i>Heptacarpus brevisstris</i> * | | | | | | 1 | | | | | | | | | | | | | | | | | | | |
| <i>Heptacarpus carinatus</i> + | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Heptacarpus palpator</i> + | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Heptacarpus paludicola</i> + | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Heptacarpus pictus</i> * | | | | | | | | | | | | | | | | | 11 | | | | | 27 | 5 | | |
| <i>Hippolyte californiensis</i> * | | | | | | | | | | | | | | | | | 3 | | | | | 1 | | | |
| Brachyura (crabs) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cancer antennarius</i> + | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cancer anthonyi</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cancer gracilis</i> | | | | | | | | | | | | 2 | | | | | | | | | 1b | | | 1b | 1b |
| <i>Cancer jordanii</i> | | | | | | 1 | | | | | | 2 | | | | | | | | | 1 | 1 | | | |
| <i>Cancer magister (megalopae)</i> | | | | | | 1 | | | | | | | | | | | | | | | | | | | |
| <i>Cancer magister</i> | | | | | | 1 | | | | | 3 | 2 | | | | 5 | | | | | 1 | 4 | 2 | 2 | 1 |
| <i>Cancer productus</i> | | | | | | | | | | | | 1 | | | | | | | | | | 2 | | | |
| <i>Cancer spp. megalopae (not C. magister)</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Carcinus maenas</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Hemigrapsis oregonensis</i> | 2 | 2 | | 6 | | 1 | 11 | 9 | 76 | | 2 | 12 | xxxb | | xxb | 1 | 45 | 13 | 92 | 70 | | 20 | 6 | 11 | 7 |
| <i>Pugettia producta</i> * | | | | | | | | | | | | | | | | | 1 | | | | | | | | |
| <i>Pugettia richii</i> * | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Megalopae (not Cancer)</i> + | | | | | | | | | | | | | | | | | | | | | | | | | |
| Anomura (hermit crabs) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Isocheles pilosus</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Pagurus spp.</i> | | | | | | 1 | | | | | 1 | | | | | | | | | | | | | | |
| Amphipoda (amphipods) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Achelua sp.</i> + | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Allorchestes angusta</i> + | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Amphithoe lacertosa</i> * | | 1 | | | | | 20 | 1 | | | | | | 1 | | | 3 | 1 | | | 2 | 14 | 3 | | |
| <i>Anisogammarus confervicolus</i> * | | | | | | | 4 | | | | | | | | | | | | | | | | | | |
| <i>Atylus tridens</i> + | | | | 1 | | | | | | | | | | | | | | | | | | | | | |
| <i>Caprella californica</i> * | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Corophium spinicorne, incl. juv.</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Grandidierella japonica</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| Isopoda (isopods) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cirolana hartfordi</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Excirolana sp.</i> + | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Idotea fewkesi</i> ** | | | | 1 | | | | | | | 3 | | | | | | | | | | | 1 | | | |
| <i>Idotea montereyensis</i> **+ | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Idotea resicata</i> ** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pycnogonida (sea spiders) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Pycnogonum stearnsi</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mollusca (molluscs) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Hermisenda crassicornis</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Lacuna sp.</i> ** | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Nudibranch sp. (?Fiona)</i> | | | | | | | | | | | | | | | | | | | | | | | | | |

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

| DATE | 20-Dec-88 | | | | | 17-Feb-89 | | | | | 6-Mar-89 | | | | | 9-Apr-89 | | | | | 5-May-89 | | | | |
|--|-----------|------|-----|------|-----|-----------|-----|-----|-----|-----|----------|-----|-----|-----|-----|----------|-----|-----|-----|-----|----------|-----|-----|------|-----|
| STATION NUMBER | 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-2 | E-3 | E-4 | E-5 | E-1 | E-2 | E-3 | E-4 | E-5 |
| NUMBER OF TOWS | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Mysidacea (mysids) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Archeomysis grebnitskii</i> | 8 | | | | | 2 | | | | | 7 | | | | | 8 | | | | | | | | | |
| <i>Holmesimysis costata</i> | | | | | | 1 | | | | | | | | | | | | | | | | | | | |
| <i>Neomysis mercedis</i> | 2 | 6 | 35 | 8000 | 2 | | | 77 | 925 | 43 | | 11 | 116 | | | 4 | 120 | | | | | | 4 | 8500 | 350 |
| <i>Neomysis rayi</i> | | | | | | | | | | | 3 | 1 | | | | | | | | | | | | | |
| Caridlia (shrimps) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Crangon alaskensis elongata</i> | 14 | | | | | 1 | | | | | | | | | | 3 | | | | | 15 | | | | |
| <i>Crangon franciscorum</i> | | | | 39 | 39 | | | | 53 | | | 2 | | | | | 1 | | | | | 1 | 12 | 2 | |
| <i>Crangon nigricauda</i> * | 38 | 40 | 2 | 62 | | 9 | 23 | 8 | 1 | | 2 | 2 | 1 | | | 2 | | | | | 4 | | | 1 | |
| <i>Heptacarpus brevirostris</i> * | 1 | | | | | 1 | | | | | | | | | | | | | | | | | | | |
| <i>Heptacarpus carinatus</i> ** | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Heptacarpus palpator</i> ** | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Heptacarpus paludicola</i> ** | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Heptacarpus pictus</i> * | 4 | 465 | 10 | 3 | | 20 | 42 | 8 | | | 20 | 1 | | | | | | | | | | | | | |
| <i>Hippolyte californiensis</i> * | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brachyura (crabs) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cancer antennarius</i> + | | | | | | | | | | | 1 | | | | | | | | | | | | | | |
| <i>Cancer anthonyi</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cancer gracilis</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cancer jordani</i> | | 3 | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cancer magister (megalopae)</i> | | | | | | | | | | | | | | | | | | | | | 2 | 10 | | | |
| <i>Cancer magister</i> | | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cancer productus</i> | 1 | | | | | | | | | | 1 | | | | | | | | | | | | | | |
| <i>Cancer spp. megalopae (not C. magister)</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Carcinus maenas</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Hemigrapsis oregonensis</i> | 1 | 32 | 3 | 5 | 7 | 1 | 8 | 1 | 3 | | 1 | 13 | | 1 | | 3 | 11 | | | | 9 | 3 | 10 | 9 | 2 |
| <i>Pugettia producta</i> * | 2 | 19 | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Pugettia richi</i> * | 1 | | | | | 1 | | | | | | | | | | | | | | | | | | | |
| <i>Megalopae (not Cancer)</i> + | | | | | | | | | | | | | | | | | | | | | | | | | |
| Anomura (hermit crabs) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Isocheles pilosus</i> | | | | | | | | | | | 1 | | | | | | | | | | | | | | |
| <i>Pagurus spp.</i> | | 12 | | | | | 5 | | | | | | | | | | | | | | | | | | |
| Amphipoda (amphipods) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Achelia sp.</i> ** | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Allochrestes angusta</i> ** | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Ampithoe lacertosa</i> * | 2 | 75 | 10 | 4 | | | 43 | 7 | | | | 5 | 1 | | | 1 | 6 | | | | 1 | | | | |
| <i>Anisogammarus confervicolus</i> * | | | | | | | | | 1 | 3 | | | | | | 6 | 11 | | | | 1 | | 1 | | |
| <i>Atylus tridens</i> ** | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Caprella californica</i> * | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Corophium spinicorne</i> , incl. juv. | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Grandidierella japonica</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| Isopoda (isopods) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cirratulus hartfordi</i> | | | | 1 | | | | | | | | | | | | | | | | | | | | | |
| <i>Excirolana sp.</i> + | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Idotea fewkesi</i> ** | 3 | | | | | | | | | | | | | | | 1 | | | | | 3 | | | | |
| <i>Idotea montereyensis</i> ** | | | | | | | 1 | 1 | | | | | | | | | | | | | | | | | |
| <i>Idotea resicata</i> ** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pycnogonida (sea spiders) | | | | | | | | | | | | | | | | | | | | | 1 | | | | |
| <i>Pycnogonum steamsi</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mollusca (molluscs) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Hemissenda crassicornis</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Lacuna sp.</i> ** | | 3000 | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Nudibranch sp. (?Fiona)</i> | | | | | | | | | | | | | | | | | | | | | | | | | |

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

| DATE | 8-Jun-89 | | | | | 6-Jul-89 | | | | | 19-Sep-89 | | | | | 28-Nov-89 | | | | | 7-Feb-90 | | | | |
|--|----------|-----|-----|-----|-----|----------|-----|-----|------|-----|-----------|-----|-----|-----|-----|-----------|------|-----|------|------|----------|-----|-----|-----|-----|
| STATION NUMBER | 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-2 | E-3 | E-4 | E-5 | E-1 | E-2 | E-3 | 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) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Archeomysis grebnitskii</i> | | | | | | | | | | | | | | | | | | | | | | 2 | | | |
| <i>Holmesimysis costata</i> | | | | | | | | | | | | | | | | | | | | | | 3 | | | 1 |
| <i>Neomysis mercedis</i> | | | | 900 | 19 | | | 200 | 1700 | 700 | | | | 800 | 8 | | 3 | 16 | 1760 | 2825 | | | 13 | 214 | 14 |
| <i>Neomysis rayi</i> | | | | | | | | | | | | | | | | | | | | | | 5 | | 3 | |
| Caridina (shrimps) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Crangon alaskensis elongata</i> | 12 | | | | | 1 | | | | | 9 | | | | | 18 | | | | | | 1 | | | |
| <i>Crangon franciscorum</i> | | | 10 | | | | | | 4 | | | | | 1 | | 3 | 1 | 80 | 14 | 5 | | | | 9 | |
| <i>Crangon nigricauda</i> * | 11 | | | | | 1 | | | | | 23 | 8 | 2 | | 2 | 70 | 27 | 124 | 11 | | 57 | 192 | 2 | | |
| <i>Heptacarpus brevis</i> * | | | | | | | | | | | 8 | 2 | | | | 31 | 5 | | | | 1 | | | | |
| <i>Heptacarpus carinatus</i> + | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Heptacarpus palpator</i> + | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Heptacarpus paludicola</i> + | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Heptacarpus pictus</i> * | | | | | | | | | | | 8 | 15 | | | | | | | | | 1 | 217 | | | |
| <i>Hippolyte californiensis</i> * | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brachyura (crabs) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cancer antennarius</i> + | | | | | | | | | | | | | | | | 1b | | | | | 1 | | | | |
| <i>Cancer anthonyi</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cancer gracilis</i> | | | | | | | | | | | | | | | | | 1,1b | | | | | | | | |
| <i>Cancer jordanii</i> | 1 | | | | | 1 | | | | | 2 | | | | | | | | | | | | | | |
| <i>Cancer magister</i> (megalo) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cancer magister</i> | 7 | 3 | | | | 5 | 6 | | | | 4 | | | | | 4 | | 2b | 1,1b | | 1 | 1 | | 1 | |
| <i>Cancer productus</i> | | | | | | | | | | | 3 | | | | | 1 | | | | | | | | | |
| <i>Cancer spp. megalopae</i> (not <i>C. magister</i>) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Carcinus maenas</i> | | 1b | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Hemigrapsis oregonensis</i> | 1 | 1 | 62 | 7 | 10 | 6 | 31 | 107 | 229 | 101 | 11 | 78 | 274 | 188 | 27 | 3 | 10 | 5 | 11 | 5 | | 7 | | 9 | |
| <i>Pugettia producta</i> * | 3 | | | | | 1 | | | | | 10 | 1 | | | | | | | | | | | | | |
| <i>Pugettia richii</i> * | | | | 1 | | | | | | | 2 | 1 | | | | 1 | | | | | | | | | |
| <i>Megalopae</i> (not <i>Cancer</i>) | | | | | | | | | | | | | | | | | | 1 | | | | 1 | 1 | | |
| Anomura (hermit crabs) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Isocheles pilosus</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Pagurus</i> spp. | | | | | | | | | | | 2 | | | | | | | | | | | 6 | | | |
| Amphipoda (amphipods) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Achelia</i> sp.* | | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| <i>Allorchestes angusta</i> + | | | | | | | | | | | | | | | | | | | | | | 1 | | | |
| <i>Ampithoe lacertosa</i> * | | | | | | | 20 | | | | | 8 | | | | | 12 | | | | | 23 | | | |
| <i>Anisogammarus confervicolus</i> * | | | 1 | | | | 100 | | 1 | | 3 | | | | | | | | 3 | | | 17 | 15 | 35 | 3 |
| <i>Atylus tridens</i> + | | | | | | | | | | | | | | | | | | | | | 4 | | | | |
| <i>Caprella californica</i> * | | | | | | | | | | | 2 | | | | | | | | | | | | | | |
| <i>Corophium spinicorne</i> , incl. juv. | | | | | | | | | | | | | | | | | | | | | | 1 | 5 | 1 | |
| <i>Grandislerella japonica</i> | | | | | | | | | | | | | | | | | | | | | | | 1 | | |
| Isopoda (isopods) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cirolana hartfordi</i> | | | | | | | | | | | | 2 | | 1 | | | | | | | | | | | |
| <i>Excirolana</i> sp. + | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Idotea falkesi</i> ** | | | | | | | | | | | 1 | | | | | 1 | 1 | | | | 2 | 1 | | | 1 |
| <i>Idotea montereyensis</i> ** | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Idotea resicata</i> ** | | | | | | | | | | | 3 | 7 | | 1 | | | 1 | | | | | | | | |
| Pycnogonida (sea spiders) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Pycnogonum steamsi</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mollusca (molluscs) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Hermisenda crassicornis</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Lacuna</i> sp.** | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Nudibranch</i> sp. (?Fiona) | 1 | | | | | 11 | | | | | | 1 | | | | | 8 | | | | | | | | |

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

| DATE | 9-Mar-90 | | | | | 5-Apr-90 | | | | | 24-May-90 | | | | | 25-Jun-90 | | | | | 26-Jul-90 | | | | |
|--|----------|-----|------|-----|-----|----------|-----|-----|-----|------|-----------|-----|-------|-------|-----|-----------|------|-----|-----|------|-----------|-----|-------|-----|-----|
| STATION NUMBER | 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-2 | E-3 | E-4 | E-5 | E-1 | E-2 | E-3 | 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) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Archeomysis grebnitskii</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Holmesimysis costata</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Neomysis mercedis</i> | | 91 | 1550 | 32 | 1 | | 183 | 170 | 144 | 1270 | | 7 | 1 | 825 | 4 | | | | | 125 | | 5 | 225 | 2 | 120 |
| <i>Neomysis rayi</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| Caridlia (shrimps) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Crangon alaskensis elongata</i> | | | | | | | | | | | | | | | | 1 | | | | | 4 | | | | |
| <i>Crangon franciscorum</i> | | | 23 | | | | | | | | | | | 9 | | | 4 | | | 4 | | 1 | | | 7 |
| <i>Crangon nigricauda</i> * | 24 | 95 | | | | 31 | 31 | | | | 18 | 1 | | | | 9 | 1 | | | | 12 | 2 | | | |
| <i>Heptacarpus brevisrostris</i> * | | | | | | 5 | | | | | | | | | | 1 | | | | | 2 | | | | |
| <i>Heptacarpus carinatus</i> * | | | | | | | | | | | | | | | | | | | | | 1 | | | | |
| <i>Heptacarpus palpator</i> * | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Heptacarpus paludicola</i> * | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Heptacarpus pictus</i> * | 14 | 17 | 1 | | | 83 | 44 | | | 1 | 2 | 5 | | | | 1 | | | | | 2 | 3 | 1 | | |
| <i>Hippolyte californiensis</i> * | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brachyura (crabs) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cancer antennarius</i> * | | | | | | | | | | | 1b | | | | | | | | | | | | | | |
| <i>Cancer anthonyi</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cancer gracilis</i> | | | | | | 1 | | | | | | | | | | | | | | | | 2 | | | |
| <i>Cancer jordani</i> | | | | | | 3 | | | | | 1 | | | | | | | | | | 2 | | | | |
| <i>Cancer magister (megalopae)</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cancer magister</i> | 3b | 1b | | | | 2 | | | | | 1 | 2b | | | | 1 | 1,2b | | | | | | | | |
| <i>Cancer productus</i> | | 2b | | | | 1 | 4 | | | | 1 | | | | | 1,13 | 10b | | | | 3,1b | 3b | | | |
| <i>Cancer spp. megalopae (not C. magister)</i> | | | | | | | | | | | 1 | | | | | | | | | | | | | | |
| <i>Carcinus maenas</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Hemigrapsus oregonensis</i> | 1 | 9 | 1 | 14 | 2 | | 43 | | 1 | 3 | | 16 | 26,20 | 23,2b | 55 | | 4 | 38 | 58 | 7 | 3 | 40 | 202,5 | 94 | 33 |
| <i>Pugettia producta</i> * | 1 | | | | | 7 | | | | | 3 | | | | | 27 | 1 | | | 1 | 5 | 2 | | | |
| <i>Pugettia richii</i> * | | | | | | 1 | | | | | 1 | | | | | 3 | | | | | | | | 1 | |
| Megalopae (not Cancer)* | | | | | | | | | | | | | | | | | | | | | | | | | |
| Anomura (hermit crabs) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Isocheles pilosus</i> | | | | | | 2 | | | | | | | | | | | | | | | | | | | |
| <i>Pagurus spp.</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| Amphipoda (amphipods) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Achelie sp. *</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Allorchestes angusta</i> * | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Amphihoe lacertosa</i> * | | 1 | | | | | 2 | | | | | 1 | | | | 1 | | | | | | 1 | | | |
| <i>Anisogammarus confervicolus</i> * | 1 | 1 | 1 | 2 | 5 | | 37 | | | 1 | | 1 | | | | | | | | | | | | | |
| <i>Atylus tridens</i> * | | | | | | 1 | 3 | | | | | | | | | | | | | | | | | | |
| <i>Caprella californica</i> * | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Corophium spinicorne, incl. juv.</i> | | | | 5 | 8 | | | | | 1 | | 1 | 2 | | 1 | | | | | >200 | | | | | |
| <i>Grandidierella japonica</i> | | 1 | | | | | 2 | | | | | | | | | | | | | | | | | | |
| Isopoda (isopods) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cirolana hartfordi</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Excirolana sp. +</i> | | | | | | | | | | | | | 1 | | 1 | | | | | | | | | | |
| <i>Idotea fewkesi</i> ** | | | | | | 1 | | | | | 1 | | | | | 1 | | | | | | | | | 1 |
| <i>Idotea montereyensis</i> ** | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Idotea resecata</i> ** | | | | | | | | | | | | | | | | | | | | | 1 | | | | 1 |
| Pycnogonida (sea spiders) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Pycnogonum stearnsi</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mollusca (molluscs) | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Hemissenda crassicornis</i> | | | | | | | | | | | | | | | | 8 | | | | | 1 | | | | |
| <i>Lacuna sp. **</i> | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Nudibranch sp. (?Fiona)</i> | | | | | | | | | | | | | | | | 1 | | | | | | | | | |

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

| DATE | 18-Sep-90 | | | | |
|--|-----------|-------|-------|-----|-----|
| STATION NUMBER | E-1 | E-2 | E-3 | E-4 | E-5 |
| NUMBER OF TOWS | 1 | 1 | 1 | 1 | 1 |
| Mysidacea (mysids) | | | | | |
| <i>Archeomysis grebnitskii</i> | | | | | |
| <i>Holmesimysis costata</i> | | | | | |
| <i>Neomysis mercedis</i> | 1 | | 60 | 500 | 85 |
| <i>Neomysis rayi</i> | | | | | |
| Caridina (shrimps) | | | | | |
| <i>Crangon alaskensis elongata</i> | 1 | | | | |
| <i>Crangon franciscorum</i> | | | | 1 | 4 |
| <i>Crangon nigricauda</i> * | 28 | 9 | 18 | 4 | 7 |
| <i>Heptacarpus brevirostris</i> * | 13 | | | | |
| <i>Heptacarpus carinatus</i> *+ | 6 | | | | |
| <i>Heptacarpus palpator</i> *+ | 2 | | | | |
| <i>Heptacarpus paludicola</i> *+ | | 2 | | | |
| <i>Heptacarpus pictus</i> * | 5 | 54 | | | 1 |
| <i>Hippolyte californiensis</i> * | | | | | |
| Brachyura (crabs) | | | | | |
| <i>Cancer antennaries</i> + | 1 | | | | |
| <i>Cancer anthonyi</i> | | | | | |
| <i>Cancer gracilis</i> | | 4,1b | | | |
| <i>Cancer jordani</i> | 4 | 2 | | | |
| <i>Cancer magister (megalopae)</i> | | | | | |
| <i>Cancer magister</i> | | 1 | | | |
| <i>Cancer productus</i> | 1 | 5,13b | | | |
| <i>Cancer spp. megalopae (not C. magister)</i> | | | | | |
| <i>Carcinus maenas</i> | | | | | |
| <i>Hemigrapsis oregonensis</i> | | 117,6 | 17,25 | 37 | 30 |
| <i>Pugettia producta</i> * | 27,2b | | | | |
| <i>Pugettia richii</i> * | 2 | | | | |
| <i>Megalopae (not Cancer)</i> + | | | | | |
| Anomura (hermit crabs) | | | | | |
| <i>Isocheles pilosus</i> | | | | | |
| <i>Pagurus spp.</i> | | | | | |
| Amphipoda (amphipods) | | | | | |
| <i>Achelia sp.</i> *+ | | | | | |
| <i>Allochrestes angusta</i> *+ | | | | | |
| <i>Ampithoe lacertosa</i> * | 6 | 50 | | 4 | |
| <i>Anisogammarus confervicolus</i> * | 1 | | | | |
| <i>Atylus tridens</i> *+ | | | | | |
| <i>Caprella californica</i> * | 4 | 1 | | | 1 |
| <i>Corophium spinicorne</i> , incl. juv. | | 1 | 3 | | |
| <i>Grandidierella japonica</i> | | | | | |
| Isopoda (isopods) | | | | | |
| <i>Cirolana hartfordi</i> | | | | | |
| <i>Excirolana sp.</i> + | | | 3 | 1 | |
| <i>Idotea fewkesi</i> ** | | | | | |
| <i>Idotea montereyensis</i> **+ | | | | | |
| <i>Idotea rescata</i> ** | 1 | | | | |
| Pycnogonida (sea spiders) | | | | | |
| <i>Pycnogonum stearnsi</i> | | | | | |
| Mollusca (molluscs) | | | | | |
| <i>Hemissenda crassicomis</i> | | | | | |
| <i>Lacuna sp.</i> ** | | | | | |
| <i>Nudibranch sp. (?Fiona)</i> | | 5 | | | |

*often associated with macrophytes
 **primarily associated with macrophytes
 a abundances estimated from drop nets
 b abundances estimated from gill nets

| DATE | Number of Dates Collected | | | | |
|--|---------------------------|-----|-----|-----|-----|
| STATION NUMBER | E-1 | E-2 | E-3 | E-4 | E-5 |
| NUMBER OF DATES SAMPLED | 21 | 21 | 19 | 21 | 18 |
| Mysidacea (mysids) | | | | | |
| <i>Archeomysis grebnitskii</i> | 6 | | | | |
| <i>Holmesimysis costata</i> | 3 | | | 1 | |
| <i>Neomysis mercedis</i> | 5 | 11 | 16 | 17 | 14 |
| <i>Neomysis rayi</i> | 2 | 1 | 1 | | |
| Caridina (shrimps) | | | | | |
| <i>Crangon alaskensis elongata</i> | 16 | 1 | | | |
| <i>Crangon franciscorum</i> | 2 | 10 | 7 | 12 | 3 |
| <i>Crangon nigricauda</i> * | 20 | 16 | 9 | 7 | 3 |
| <i>Heptacarpus brevirostris</i> * | 11 | 2 | | | |
| <i>Heptacarpus carinatus</i> ** | 2 | | | | |
| <i>Heptacarpus palpator</i> ** | 1 | | | | |
| <i>Heptacarpus peludicola</i> ** | | 1 | | | |
| <i>Heptacarpus pictus</i> * | 10 | 14 | 5 | 1 | 2 |
| <i>Hippolyte californiensis</i> * | | 3 | | | |
| Brachyura (crabs) | | | | | |
| <i>Cancer antennarius</i> + | 4 | | | | |
| <i>Cancer anthonyi</i> | 1 | | | | |
| <i>Cancer gracilis</i> | 2 | 4 | | 1 | 1 |
| <i>Cancer jordani</i> | 9 | 4 | | | |
| <i>Cancer magister (megalopae)</i> | 1 | | | | |
| <i>Cancer magister</i> | 14 | 11 | 2 | 3 | 1 |
| <i>Cancer productus</i> | 9 | 7 | | | |
| <i>Cancer spp. megalopae (not C. magister)</i> | 1 | | | | |
| <i>Carcinus maenas</i> | | 1 | | | |
| <i>Hemigrapsus oregonensis</i> | 15 | 21 | 16 | 19 | 15 |
| <i>Pugettia producta</i> * | 10 | 5 | | 1 | 1 |
| <i>Pugettia richii</i> * | 8 | 1 | | 2 | |
| <i>Megalopae (not Cancer)</i> + | | 1 | 2 | | |
| Anomura (hermit crabs) | | | | | |
| <i>Ischocheles pilosus</i> | 2 | | | | |
| <i>Pagurus spp.</i> | 4 | 3 | | | |
| Amphipoda (amphipods) | | | | | |
| <i>Achelia sp.</i> ** | 1 | | | | |
| <i>Allorchestes angusta</i> ** | 1 | | | | |
| <i>Ampithoe laceriosa</i> * | 6 | 16 | 7 | 3 | |
| <i>Anisogammarus confervicolus</i> * | 5 | 7 | 4 | 7 | 4 |
| <i>Atylus tridens</i> ** | 2 | 1 | | | |
| <i>Caprella californica</i> * | 2 | 1 | | | 1 |
| <i>Corophium spinicorne, incl. juv.</i> | | 3 | 3 | 3 | 3 |
| <i>Grandidierella japonica</i> | | 2 | 1 | | |
| Isopoda (isopods) | | | | | |
| <i>Cirolana hartfordi</i> | | 1 | | 2 | |
| <i>Excirolana sp.</i> + | | | 2 | 1 | 1 |
| <i>Idotea fewkesi</i> ** | 10 | 3 | | 1 | 2 |
| <i>Idotea montereyensis</i> ** | | | | 1 | |
| <i>Idotea resicata</i> ** | 3 | 3 | 1 | 1 | 1 |
| Pycnogonida (sea spiders) | | | | | |
| <i>Pycnogonum steamsi</i> | 1 | | | | |
| Mollusca (molluscs) | | | | | |
| <i>Hemissenda crassicornis</i> | 2 | | | | |
| <i>Lacuna sp.</i> ** | | 1 | | | |
| <i>Nudibranch sp. (?Fiona)</i> | 3 | 3 | | | |
| NUMBER OF SPECIES | 35 | 30 | 14 | 18 | 14 |

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

| DATE | 6-Jul-89 | | | 18-Sep-89 | | | 8-Feb-90 | | | 10-Mar-90 | | | 4-Apr-90 | | | 25-May-90 | | | 26-Jun-90 | | | 27-Jul-90 | | | 19-Sep-90 | | |
|--|----------|-----|-----|-----------|-----|-----|----------|-----|-----|-----------|-----|-----|----------|-----|-----|-----------|-------|-----|-----------|-----|-----|-----------|-----|-----|-----------|------|-----|
| STATION NUMBER | 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-2 | S-4 | S-6 | S-2 | S-4 | S-6 | S-2 | S-4 | S-6 | S-2 | S-4 | S-6 | S-2 | S-4 | S-6 |
| 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 |
| Mysidacea (mysids) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Neomysis mercedis</i> | 6 | | | | | | 2 | | | >100 | 1 | | 5 | 235 | | 3500 | 340 | 6 | 110 | 26 | 6 | 100 | 60 | 6 | 2 | 200 | 4 |
| Caridia (shrimps) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Crangon franciscorum</i> | 2 | | | | | | | | | | | | | | | 1 | | | | | | | | | | | |
| <i>Heptacarpus pictus</i> * | | | | | | | 11 | | | | | | | | | | | | | | | | | | | | |
| Brachyura (crabs) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cancer jordanii</i> | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cancer magister</i> | | | | | | | | | | | | | | | | 1.5b | | | 2b | | | | | | | | |
| <i>Hemigrapsis oregonensis</i> | | | | | | | 1 | | | | | | | | | | | | 1 | | | | | | 1 | | |
| Amphipoda (amphipods) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Anisogammarus confervicolus</i> * | 4 | | 4 | | | | | 235 | 9 | 8 | | 9 | 5 | 5 | | 6 | | 2 | | 5 | 5 | 5 | | | 325 | 10 | |
| <i>Corophium spinicorne</i> , incl. juv. | 1 | | 44 | | | | | | | 2 | | | 37 | | | 6 | >1000 | | >200 | 2 | | >1000 | 220 | | >1000 | 1500 | |
| Isopoda (isopods) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Gnornosphaeroma</i> sp. | | | | | | | | 1 | | | | 2 | | | | | | | 1 | | | | | | | | |
| Insecta | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Corixidae | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Cenocorixa blaisdelli</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Corisella inscripta</i> | | | | | | | | | | | | | | | | | | | | | 1 | | | | | 1 | 5 |
| Coleoptera | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Tropisternus</i> sp. larva | | | | | | | | | | | | | | | | | | | | | 1 | | | | | | |
| Diptera | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chironomid larvae | | | | | | | | | | | | | | | | | | | | | | | | | 1 | | |
| Chironomid pupae | | | | | | | | | | | | | | | | | | | | | | | 1 | | | | |

| DATE | Number of Dates Collected | | |
|--|---------------------------|-----|-----|
| STATION NUMBER | S-2 | S-4 | S-6 |
| NUMBER OF DATES SAMPLED | 9 | 7 | 9 |
| Mysidacea (mysids) | | | |
| <i>Neomysis mercedis</i> | 8 | 5 | 5 |
| Caridea (shrimps) | | | |
| <i>Crangon franciscorum</i> | 1 | | |
| <i>Heptacarpus pictus</i> * | 2 | | |
| Brachyura (crabs) | | | |
| <i>Cancer jordanii</i> | 1 | | |
| <i>Cancer magister</i> | 2 | | |
| <i>Hemigrapsis oregonensis</i> | 3 | | |
| Amphipoda (amphipods) | | | |
| <i>Anisogammarus confervicolus</i> * | 6 | 4 | 5 |
| <i>Corophium spinicorne</i> , incl. juv. | 7 | 4 | 1 |
| Isopoda (isopods) | | | |
| <i>Gnathosphaeroma</i> sp. | | 1 | 2 |
| Insecta | | | |
| Corixidae | | | |
| <i>Cenocorixa blaisdelli</i> | | | 2 |
| <i>Corisella inscripta</i> | | 1 | 2 |
| Coleoptera | | | |
| <i>Tropisternus</i> sp. larva | | | 1 |
| Diptera | | | |
| Chironomid larvae | | 1 | |
| Chironomid pupae | | | 1 |
| NUMBER OF SPECIES | 8 | 6 | 8 |

BENTHIC INVERTEBRATE APPENDIX

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

| DATE | 13-Apr-88 | | | | | | 21-Jul-88 | | | | | | 26-Oct-88 | | | | | |
|--------------------------------|-----------|-----|-----|-----|-----|------|-----------|-----|------|-----|-----|-----|-----------|-----|-----|-----|--|--|
| 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-3 | E-4 | E-5 | E-6 | | |
| | | | ns | | ns | | | | | ns | | | | | ns | ns | | |
| Cnidaria | | | | | | | 1 | | | | | | | | | | | |
| unidentified Anthozoa | | | | | | | | | | | | | | | | | | |
| unidentified Pennatulacea* | | | | | | | | | | | | | | | | | | |
| Platyhelminthes | | | | | | | | | | | | | | | | | | |
| unidentified Turbellaria | | | | | | | | | | | | | | | | | | |
| Nematoda | | | | | | | | | | | | | | | | | | |
| unidentified Nematoda | | | | 2 | | | | | | | | | | | | | | |
| Nemertes | | | | | | | | | | | | | | | | | | |
| unidentified Nemertea | 7 | 1 | | | | | | | | | | | 1 | | | | | |
| Annelida | | | | | | | | | | | | | | | | | | |
| Oligochaeta | | 2 | | 36 | | 2115 | | 2 | 112 | | 6 | 1 | 2 | 14 | | | | |
| unidentified Oligochaeta | | | | | | | | | | | | | | | | | | |
| Polychaeta | | | | | | | | | | | | | | | | | | |
| Ameana occidentalis | | | | | | | 1 | | | | | | | | | | | |
| Armandia brevis | | 13 | | | | | 2 | | | | | 2 | 1 | | | | | |
| Axiothella rubrocincta | | | | | | | | | | | | 1 | | | | | | |
| Capitella capitata complex | | 6 | | | | | | | | | | | 5 | | | | | |
| Capitellidae A | | 10 | | | | | | 2 | | | | 2 | 53 | | | | | |
| Capitellidae B | | | | | | | | | | | | | | | | | | |
| Capitellidae, unidentified | | | | | | | 2 | | | | | | | | | | | |
| Chaetozone setosa | | | | | | | 11 | | | | | 3 | | | | | | |
| Chone ecaudata | | | | | | | | | | | | | | | | | | |
| Chone mollis* | | | | | | | | | | | | | | | | | | |
| Cirriformia spirabrancha* | | | | | | | | | | | | | | | | | | |
| Cistenides californiensis | | | | | | | | | | | | 2 | | | | | | |
| Dorvillea rudolphi | | | | | | | | | | | | | 3 | | | | | |
| Eteone nr. californica | | 2 | | | | | | | | | | | | | | | | |
| Euchone limnicola* | | | | | | | | | | | | | | | | | | |
| Eumida spp. | | | | | | | | | | | | 6 | | | | | | |
| Glycinde polygnatha | | 4 | | | | | | | | | | | | | | | | |
| Gyptis brevipalpa* | | | | | | | | | | | | | | | | | | |
| Hemipodus borealis | | | | | | | | | | | | | | | | | | |
| Hesionura spp. | 89 | | | | | | | | | | | | | | | | | |
| Heteromastus filobranchus* | | | | | | | | | | | | | | | | | | |
| Heteromastus sp.* | | 2 | | | | | | | | | | | | | | | | |
| Leitoscoloplos elongatus | | | | | | | | | | | | | | | | | | |
| Lumbrineris spp. | | | | | | | | | | | | | | | | | | |
| Mediomastus californiensis | | 26 | | | | | 5 | 2 | | | | 3 | | | | | | |
| Microphthalmus nr. szcelkowi* | | | | | | | | | | | | | | | | | | |
| Neanthes limnicola | | | | 1 | | | | | | | | | | | | | | |
| Nephtys caecoides | | 9 | | | | | 4 | | | | | | | | | | | |
| Nephtys cornuta franciscana | | | | | | | | | | | | | | | | | | |
| Nephtys spp. juv | | | | | | | | | | | | | | | | | | |
| Nereis sp. | | | | | | | 1 | | | | | | | | | | | |
| Nereidae | | | | | | | | 1 | | | | | | | | | | |
| Notomastus tenuis | | | | | | | | | | | | | | | | | | |
| Owenia collaris | | | | | | | | | | | | | | | | | | |
| Pectinaria californiensis* | | | | | | | | | | | | | | | | | | |
| Phyllodoce hartmanae | | 6 | | | | | | | | | | | | | | | | |
| Platynereis bicanaliculata | | 2 | | | | | | | | | | 4 | | | | | | |
| Polydora bracycephala | | 2 | | | | | | | | | | | | | | | | |
| Polydora ligni | | | | | | | | | | | | | | | | | | |
| Polydora socialis | | 1 | | | | | 1 | | | | | | | | | | | |
| Polydora spp. | | 1 | | | | | | | | | | | | | | | | |
| Pseudopolydora kemp | | 7 | | | | | 4 | 129 | 1 | | | 6 | 317 | | | | | |
| Pseudopolydora paucibranchiata | | 4 | | | | | 72 | | | | | 12 | 1 | | | | | |
| Pygospio elegans | | | | | | | | | | | | | | 60 | | | | |
| Scoloplos sp.* | | | | | | | | | | | | | | | | | | |
| Spiophanes missionensis | | | | | | | | | | | | | | | | | | |
| Streblospio benedicti | | 212 | | 84 | | | 189 | 162 | 1260 | | 2 | 191 | 83 | 487 | | | | |

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

| DATE | 13-Apr-88 | | | | | | 21-Jul-88 | | | | | | 28-Oct-88 | | | | | |
|------------------------------------|-----------|-----|-----|-----|-----|-----|-----------|-----|-----|-----|-----|-----|-----------|-----|-----|-----|--|--|
| 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-3 | E-4 | E-5 | E-6 | | |
| Arthropoda | | | | | | | | | | | | | | | | | | |
| Crustacea | | | | | | | | | | | | | | | | | | |
| Allochrestes angusta | | | | | | | | | | | | | | | | | | |
| Ampelisca abdita | | 4 | | | | | 4 | 1 | | | | 615 | 7 | 142 | | | | |
| Ampithoe valida | | | | | | | | | | | | | | | | | | |
| Ampithoe lacertosa* | | | | | | | | | | | | | | | | | | |
| Ampithoe spp. | | | | | | | 1 | | | | | 1 | | | | | | |
| Anisogammarus confervicolus | | | | | | | | | | | | | | | | | | |
| Anisogammarus spp. | | | | | | | | | | | | | | | | | | |
| Aoroides columbiae* | | | | | | | | | | | | | | | | | | |
| Atylus tridens | | | | | | | 3 | | | | | | | | | | | |
| Caprella californica | | | | | | | | | | | | | | | | | | |
| Corophium spinicorne, incl. juv. | | 368 | | 281 | | 1 | 7 | 196 | 2 | | | 35 | 426 | 1 | | | | |
| Cumella vulgaris | | 14 | | | | | 2 | | | | | 13 | 31 | | | | | |
| Grandidierella japonica | | 1 | | | | | 11 | | | | | 45 | 8 | | | | | |
| Exosphaeroma sp.* | | | | | | | | | | | | | | | | | | |
| Harpacticoid copepoda | | | | | | | | | 2 | | 1 | | | | | | | |
| Hemigrapsis oregonensis | | | | | | | 1 | | | | | | | 1 | | | | |
| Hemigrapsis oregonensis megalopae | | | | | | | | | | | | 1 | | | | | | |
| Hemigrapsis sp. juvenile | | 1 | | | | | | | | | | | | | | | | |
| Heptacarpus paludicola* | | | | | | | | | | | | | | | | | | |
| Idotea resicata | | | | | | | | | | | | | | | | | | |
| Leptochelia dubia* | | | | | | | | | | | | | | | | | | |
| Mysidacea | | | | | | | | | | | | | | | | | | |
| Nebalia pugettensis* | | | | | | | | | | | | | | | | | | |
| Neomysis mercedis | | 1 | | | | | | | | | | | | | | | | |
| Neomysis spp. | | | | | | | | | | | | | | | | | | |
| Ostracoda (?Cylindroleberis spp.) | | | | | | | | 1 | 3 | | | | | | 4 | | | |
| Pagurus sp.* | | | | | | | | | | | | | | | | | | |
| unidentified Amphipoda juveniles | | 1 | | | | | | | | | | | | | | | | |
| unidentified Isopoda* | | | | | | | | | | | | | | | | | | |
| unidentified brachyuran megalopae* | | | | | | | | | | | | | | | | | | |
| Insecta | | | | | | | | | | | | | | | | | | |
| Chironomus sp. larvae | | | | | | 51 | | | | | | | | | | | | |
| Mollusca | | | | | | | | | | | | | | | | | | |
| Axinopsida serricata* | | | | | | | | | | | | | | | | | | |
| Clinocardium nuttalli | | | | | | | 5 | | | | | 1 | | | | | | |
| Composomyx subdiaphana?* | | | | | | | | | | | | | | | | | | |
| Cryptomya californica | | 1 | | | | | | | | | | 2 | | | | | | |
| Lacuna marmorata* | | | | | | | | | | | | | | | | | | |
| Lyonsia californica | | | | | | | | | | | | 1 | | | | | | |
| Macoma bathica | | | | | | | | | | | | | | | | | | |
| Macoma nasuta | | 2 | | | | | | | | | | | | | | | | |
| Macoma yoldiformis* | | | | | | | | | | | | | | | | | | |
| Macoma spp. juv. | | | | | | | 2 | | | | | 18 | 1 | | | | | |
| Mactra spp. | | | | | | | | | | | | | | | | | | |
| Musculista senhousia | | 1 | | | | | | | | | | | | 2 | | | | |
| Mya arenaria* | | | | | | | | | | | | | | | | | | |
| Mysella tumida | | | | | | | | | | | | | | | | | | |
| Mytilus edulis* | | | | | | | | | | | | | | | | | | |
| Mytilus spp. juveniles | | | | | | | | | | | | | | 1 | | | | |
| Odostomia sp.* | | | | | | | | | | | | | | | | | | |
| Protothaca staminea | | | | | | | | | | | | 3 | | | | | | |
| Sphenia fragilis | | | | | | | 3 | | | | | 1 | | | | | | |
| Tellina modesta | | | | | | | | | | | | 1 | | | | | | |
| Tapes japonica | | | | | | | | | | | | 1 | | | | | | |
| unidentified Bivalvia | | 3 | | | | | 2 | | | | | 1 | | | | | | |
| unidentified Gastropoda | | | | | | | 1 | | | | | | | | | | | |
| unidentified Tellinidae | | | | | | | | | | | | | | 1 | | | | |
| Phoronida | | | | | | | | | | | | | | | | | | |
| Phoronis spp. | | | | | | | 20 | | | | | 20 | | | | | | |
| Phoronopsis sp.* | | | | | | | | | | | | | | | | | | |
| Echinodermata | | | | | | | | | | | | | | | | | | |
| unidentified Holothuroidea | | | | | | | | | | | | | | | | | | |

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

| DATE | 20-Jan-89 | | | | | 4-May-89 | | | | | 18-Sep-89 | | | | | | | |
|--------------------------------|-----------|-----|-----|-----|-----|----------|------|-----|------|-----|-----------|-----|------|-----|------|-----|-----|-----|
| STATION NUMBER | E-2 | E-3 | E-4 | E-5 | E-6 | E-2 | E-2A | E-3 | E-3A | E-4 | E-5 | E-2 | E-2A | E-3 | E-3A | E-4 | E-5 | E-6 |
| Cnidaria | | | | | | | | | | | | | | | | | | |
| unidentified Anthozoa | | | | | | | | | | | | | | | | | | |
| unidentified Pennatulacea* | | | | | | | | | | | | | | | | | | |
| Platyhelminthes | | | | | | | | | | | | 2 | 1 | | | | | |
| unidentified Turbellaria | | | | | | | | | | | | | | | | | | |
| Nematoda | | | | | | | | | | | | 3 | | | 11 | | | |
| unidentified Nematoda | | | 2 | | | | | | | | | | | | | | | |
| Nemertea | | | | | | | | | | | | | | | | | | |
| unidentified Nemertea | | | | | | | | | | | | | | | | | | |
| Annelida | | | | | | | | | | | | | | | | | | |
| Oligochaeta | | | | | | | | | | | | | | | | | | |
| unidentified Oligochaeta | 1 | 13 | 24 | 149 | | 3 | 2 | 91 | 10 | 68 | 245 | | | 8 | 375 | 4 | | 4 |
| Polychaeta | | | | | | | | | | | | | | | | | | |
| Ameana occidentalis | 1 | | | | | | | | | | | | | | | | | |
| Armandia brevis | 9 | 2 | | | | 1 | | | | | | 1 | 8 | 1 | | | | |
| Axiothella rubrocincta | 5 | 1 | | | | | | | | | | | | | | | | |
| Capitella capitata complex | 1 | | | | | 1 | | | | | | | 63 | 4 | 229 | | | |
| Capitellidae A | | 167 | | | | | | | | | | | | | 20 | | | |
| Capitellidae B | 2 | | | | | | 4 | 19 | 3 | | | | | | | | | |
| Capitellidae, unidentified | | | | | | | 1 | | | | | | | | | | | |
| Chaetozone setosa | 1 | | | | | | | | | | | 1 | | | | | | |
| Chone ecaudata | 7 | | | | | | | | | | | | | | | | | |
| Chone mollis* | | | | | | | | | | | | | | | | | | |
| Cirriformia spirabrancha* | | | | | | | | | | | | | | | | | | |
| Cistenides californiensis | 10 | | | | | | | | | | | 1 | | | | | | |
| Dorvillea rudolphi | | | | | | | | | | | | | 1 | | 2 | | | |
| Eteone nr. californica | | 6 | | | | | | | | | | | | | | | | |
| Euchone limnicola* | | | | | | | | | | | | | | | | | | |
| Eumida spp. | 1 | | | | | | | | | | | | | | | | | |
| Glycinde polygnatha | 5 | | | | | | | | | | | 7 | | | | | | |
| Gyptis brevipalpa* | | | | | | | | | | | | | | | | | | |
| Hemipodus borealis | | | | | | | 1 | | | | | | | | | | | |
| Hesionura spp. | | | | | | | | | | | | | | | | | | |
| Heteromastus filobranchus* | | | | | | | | | | | | | | | | | | |
| Heteromastus sp.* | | | | | | | | | | | | | | | | | | |
| Leitoscoloplos elongatus | 1 | | | | | | | | | | | | | | | | | |
| Lumbrineris spp. | 1 | | | | | | | | | | | | | | | | | |
| Mediomastus californiensis | 6 | | | | | 9 | 1 | | | | | 5 | 2 | | | | | |
| Microphthalmus nr. sczelkowi* | | | | | | | | | | | | | | | | | | |
| Neanthes limnicola | | | | | | | | | | | | | | | 1 | | | |
| Nephtys caecoides | | | | | | | | | | | | | | | | | | |
| Nephtys comuta franciscana | 1 | | | | | | | | | | | 1 | | | | | | |
| Nephtys spp. juv | | | | | | | | | | | | 1 | | | | | | |
| Nereis sp. | | | | | | | | | | | | | | | | | | |
| Nereidae | | | | | | | | | | | | | | | | | | |
| Notomastus tenuis | 1 | | | | | | | | | | | | | | | | | |
| Owenia collaris | 1 | | | | | | | | | | | | | | | | | |
| Pectinaria californiensis* | | | | | | | | | | | | | | | | | | |
| Phyllodoce hartmanae | 2 | | | | | | | | | | | | | | | | | |
| Platynereis bicanaliculata | 11 | | | | | | | | | | | 1 | | 1 | | | | |
| Polydora bracycephala | | | | | | 1 | | | | | | | | | | | | |
| Polydora ligni | | | | | | | | | | | | | | | | 3 | | |
| Polydora socialis | | | | | | | | | | | | | | | | | | |
| Polydora spp. | | | | | | | | | | | | | | | | | 1 | |
| Pseudopolydora kempi | 2 | 184 | | | | | | | | | | | | 10 | | 11 | | |
| Pseudopolydora paucibranchiata | 2 | 2 | | | | | | | | | | | | | | | | |
| Pygospio elegans | | 103 | | | | | | | | | | | | | 1 | | | |
| Scoloplos sp.* | | | | | | | | | | | | | | | | | | |
| Spiophanes missionensis | 1 | | | | | | | | | | | | | | | | | |
| Streblospio benedicti | 326 | 174 | 634 | 998 | | 4 | 105 | | | 37 | | 10 | 372 | 42 | 147 | 118 | 3 | |

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

| DATE | 20-Jan-89 | | | | | 4-May-89 | | | | | 18-Sep-89 | | | | | | | |
|------------------------------------|-----------|-----|-----|-----|-----|----------|------|------|------|-----|-----------|-----|------|-----|------|-----|-----|-----|
| STATION NUMBER | E-2 | E-3 | E-4 | E-5 | E-6 | E-2 | E-2A | E-3 | E-3A | E-4 | E-5 | E-2 | E-2A | E-3 | E-3A | E-4 | E-5 | E-6 |
| Arthropoda | | | | | | | | | | | | | | | | | | |
| Crustacea | | | | | | | | | | | | | | | | | | |
| Allochrestes angusta | | | | | | | | | | | | | | 2 | | | | |
| Ampelisca abdita | 1801 | 2 | 16 | | | 37 | 7 | 1 | | | | 5 | | | 1 | | | |
| Ampithoe valida | | | | | | | | | | | | | 2 | 3 | | | | |
| Ampithoe lacertosa* | | | | | | | | | | | | | | | | | | |
| Ampithoe spp. | | | | | | | 2 | | | | | 2 | 3 | 4 | | | | |
| Anisogammarus confervicolus | | | | | | | 2 | 2 | 1 | | | | 5 | 8 | | | 1 | |
| Anisogammarus spp. | | | | | | 4 | 4 | 15 | 1 | | | | 2 | 9 | | | | |
| Aoroides columbiae* | | | | | | | | | | | | | | | | | | |
| Atylus tridens | | | | | | | | | | | | | | | | | | |
| 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 | | | 9 | 16 | 9 | 8 | | | |
| Exosphaeroma sp.* | | | | | | | | | | | | | | | | | | |
| Harpacticoid copepoda | | | | | | | | | | | | | | | 1 | | | |
| Hemigrapsis oregonensis | | | 2 | | | 1 | | 5 | | | | | | | | | | |
| Hemigrapsis oregonensis megalopae | | | | | | | | | | | | | | 1 | | | | |
| Hemigrapsis sp. juvenile | | | | | | | | | | | | | | | | | | |
| Heptacarpus paludicola* | | | | | | | | | | | | 2 | 1 | | | | | |
| Idotea resicata | | | | | | | | | | | | | | | | | | |
| Leptochelia dubia* | | | | | | | | | | 1 | | | | | | | | |
| Mysidacea | | | | | | | | | | | | | | | | | | |
| Nebalia pugettensis* | | | | | | | | | | | | | | | | | | |
| Neomysis mercedis | | | | | | | | | | | | | | | | | | |
| Neomysis spp. | | | | | | | | | | | 2 | | | | | | | |
| Ostracoda (?Cylindroleberis spp.) | | | | | | | | 299 | | | 1 | | | | 197 | | | |
| Pagurus sp.* | | | | | | | | | | | | | | | | | | |
| unidentified Amphipoda juveniles | | | | | | | | | | | | | | | | | | |
| unidentified Isopoda* | | | | | | | | | | | | | | | | | | |
| unidentified brachyuran megalopae* | | | | | | | | | | | | | | | | | | |
| Insecta | | | | | | | | | | | | | | | | | | |
| Chironomus sp. larvae | | | | | | | | | | | | | | | | | | |
| Mollusca | | | | | | | | | | | | | | | | | | |
| Axinopsida semicata* | | | | | | | | | | | | | | | | | | |
| Clinocardium nuttalli | | | | | | | | | | | | | | | | | | |
| Composomyx subdiaphana?* | | | | | | | | | | | | | | | | | | |
| Cryptomya californica | 3 | | | | | | | | | | | | | | | | | |
| Lacuna mamorata* | | | | | | | | | | | | | | | | | | |
| Lyonsia californica | 2 | | | | | | | | | | | | | | | | | |
| Macoma bathica | 3 | | | | | | 1 | | | | | | | | | | | |
| Macoma nasuta | 5 | | | | | 3 | | | | | | | | | | | | |
| Macoma yoldiformis* | | | | | | | | | | | | | | | | | | |
| Macoma spp. juv. | 4 | | | | | | | | | | | 41 | 5 | | 1 | | | |
| Macra spp. | 1 | | | | | | | | | | | | | | | | | |
| Musculista senhousia | 1 | 1 | | | | | | | | | | | | | | | | |
| Mya arenaria* | | | | | | | | | | | | | | | | | | |
| Mysella tumida | | | | | | | | | | | | 1 | | | | | | |
| Mytilus edulis* | | | | | | | | | | | | | | | | | | |
| Mytilus spp. juveniles | 1 | | | | | 2 | | | | | | 2 | | | | | | |
| Odostomia sp.* | | | | | | | | | | | | | | | | | | |
| Protothaca staminea | 6 | | | | | | | | | | | 3 | | | | | | |
| Sphenia fragilis | | | | | | | | | | | | | | | | | | |
| Tellina modesta | 8 | | | | | 1 | | | | | | 6 | | | | | | |
| Tapes japonica | 1 | | | | | 1 | | | | | | | | | | | | |
| unidentified Bivalvia | 1 | | | | | | | | | | | | | | | | | |
| unidentified Gastropoda | | | | | | | | | | | | | | | | | | |
| unidentified Tellinidae | 1 | | | | | | | | | | | | | | | | | |
| Phoronida | | | | | | | | | | | | | | | | | | |
| Phoronis spp. | 1 | | | | | 1 | | | | | | | | | | | | |
| Phoronopsis sp.* | | | | | | | | | | | | | | | | | | |
| Echinodermata | | | | | | | | | | | | | | | | | | |
| unidentified Holothuroidea | 1 | | | | | | | | | | | | | | | | | |

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

| DATE | 8-Feb-90 | | | | | | 25-May-90 | | | | | | 19-Sep-90 | | | | | | | |
|--------------------------------|----------|------|-----|------|-----|-----|-----------|------|-----|------|-----|-----|-----------|-----|------|------|-----|------|-----|-----|
| | E-2 | E-2A | E-3 | E-3A | E-4 | E-5 | E-2 | 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 |
| Cnidaria | | | | | | | | | | | | | | | | | | | | |
| unidentified Anthozoa | | | | | | | 8 | | | | | | | | | | | | | |
| unidentified Pennatulacea* | | | | | | | | | | | | | | | | 1 | | | | |
| Platyhelminthes | | | | | | | | | | | | | | | | | | | | |
| unidentified Turbellaria | | | | | | | | | | | | | | | | | | | | |
| Nematoda | | | | | | | | | | | | | | | | | | | | |
| unidentified Nematoda | | | | | | 5 | | | | | 1 | | | 4 | | | | | | |
| Nemertea | | | | | | | | | | | | | | | | | | | | |
| unidentified Nemertea | 2 | 1 | | | | | 1 | 1 | | 1 | | | | 2 | | 1 | | | | |
| Annelida | | | | | | | | | | | | | | | | | | | | |
| Oligochaeta | | | | | | | | | | | | | | | | | | | | |
| unidentified Oligochaeta | | 1 | 40 | 25 | 54 | 478 | | 2 | 2 | 34 | 84 | 188 | | | 1 | | 9 | 2 | 10 | 33 |
| Polychaeta | | | | | | | | | | | | | | | | | | | | |
| Ameana occidentalis | | | | | | | | | | | | | | 16 | | 9 | | | | |
| Armandia brevis | 1 | 2 | | | | | 1 | | | | | | | 8 | | | | | | |
| Axiothella rubrocincta | 20 | 5 | | | | | 5 | 3 | | | | | | | | | 1 | | | |
| Capitella capitata complex | | | | | | | | | 2 | | | | | | | | | | | |
| Capitellidae A | | | | | | | | | | | | | | | | | | | | |
| Capitellidae B | | | | | | | | 12 | | | | | | | 2 | | | | | |
| Capitellidae, unidentified | | | | | | | | | | | | | | | | | | | | |
| Chaetozone setosa | 5 | | | | | | 8 | | | | | | | | | | | | | |
| Chone ecaudata | | | | | | | 9 | | | | | | | | | | | | | |
| Chone mollis* | | | | | | | | | | | | | | 52 | | | | | | |
| Cirriformia spirabranchia* | | | | | | | | 1 | | | | | | | | | | | | |
| Cistenides californiensis | 1 | | | | | | | | | | | | | | | | | | | |
| Dorvillea rudolphi | 4 | | | | | | | 1 | | | | | | 2 | | | | | | |
| Eteone nr. californica | | | | | 1 | | 3 | | | 1 | | | | | 4 | 1 | | | | |
| Euchone limnicola* | | | | | | | | | | | | | | 6 | | | | | | |
| Eumida spp. | | | | | | | | | | | | | | | | | | | | |
| Glycinde polygnatha | 1 | 5 | | | | | 2 | 3 | | | | | | 4 | | 1 | | | | |
| Gyptis brevipalpa* | 1 | | | | | | | | | | | | | | | | | | | |
| Hemipodus borealis | | | | | | | | | | | | | | | | | | | | |
| Hesionura spp. | | | | | | | | | | | | | | | | | | | | |
| Heteromastus filobranchus* | | | | | | | | | | | | | | 2 | | | | | | |
| Heteromastus sp.* | | | 1 | | | | | | | | | | | | | | 1 | | | |
| Leitoscoloplos elongatus | | | | | | | 7 | | | | | | | | | | | | | |
| Lumbrineris spp. | | | | | | | | | | | | | | | | | | | | |
| Mediomastus californiensis | 105 | 9 | | 1 | | | 263 | 28 | 4 | 1 | | | 1 | 46 | | 5 | | 15 | | |
| Microphthalmus nr. sczelkowi* | | | | | | | 1 | | | | | | | | | | | | | |
| Neanthes limnicola | | | | | | | | | | | | | | 3 | 1 | 3 | 6 | | | |
| Nephtys caecoides | | | | | | | | | | | | | | | | | | | | |
| Nephtys cornuta franciscana | 3 | | | | | | 3 | | | | | | | | | | | | | |
| Nephtys spp. juv | 1 | | | | | | | | | | | | | | | | | | | |
| Nereis sp. | 1 | | | | | | | | | | 1 | 1 | | 2 | | | | | | |
| Nereidae | | | | | 1 | 1 | | | | | | | | | | | | | | |
| Notomastus tenuis | | | | | | | | | | | | | | 2 | | | | | | |
| Owenia collaris | 2 | | | | | | 3 | | | | | | | 2 | | | | | | |
| Pectinaria californiensis* | | | | | | | | | | | | | | 1 | | | | | | |
| Phyllodoce hartmanae | | | | | | | | | | | | | | 2 | | | | | | |
| Platynereis bicanaliculata | | | | | | | | | | | | | | | | 3 | | | | |
| Polydora bracycephala | | | | | | | | | | | | | | | | | | | | |
| Polydora ligni | | | | | | | | | | | | | | | | | | | | |
| Polydora socialis | | | | | | | | | | | | | | 2 | | | | | | |
| Polydora spp. | | | | | | | | | | | | | | | | | | | | |
| Pseudopolydora kempii | | | | 4 | | | 2 | 2 | 20 | 23 | 1 | | | | 20 | 19 | 10 | 1 | 2 | |
| Pseudopolydora paucibranchiata | | | | | | | 22 | 1 | | | | | | 6 | 1 | 1 | | | | |
| Pygospio elegans | | | 2 | 15 | | | | 47 | | 2 | | | | | | 2 | | | | |
| Scoloplos sp.* | 2 | | | | | | | | | | | | | | | | | | | |
| Spiophanes missionensis | | | | | | | | 1 | | | | | | | | 1 | | | | |
| Streblospio benedicti | 10 | 51 | 26 | 123 | 927 | 995 | 57 | 9 | 43 | 81 | 251 | 75 | 1 | 34 | 134 | 121 | 56 | 47 | 454 | 602 |

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

| DATE | 8-Feb-90 | | | | | | 25-May-90 | | | | | | 19-Sep-90 | | | | | | | |
|------------------------------------|----------|------|-----|------|-----|-----|-----------|------|-----|------|-----|-----|-----------|------|------|------|-----|------|-----|-----|
| STATION NUMBER | E-2 | E-2A | E-3 | E-3A | E-4 | E-5 | E-2 | 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 |
| Arthropoda | | | | | | | | | | | | | | | | | | | | |
| Crustacea | | | | | | | | | | | | | | | | | | | | |
| Allochroetes angusta | | | 1 | 1 | | | | | | | | | | | | 74 | | | | |
| Ampelisca abdita | 3 | 1 | | | | | 28 | 18 | 14 | 9 | | | | 1092 | | | 2 | 1 | | |
| Ampithoe valida | | | | | | | | | | 1 | | | | | | | | | | |
| Ampithoe lacertosa* | | | | | | | | | | | | | | | | 153 | | | | |
| Ampithoe spp. | | | | | | | | | | | | | | | | | | | | |
| Anisogammarus confervicolus | | | | | | 2 | | | 1 | | | | | | | | | | | |
| Anisogammarus spp. | | | 4 | | 1 | | | | 4 | | | 1 | | | | | | | | |
| Aoroides columbiae* | | 1 | | | | | | | | | | | | | | | | | | |
| Atylus tridens | | | | | | | | | | | | | | | | | | | | |
| Caprella californica | | | | | | | | | | | | | | | | | | | | |
| Corophium spinicorne, incl. juv. | | 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 | | | |
| Grandierella japonica | 1 | 3 | 39 | 10 | | | 3 | 18 | 55 | 28 | | | | 26 | 14 | 37 | | 2 | | |
| Exosphaeroma sp.* | | | | 1 | | | | | | | | | | | | | | | | |
| Harpacticoid copepoda | | | | | | | | | | | 1 | 2 | | | | | | | | |
| Hemigrapsis oregonensis | | 1 | | | | | | | | | | | | | 2 | 42 | | 7 | | |
| Hemigrapsis oregonensis megalopae | | | | | | | | | 1 | | | | | 2 | | | | | | |
| Hemigrapsis sp. juvenile | | | | | | | | | | | | | | | | 1 | | | | |
| Heptacarpus paludicola* | | | | | | | | | | | | | | | | | | | | |
| Idotea resicata | | | | | | | 1 | | | | | | | | | | | | | |
| Leptochelia dubia* | | | | | | | | | | | | | | | | | | | | |
| Mysidacea | | | | | | | | | | | | | | 2 | | 122 | | | | |
| Nebalia pugettensis* | | | | | | | | | | | | | | | | | | | | |
| Neomysis mercedis | | | | | | | | | | | | | | | | | | | | |
| Neomysis spp. | | | | | | | | | | | 2 | 1 | | | | | | | | |
| Ostracoda (?Cylindroleberis spp.) | | 2 | | 5 | 1 | | 5 | | 31 | 9 | | | | | | 1 | | 1 | 4 | 1 |
| Pagurus sp.* | | | | | | | | | | | | | | | | 2 | | | | |
| unidentified Amphipoda juveniles | | | | | | | | | | | | | | | | | | | | |
| unidentified Isopoda* | | | | | | | | | 1 | | | | | | | | | | | |
| unidentified brachyuran megalopae* | | | | | | | | | | | | | | | | 1 | | | | |
| Insecta | | | | | | | | | | | | | | | | | | | | |
| Chironomus sp. larvae | | | | | | | | | | | | | | 2 | | | | | | |
| Mollusca | | | | | | | | | | | | | | | | | | | | |
| Axinopsida serricata* | | | | | | | | | | | | | | | | | | | | |
| Clinocardium nuttalli | 1 | | | | | | | | | | | | | | | | | | | |
| Composomyx subdiaphana?* | 1 | | | | | | | | | | | | | | | | | | | |
| Cryptomya californica | | | | | | | | | | | | | | 2 | | | | | | |
| Lacuna marmorata* | | | | | | | | | | | | | | | | 8 | | | | |
| Lyonsia californica | | 1 | | | | | | | | | | | | 2 | | | | | | |
| Macoma balthica | | | | | | | | | | | | | | 2 | | | | | | |
| Macoma nasuta | 2 | | | | | | | 1 | | | | | | 2 | | | | 1 | | |
| Macoma yoldiformis* | | | | | | | | | | | | | | 2 | | | | | | |
| Macoma spp. juv. | 47 | 5 | | 3 | | | 15 | | | | | | 2 | | 1 | 2 | | | | |
| Macra spp. | | | | | | | | | | | | | | | | | | | | |
| Musculista senhousia | 1 | | | | | | 1 | | | | | | | | | | | | | |
| Mya arenaria* | | | | | | | | | | | | | | | 1 | | | | | |
| Mysetia tumida | 2 | | | | | | 1 | | | | | | | 6 | | | | | | |
| Mytilus edulis* | | | | | | | | | 1 | | | | | | | | | | | |
| Mytilus spp. juveniles | | 2 | | | | | 7 | | | | | | 1 | 6 | | | | | | |
| Odostomia sp.* | 2 | 1 | | | | | | | | | | | | | | | | | | |
| Protothaca staminea | 14 | 2 | | | | | 9 | 1 | | | | | | 10 | | 4 | | | | |
| Sphenia fragilis | | | | | | | | | | | | | | | | | | | | |
| Tellina modesta | 2 | | | | | | 5 | | | | | | | | | | | | | |
| Tapes japonica | 1 | | | | | | | | | | | | | | | | | | | |
| unidentified Bivalvia | | | | | | | | | | | | | | | | | | | | |
| unidentified Gastropoda | | | | | | | | | | | | | | | | | | | | |
| unidentified Tellinidae | 2 | | | | | | 4 | | | | | | | | | | | | | |
| Phoronida | | | | | | | | | | | | | | | | | | | | |
| Phoronis spp. | 2 | | | | | | | | | | | | | 10 | | | | | | |
| Phoronopsis sp.* | | | | | | | | | | | | | 17 | 4 | | 5 | | | | |
| Echinodermata | | | | | | | | | | | | | | | | | | | | |
| unidentified Holothuroidea | | | | | | | | | | | | | | | | | | | | |

Appendix B2. Benthic invertebrates collected in Estero de San Antonio
 PONAR grabs, 1990. (numbers per grab; to obtain no./ m², multiply by 43.3)

| DATE | 8-Feb-90 | | | 25-May-90 | | | 19-Sep-90 | | |
|---|----------|-----|-----|-----------|-----|-----|-----------|-----|-----|
| STATION NUMBER | S-2 | S-4 | S-6 | S-2 | S-4 | S-6 | S-2 | S-4 | S-6 |
| Nematoda | 1 | 2 | 2 | | 2 | | 7 | 5 | |
| Nemertea | | | | | | | 7 | | |
| Annelida | | | | | | | | | |
| Oligochaeta | 2 | 189 | 11 | 161 | 165 | 1 | 394 | 883 | |
| Polychaeta | | | | | | | | | |
| <i>Capitella capitata</i> complex | 8 | 11 | | 173 | 8 | 1 | | | |
| <i>Cirriformia spirabrancha</i> | 2 | | | | | | | | |
| <i>Dorvillea rudolphi</i> | | 1 | | | | | | | |
| <i>Glycinde polygnatha</i> | 1 | | | | | | | | |
| <i>Polydora ligni</i> | | | | 5 | | | | 124 | |
| <i>Pseudopolydora paucibranchiata</i> | | | | | 1 | | | | |
| <i>Streblospio benedicti</i> | 31 | 143 | 3 | 104 | 136 | | 284 | 141 | |
| <i>Eumida</i> sp. | 1 | | | | | | | | |
| Mysidacea (mysids) | | | | | | | | | |
| <i>Neomysis mercedis</i> , incl. juv. | | | | 3 | | | | | |
| Amphipoda (amphipods) | | | | | | | | | |
| <i>Anisogammarus confervicolus</i> , incl. juv. | | | | 60 | 27 | | 44 | 55 | |
| <i>Corophium spinicorne</i> , incl. juv. | | | | 328 | 158 | 2 | 447 | 906 | 14 |
| <i>Grandidierella japonica</i> | | | | | | 1 | | | |
| Isopoda (isopods) | | | | | | | | | |
| <i>Gnornosphæroma ?luteum</i> , incl. juv. | | | | | | | 42 | 56 | 3 |
| Harpacticoida | | | | | | | | 5 | |
| Ostracoda | 1 | 17 | 46 | | 8 | | 45 | 7 | 31 |
| Insecta | | | | | | | | | |
| Diptera | | | | | | | | | |
| <i>Aedes</i> sp. larvae | | | 1 | | | | | | |
| Chironomid larvae | | | | | | | 1 | 2 | |
| Mollusca | | | | | | | | | |
| <i>Mya arenaria</i> | 1 | | | 1 | | | 20 | | |
| <i>Margarites</i> sp. | 1 | | | | | | | | |

FISH APPENDIX

Appendix F1. Otter Trawl Sampling Effort (Minutes) Estero Americano, November 1989 - September 1990.

| DATE | Station | | | | |
|-----------|---------|-----|-----|-----|-----|
| | 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.

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

Appendix F3. Total Catch in Otter Trawls at Estero Americano Stations, November 1989 - September 1990.

| Species | Station | | | | | Total | % of Total |
|------------------------|---------|-----|-----|------|------|-------|------------|
| | E-1 | E-2 | E-3 | E-4 | E-5 | | |
| 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 |
| Cabazon | 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 | | 1 | | | 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 | 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.

| Date | Station | | | | | Total |
|-----------|---------|-----|-----|------|------|-------|
| | E-1 | E-2 | E-3 | E-4 | E-5 | |
| 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.

| Species | Station | | | | | Total | % of |
|------------------|---------|-----|-----|-----|-----|-------|-------|
| | E-1 | E-2 | E-3 | E-4 | E-5 | | Total |
| Topsmelt | 89 | 7 | 35 | 86 | 98 | 315 | 54.03 |
| Jacksmelt | 37 | 49 | 3 | | | 89 | 15.27 |
| Shiner surfperch | 8 | 9 | 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.

| | Station | | | | | |
|-----------|---------|-----|-----|-----|-----|-------|
| | 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 | | 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 |

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

| Station | Date | Tow Length | Name | Total Catch | CPE | Fork Length (mm) | | Weight (g) | |
|---------|-----------|------------|------------------|-------------|-----|------------------|------|------------|-----|
| | | | | | | mean | SD | mean | SD |
| 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 | Staghorn 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 | |
| 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 | | |
| 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 | |
| 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 |
| 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 |
| E-2 | 8 Mar 90 | 4 | English sole | 4 | 1.0 | 45.0 | | 1.1 | |
| E-2 | 8 Mar 90 | 4 | Staghorn sculpin | 1 | 0.3 | 50.0 | 12.3 | 1.0 | 0.8 |
| E-2 | 4 Apr 90 | 4 | Cabezon | 1 | 0.3 | 42.0 | | 1.5 | |
| E-2 | 4 Apr 90 | 4 | English sole | 5 | 1.3 | 49.0 | 0.9 | 1.5 | 0.9 |
| E-2 | 4 Apr 90 | 4 | Staghorn sculpin | 8 | 2.0 | 58.3 | 12.2 | 2.5 | 1.5 |

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

| Station | Date | Tow Length | Name | Total Catch | CPE | Fork Length (mm) | | Weight (g) | |
|---------|-----------|------------|------------------------|-------------|------|------------------|------|------------|-----|
| | | | | | | 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 | Staghorn 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 | Staghorn 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 | |
| E-2 | 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 | | 0.3 | |
| E-3 | 27 Nov 89 | 4 | Surf Smelt | 2 | 0.5 | 116.0 | 7.1 | 12.5 | 3.2 |
| 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 |
| E-3 | 8 Mar 90 | 4 | Arrow goby | 2 | 0.5 | 27.5 | 2.1 | 0.2 | 0.1 |
| E-3 | 8 Mar 90 | 4 | Osmeridae | 4 | 1.0 | | | | |
| E-3 | 8 Mar 90 | 4 | Shiner surfperch | 1 | 0.3 | 106.0 | | 17.6 | |
| E-3 | 8 Mar 90 | 4 | Staghorn sculpin | 27 | 6.8 | 31.5 | 7.8 | 0.4 | 0.3 |
| E-3 | 8 Mar 90 | 4 | Starry flounder | 1 | 0.3 | 295.0 | | 400.0 | |
| E-3 | 8 Mar 90 | 4 | Surfsmelt | 16 | 4.0 | 46.3 | 3.0 | 0.5 | 0.1 |
| E-3 | 4 Apr 90 | 4 | English sole | 1 | 0.3 | 56.0 | | 2.0 | |
| E-3 | 4 Apr 90 | 4 | Goby larvae | 2 | 0.5 | 22.0 | | | |
| E-3 | 4 Apr 90 | 4 | Pacific herring | 5 | 1.3 | 36.7 | | | |
| E-3 | 4 Apr 90 | 4 | Staghorn sculpin | 5 | 1.3 | 48.0 | 15.3 | 1.6 | 1.7 |
| E-3 | 4 Apr 90 | 4 | Surfsmelt | 3 | 0.8 | 53.7 | 3.8 | | |
| E-3 | 24 May 90 | 2.67 | Arrow goby | 2 | 0.7 | 54.0 | 0.0 | | |
| E-3 | 24 May 90 | 2.67 | Bay pipefish | 1 | 0.4 | 210.0 | | 3.8 | |
| E-3 | 24 May 90 | 2.67 | Cheekspot goby | 1 | 0.4 | 35.0 | | 0.3 | |
| E-3 | 24 May 90 | 2.67 | Staghorn sculpin | 12 | 4.5 | 82.4 | 16.2 | 7.0 | 4.9 |
| E-3 | 24 May 90 | 2.67 | Threespine stickleback | 9 | 3.4 | 36.2 | 10.6 | 0.6 | 0.5 |
| E-3 | 24 Jun 90 | 4 | Crevice kelpfish | 1 | 0.3 | 35.0 | | | |
| E-3 | 24 Jun 90 | 4 | Northern anchovy | 7 | 1.8 | 41.7 | 4.5 | | |
| E-3 | 24 Jun 90 | 4 | Pacific herring | 2 | 0.5 | 45.0 | | | |
| E-3 | 24 Jun 90 | 4 | Shiner surfperch | 17 | 4.3 | 72.3 | 25.0 | | |
| E-3 | 24 Jun 90 | 4 | Staghorn sculpin | 4 | 1.0 | 89.0 | 10.2 | | |

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

| Station | Date | Tow Length | Name | Total Catch | CPE | Fork Length (mm) | | Weight (g) | |
|---------|-----------|------------|------------------------|-------------|-------|------------------|------|------------|------|
| | | | | | | 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 | Arrow 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 | |
| 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 | Staghorn 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 |
| E-4 | 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 | | | |
| E-4 | 25 Jul 90 | 4 | Arrow goby | 135 | 33.8 | 25.1 | 4.6 | | |
| 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 | | |
| E-4 | 25 Jul 90 | 4 | Shiner surfperch | 1 | 0.3 | 103.0 | | 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 | | |
| E-4 | 17 Sep 90 | 4 | Northern anchovy | 4 | 1.0 | 49.0 | 1.4 | | |
| E-4 | 17 Sep 90 | 4 | Plainfin midshipman | 2320 | 580.0 | 38.6 | 6.7 | | |
| E-4 | 17 Sep 90 | 4 | 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

| Station | Date | Tow Length | Name | Total Catch | CPE | Fork Length (mm) | | Weight (g) | |
|---------|-----------|------------|------------------------|-------------|-------|------------------|------|------------|------|
| | | | | | | mean | SD | mean | SD |
| 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 | | |
| 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 | | | |
| 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 | | |
| E-5 | 26 Jul 90 | 2 | Threespine stickleback | 14 | 7.0 | 41.9 | 7.7 | 0.9 | 0.5 |
| E-5 | 26 Jul 90 | 2 | Topsmelt | 88 | 44.0 | 57.6 | 11.1 | | |
| E-5 | 17 Sep 90 | 2 | Arrow goby | 43 | 21.5 | 21.3 | 4.0 | | |
| 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 F8. Summary of Fish Catch Data in Estero Americano 24-hour Gillnet Sets, November 1989 -
September 1990

| Station | Date | Name | Total
Catch | Fork Length (mm) | | Weight (g) | |
|---------|-----------|------------------|----------------|------------------|------|------------|------|
| | | | | mean | SD | mean | SD |
| E-1 | 28 Nov 89 | Staghorn sculpin | 1 | 155.0 | | 42.3 | |
| E-1 | 28 Nov 89 | Topsmelt | 9 | 123.7 | 31.5 | 27.6 | 18.1 |
| E-1 | 7 Feb 90 | Buffalo sculpin | 1 | 290.0 | | 530.0 | |
| 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 | |
| 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 | | 90.4 | |
| E-1 | 5 Apr 90 | Shiner surfperch | 1 | 138.0 | | | |
| E-1 | 24 May 90 | Jacksmelt | 3 | 201.0 | 5.0 | 78.9 | 8.2 |
| E-1 | 24 May 90 | Opaleye | 1 | 305.0 | | 774.7 | |
| E-1 | 24 May 90 | 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 |
| E-1 | 24 May 90 | Surfsmelt | 1 | 155.0 | | 24.5 | |
| E-1 | 24 May 90 | Topsmelt | 76 | 192.9 | 23.5 | 64.2 | 19.8 |
| E-1 | 24 May 90 | White surfperch | 1 | 112.0 | | 20.0 | |
| E-1 | 25 Jun 90 | Jacksmelt | 15 | 225.8 | 23.6 | 88.8 | 40.4 |
| E-1 | 25 Jun 90 | Opaleye | 1 | 310.0 | | | |
| E-1 | 25 Jun 90 | Pacific herring | 3 | 176.0 | 13.9 | 68.0 | 21.1 |
| E-1 | 25 Jun 90 | Pile surfperch | 1 | 128.0 | | | |
| E-1 | 25 Jun 90 | Shiner surfperch | 1 | 109.0 | | 24.4 | |
| E-1 | 25 Jun 90 | Spiny dogfish | 2 | 670.0 | 0.0 | 975.0 | 35.4 |
| E-1 | 25 Jun 90 | Staghorn sculpin | 24 | 106.3 | | | |
| E-1 | 25 Jun 90 | Topsmelt | 4 | 198.0 | 7.8 | | |
| E-1 | 26 Jul 90 | Black surfperch | 1 | 293.0 | | 652.0 | |
| E-1 | 26 Jul 90 | Kelp surfperch | 1 | 71.0 | | 6.0 | |
| E-1 | 18 Sep 90 | Jacksmelt | 1 | 292.0 | | 216.2 | |
| E-1 | 18 Sep 90 | Pacific sanddab | 1 | 79.0 | | 6.8 | |
| E-1 | 18 Sep 90 | Shiner surfperch | 1 | 109.0 | | | |
| E-1 | 18 Sep 90 | Staghorn sculpin | 1 | 152.0 | | 38.6 | |
| E-2 | 28 Nov 89 | Staghorn sculpin | 7 | 159.1 | 8.8 | 52.9 | 11.8 |
| E-2 | 28 Nov 89 | Steelhead | 1 | 420.0 | | 880.0 | |
| E-2 | 28 Nov 89 | Topsmelt | 1 | 197.0 | | 77.3 | |
| E-2 | 7 Feb 90 | Pacific herring | 1 | 171.0 | | | |
| E-2 | 7 Feb 90 | Staghorn sculpin | 1 | 177.0 | | | |
| E-2 | 9 Mar 90 | Jacksmelt | 15 | 248.7 | 19.9 | 127.7 | 30.2 |
| E-2 | 9 Mar 90 | Pacific herring | 2 | 155.0 | | 48.4 | |
| E-2 | 9 Mar 90 | Steelhead | 1 | 583.0 | | 2106.0 | |
| 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

| Station | Date | Name | Total
Catch | Fork Length (mm) | | Weight (g) | |
|---------|-----------|---------------------|----------------|------------------|-------|------------|--------|
| | | | | mean | SD | mean | SD |
| E-2 | 5 Apr 90 | Jacksmelt | 28 | 238.3 | 17.8 | 109.4 | 31.0 |
| E-2 | 5 Apr 90 | Opaleye | 1 | ~220 | | | |
| 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 | | | |
| E-2 | 26 Jul 90 | Staghorn sculpin | 2 | 141.0 | | | |
| E-2 | 18 Sep 90 | Leopard shark | 7 | 604.3 | 136.2 | 1766.7 | 1050.4 |
| 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 | 28 Nov 89 | no catch | | | | | |
| E-3 | 7 Feb 90 | no catch | | | | | |
| E-3 | 9 Mar 90 | Surfsmelt | 1 | | | | |
| E-3 | 9 Mar 90 | Topsmelt | 1 | | | | |
| E-3 | 5 Apr 90 | English sole | 1 | 300.0 | | | |
| 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 |
| 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 | 5.7 | 50.1 | 10.9 |
| E-3 | 24 May 90 | Topsmelt | 22 | 200.0 | | | |
| E-3 | 25 Jun 90 | Plainfin midshipman | 1 | 140.0 | | 34.2 | |
| E-3 | 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 |

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

| Station | Date | Name | Total Catch | Fork Length (mm) | | Weight (g) | |
|---------|-----------|------------------|-------------|------------------|------|------------|------|
| | | | | mean | SD | mean | SD |
| 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 | |
| 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 | Staghorn sculpin | 1 | 96.0 | | 9.4 | |
| E-4 | 24 May 90 | Striped bass | 1 | 306.0 | | 344.1 | |
| E-4 | 24 May 90 | Topsmelt | 30 | 180.0 | 30.5 | 60.2 | 26.1 |
| 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 | | 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 | 94.0 | 7.7 | 8.3 | 1.3 |
| E-5 | 24 May 90 | Topsmelt | 58 | 158.7 | 32.3 | 38.6 | 26.1 |
| E-5 | 25 Jun 90 | Topsmelt | 40 | 139.9 | 25.1 | | |
| E-5 | 26 Jul 90 | no catch | | | | | |
| E-5 | 18 Sep 90 | Staghorn sculpin | 1 | 127.0 | | | |

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

| Date | Station | | |
|-----------|---------|-----|-----|
| | S-2 | 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

| 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

| Species | Station | | | Total | % of Total |
|------------------------|---------|-----|-----|-------|------------|
| | S-2 | S-4 | S-6 | | |
| 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 | | | Total |
|-----------|---------|-----|-----|-------|
| | S-2 | S-4 | S-6 | |
| 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 |
|-------|-----|-----|------|------|

Appendix F13. Total Catch in Gillnets at Estero de San Antonio Stations, February - September 1990

| Species | Station | | | Total | % of Total |
|------------------|---------|-----|-----|-------|------------|
| | S-2 | S-4 | S-6 | | |
| 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

| | Station | | | Total |
|-----------|---------|-----|-----|-------|
| | S-2 | S-4 | S-6 | |
| 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 |

Appendix F15. Summary of Fish Catch Data in Estero de San Antonio Otter Trawls, February - September 1990

| Station | Date | Tow Length | Name | Total Catch | CPE | Fork Length (mm) | | Weight (g) | |
|---------|-----------|------------|------------------------|-------------|------|------------------|------|------------|------|
| | | | | | | 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 |
| S-2 | 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 | | | |
| S-2 | 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 | |
| S-2 | 18 Sep 90 | 2 | Staghorn sculpin | 3 | 1.5 | 72.7 | 58.7 | | |
| S-2 | 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 | | | | |
| S-4 | 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 | | |
| S-4 | 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 | 26 Jul 90 | 2 | Staghorn Sculpin | 22 | 11.0 | 132.6 | 12.5 | | |
| S-4 | 26 Jul 90 | 2 | Threespine stickleback | 16 | 8.0 | 39.8 | 11.1 | 1.0 | 8.0 |
| S-4 | 26 Jul 90 | 2 | Tidewater goby | 1 | 0.5 | 44.0 | | 0.8 | |

Appendix F15. Summary of Fish Catch Data in Estero de San Antonio Otter Trawls, February - September 1990

| Station | Date | Tow Length | Name | Total Catch | CPE | Fork Length (mm) | | Weight (g) | |
|---------|-----------|------------|------------------------|-------------|-------|------------------|-----|------------|-----|
| | | | | | | 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 |
| S-6 | 7 Feb 90 | 1.28 | Staghorn sculpin | 1 | 0.8 | 29.0 | | 0.2 | |
| S-6 | 7 Feb 90 | 1.28 | Tidewater Goby | 3 | 2.3 | 39.7 | 9.9 | 0.6 | 0.4 |
| S-6 | 9 Mar 90 | 2 | Prickly sculpin | 1 | 0.5 | 100.0 | | 13.2 | |
| S-6 | 9 Mar 90 | 2 | Staghorn sculpin | 18 | 9.0 | 49.7 | 9.0 | 1.6 | |
| S-6 | 9 Mar 90 | 2 | Threespine stickleback | 10 | 5.0 | 41.7 | 7.6 | 0.8 | 0.4 |
| S-6 | 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 | |
| S-6 | 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 | | |
| S-6 | 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

| Station | Date | Name | Total Catch | Fork Length (mm) | | Weight (g) | |
|---------|-----------|------------------|-------------|------------------|-------|------------|--------|
| | | | | mean | SD | mean | SD |
| S-2 | 9 Mar 90 | Pacific herring | 87 | 151.6 | 35.3 | 55.2 | |
| S-2 | 9 Mar 90 | Starry flounder | 1 | 281.0 | | 321.1 | |
| S-2 | 9 Mar 90 | Striped bass | 4 | 476.3 | 113.6 | 1805.0 | 1410.8 |
| 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 | 25 Jun 90 | Topsmelt | 4 | 123.0 | 135.5 | 6.0 | |
| S-2 | 26 Jul 90 | Pacific herring | 1 | 194.0 | | 91.0 | |
| S-2 | 26 Jul 90 | Staghorn sculpin | 44 | 146.8 | 15.4 | | |
| S-2 | 26 Jul 90 | Starry flounder | 1 | 332.0 | | 520.0 | |
| S-2 | 26 Jul 90 | Striped bass | 1 | 248.0 | | 209.2 | |
| S-2 | 26 Jul 90 | Topsmelt | 8 | 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 | |
| S-4 | 24 May 90 | Pacific herring | 1 | 192.0 | | 71.3 | |
| S-4 | 24 May 90 | Staghorn sculpin | 1 | 106.0 | | 13.2 | |
| S-4 | 24 May 90 | Striped bass | 1 | 490.0 | | 1700.0 | |
| S-4 | 24 May 90 | Topsmelt | 1 | 130.0 | | 18.3 | |
| S-4 | 25 Jun 90 | Staghorn sculpin | 6 | 140.2 | 9.5 | | |
| 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 | | | | | |
| S-6 | 9 Mar 90 | no catch | | | | | |
| S-6 | 5 Apr 90 | Striped Bass | 3 | 344.0 | 12.1 | 628.0 | 75.8 |

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

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