

**EFFECTS OF SEVIN APPLICATION ON LITTORAL
FLAT MEIOFAUNA: PRELIMINARY SAMPLING
IN WILLAPA BAY, JUNE-JULY 1988**

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Technical Report to
Willapa Bay, Grays Harbor
Oyster Growers Association
South Bend, Washington

Approved

Submitted

12-13-89



Director

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ACKNOWLEDGMENTS

We express our appreciation to David Armstrong, Brett Dumbauld and Dan Doty of the School of Fisheries, University of Washington, and Dick Wilson and Dan Cheny of Bay Center Mariculture, for their logistical support and assistance during the field experiments.

EFFECTS OF SEVIN APPLICATION ON LITTORAL FLAT MEIOFAUNA: PRELIMINARY SAMPLING ON WILLAPA BAY, JUNE-JULY 1988

INTRODUCTION

The following technical report describes the results of a preliminary field assessment of the effects of applying the insecticide Sevin (carbaryl) on meiofauna of littoral flats in Willapa Bay, Washington, in late June 1988.

Previous investigations on the effects of Sevin and its degradation products have focused almost exclusively upon direct toxicity to benthic and epibenthic macroinvertebrates (Chambers, 1970; Davis 1961; Davis and Hidu 1969; Haydock 1964; Haven et al. 1966; Stewart et al. 1967; Butler et al. 1968; Armstrong and Millemann 1974; Rao 1981; Buchanan et al. 1985). But for a few experimental studies (e.g., Tagatz et al. 1979), indirect and overall community effects via disrupted food web linkages and competitive interactions have been largely ignored. The principal assumption has been that, because of the relative short half-life of Sevin, recolonization and recruitment of other susceptible organisms such as meiofauna will occur rapidly owing to tidal transport from unaffected areas. In addition, repopulation of treated sediments is assumed to be rapid because of the typically high and continuous reproductive capacities of meiofauna.

Although these assumptions are valid in part, significant indirect effects upon the community may also occur through disruption of specific predator-prey interactions. In particular, several taxa of meiofauna and small macrofauna susceptible to Sevin toxicity—harpacticoid copepods and gammarid amphipods—constitute important prey resources to many estuarine fishes, such as juvenile salmon and flatfish; they are also preyed upon by shorebirds such as Dunlin and sandpiper species (see Simenstad 1983 for general synopsis). Furthermore, recently metamorphosed and young-of-the-year Dungeness crab prey extensively upon meiofaunal crustaceans and molluscs (Stevens 1982). A critical aspect of many of these epibenthos-predator interactions is that the consumers are frequently highly selective on particular species of copepods or amphipods. For

instance, species of *Harpacticus*, an epibenthic harpacticoid, and *Corophium*, a tubicolous gammarid amphipod, are apparently preferred by epibenthic feeding juvenile salmon (Simenstad and Wissmar 1984; Simenstad et al. 1988). In addition, many of these "key" epibenthic prey organisms are uniquely associated with particular littoral flat habitats or have ecological (e.g., tube-dwelling) or reproductive traits (e.g., univoltine generations) that conceivably could make them vulnerable to impact from Sevin without the potential for rapid recolonization and recruitment from adjacent, unaffected habitats. Thus, there is a potential for longer-term, more comprehensive effects on certain particularly important components of the epibenthos than might be anticipated with other components of the community.

In 1988, the application of Sevin to control burrowing shrimp in Willapa Bay presented the opportunity to test the short-term effects of the insecticide on epibenthic meiofauna and small macrofauna (hereafter termed the "epibenthos"). The objective of this study was to test the (null) hypothesis that epibenthos densities, and specifically trophically important taxa, are not significantly different between control and the Sevin treatment. If significant reduction was found (the null hypothesis rejected), the alternative hypothesis—that the epibenthos was not significantly different during the subsequent neap tidal cycle (two weeks later)—would be tested

Pre-application baseline sampling occurred on 29 June; sampling occurred again immediately after application, during the subsequent flooding tide (application occurs at low tide) on 1 July; and sampling of the next neap tidal cycle occurred on 12 July.

METHODS AND MATERIALS

Sampling Sites

Sampling was located on a broad littoral flat east of the confluence of the Bay Center Channel and the Bay Center Cutoff, in the northeastern shore of Willapa Bay (Figs. 1 and 2). The treatment (Sevin spray) site was located on Pacific County oyster plat #B76, and the control was located on plat #B90 to the south near the confluence of the Bone River and the Palix River.

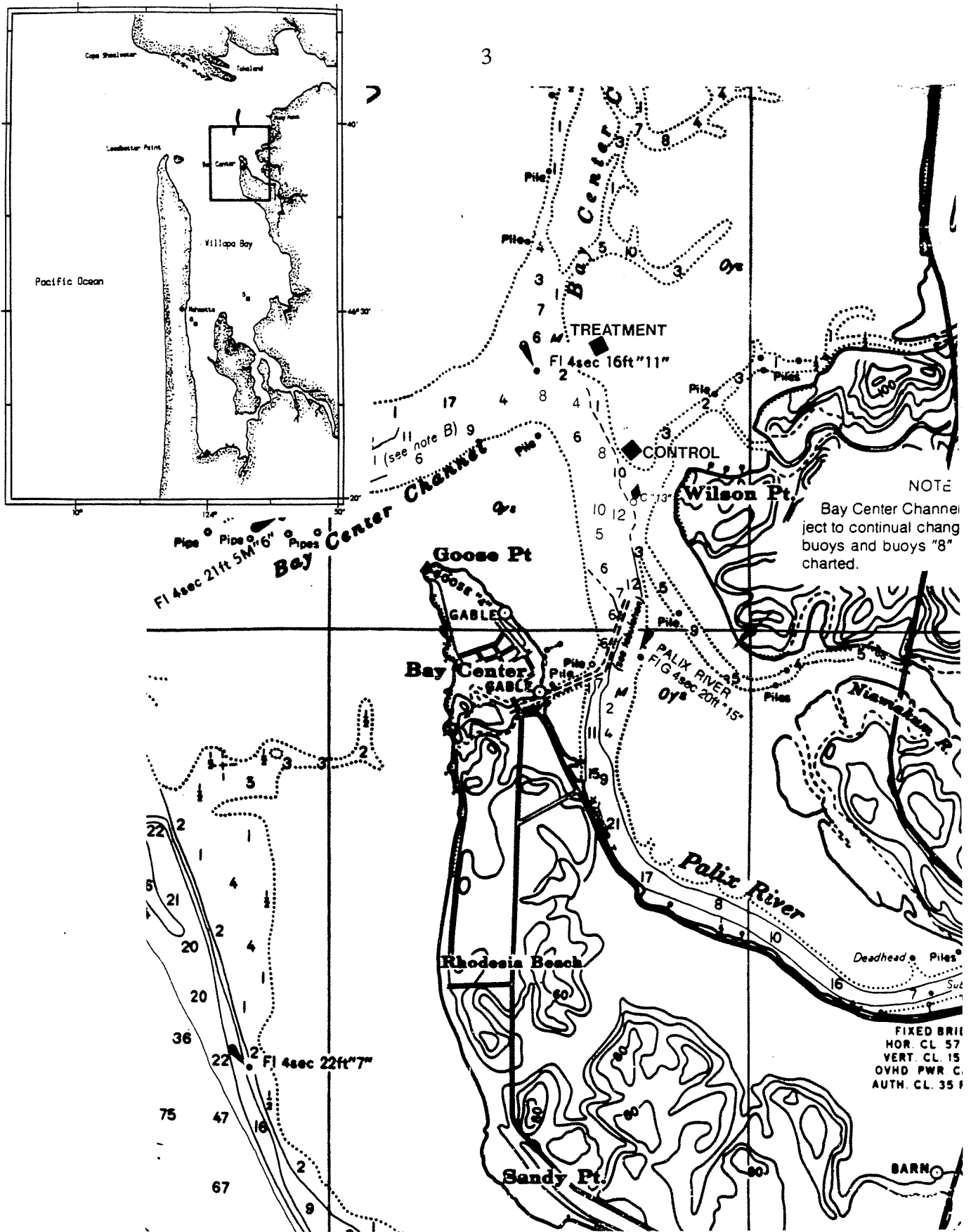


Figure 1. Map of Willapa Bay showing the locations of control and treatment intertidal sampling sites near Palix River for examining the effects of Sevin application on littoral flat meiofauna, June-July 1988.

Both sites have the same tidal elevation, approximately -0.5' relative to mean lower low water, and are composed of fine sand and mud with a moderate, patchy cover of eelgrass (*Zostera* spp.).

Sampling Design

Ten replicate samples of epibenthos in the benthic boundary layer over 0.016 m² of the bottom were collected. Using a random numbers table, ten X:Y coordinates were chosen corresponding to a 100-m x 100-m sampling grid (Appendix A). During exposure of the littoral flat prior to sampling, a 0:0 corner point was established randomly, and the sampling points were located relative to this point using compass bearings and pacing off the distances by foot. Each sampling point was marked by a 2-m stake. Every effort was made to avoid disturbing the benthic surface around the sampling sites at the time of setting the stakes.

Sampling Methodology

Sampling occurred by boat when the flooding tide was approximately 1-m over the littoral flat and continued until all 10 replicate samples had been collected. Sampling duration was approximately 1 hour for each site.

The sediment-water interface (benthic boundary layer) over 179 cm² of the sediment surface was sampled with a battery-powered epibenthic suction pump (epibenthic pump equipped with 0.130-mm mesh screening over replacement water ports), which has been shown to effectively sample most epibenthic crustaceans in similar habitats (C. A. Simenstad and J. R. Cordell, unpubl.; Thom et al. 1986). Ten replicates each were sampled in the treatment and control plots. In the laboratory, all organisms were classified, enumerated and weighed (damped wet weight). Organisms of potential importance as fish prey, such as harpacticoid copepods, gammarid amphipods, cumaceans, and ostracods, were identified to the lowest possible taxonomic level (species and life history stage in most cases).

All field collection and laboratory data were recorded on standardized (FRI estuarine-coastal marine fish/zooplankton formats) forms, which utilize the format #100 series of the National

Oceanographic Data Center (NODC). This format system has been utilized in almost all FRI sampling in Puget Sound and coastal estuaries since 1976 and provides for a widely comparable database. The system also utilizes the NODC taxonomic code, a 10-digit code that enables encoding of all organisms to any phylogenetic level and life history stage. All data was entered by an experienced data entry operator and was automatically verified at the time of entry.

Tabulation and basic statistical descriptions of the samples were produced with an FRI computer program (SUPERPLANKTON, which runs on the UW's Cyber 180-855 mainframe computer) specifically developed for NODC-formatted data. These tabulations standardized all data to standing stock on a unit area (m^2) basis. Summarized data were analyzed further on either the Cyber mainframe or on a microcomputer using commercial statistical software. In these analyses, the epibenthos density data were tested initially for homogeneity of variance by examining a normal probability plot and conducting a Bartlett's test; as the variance of the raw density data was found to vary significantly from normality, all data were natural log transformed before subsequent analysis of variance.

RESULTS

A diverse assemblage of epibenthic crustaceans, dominated by harpacticoid copepods, typifies the littoral flat habitat in the study area (Table 1; Appendix B). Pelagic calanoid copepods (e.g., *Eurytemora americana*, *Acartia* sp.) and cladocerans (*Podon leuckarti*) were also prominent (6.7% to 45.8%) in the samples, but were presumed to be entrained in the turbulent mixing layer from the water column and not associated with the epibenthic community. Of forty harpacticoid taxa, five taxa were comparatively abundant (i.e., >5% of total density): *Longipedia* sp.; *Tisbe* spp.; *Paralaophonte congenera*; *Tymphlamphiascus pectinifer*; and *Robertsonia* cf. *knoxii*; the cumacean *Cumella vulgaris* and gammarid amphipods *Corophium* spp. were the only other numerically prominent epibenthic crustacean. Benthic polychaete annelids (2.9-18.1% total density) and nematodes (1.4-16.5%) comprised the other numerically prominent taxa in the samples, but they

Table 1. Occurrence (% density) of epibenthic taxa at Sevin treatment (ST) and control (SC) littoral flats, Willapa Bay, June-July 1988.

| Taxa | Pre-application 29 June 1988 | | Immediate post-application 1 July 1988 | | Two-week post-application 12 July 1988 | |
|--------------------------|---------------------------------|------|--|------|--|------|
| | ST | SC | ST | SC | ST | SC |
| Turbellaria | | 0.1 | 0.1 | 0.4 | 0.3 | |
| Nematoda | 1.4 | 4.5 | 6.0 | 4.2 | 9.3 | 16.5 |
| Polychaeta | 5.3 | 2.9 | 18.1 | 4.1 | 14.9 | 9.5 |
| Oligochaeta | 0.2 | 1.1 | 2.2 | | 1.7 | 1.7 |
| Mesogastropoda | 0.3 | 0.3 | <0.1 | | | |
| Opisthobranchia | | 0.1 | | | <0.1 | |
| Bivalvia | | 0.5 | 1.1 | 0.8 | 1.1 | 2.2 |
| Acarina | | | | | | |
| Halacaridae | 0.5 | 0.4 | 0.5 | 0.1 | 0.7 | 0.1 |
| Crustacea | | | | | | |
| Cladocera | | | | | | |
| Polyphemidae | | | | | | |
| <i>Evadne nordmanni</i> | | | | | <0.1 | |
| <i>Podon leuckarti</i> | 3.0 | 17.7 | 0.9 | 4.2 | 0.1 | 0.1 |
| Podocopa | 0.3 | 0.3 | 1.0 | 1.1 | 1.8 | 1.2 |
| Copepoda | | | | 0.1 | | |
| Calanoida | 0.8 | 1.6 | 0.2 | 0.8 | | |
| Calanidae | | | | | | |
| <i>Calanus</i> sp. | | 0.1 | | | | |
| Pseudocalanidae | | | | | | |
| <i>Pseudocalanus</i> sp. | 0.1 | 0.1 | <0.1 | | | <0.1 |
| Stephidae | | | | | | <0.1 |
| Centropagidae | | | | | | |
| <i>Centropages</i> | | | | | | |
| <i>abdominalis</i> | 0.2 | | <0.1 | 0.5 | <0.1 | <0.1 |
| Temoridae | | | | | | |
| <i>Eurytemora</i> | | | | | | |
| <i>americana</i> | 7.4 | 4.6 | 1.6 | 2.8 | 2.7 | 0.6 |
| Acartidae | | | | | | |
| <i>Acartia</i> sp. | 34.1 | 36.1 | 17.1 | 45.8 | 6.7 | 3.5 |
| Harpacticoida | 0.4 | 1.2 | 0.8 | 0.7 | 0.7 | 0.5 |
| Tegastidae | | 0.1 | | | | |
| Longipediidae | | | | | | |
| <i>Longipedia</i> sp. | 2.5 | 3.9 | 3.0 | 4.9 | 12.1 | 15.5 |
| Ectinosomatidae | 4.4 | 1.3 | 1.9 | 0.8 | 2.0 | 2.3 |
| Harpacticidae | | | | | | |
| <i>Harpacticus</i> | | | | | | |
| <i>spinulosus</i> | 0.4 | 0.8 | <0.1 | 1.1 | 0.5 | 1.8 |
| <i>H.</i> sp. | | | | | | |
| <i>obscurus</i> gp. | | 0.4 | | | 0.1 | |
| Tisbidae | | | | | | |
| <i>Tisbe</i> spp. | 4.6 | 5.9 | 1.3 | 7.6 | 7.0 | 6.8 |

Table 1—cont'd.

| Taxa | Pre-application 29 June 1988 | | Immediate post-application 1 July 1988 | | Two-week post-application 12 July 1988 | |
|-----------------------------|---------------------------------|------|--|-----|--|------|
| | ST | SC | ST | SC | ST | SC |
| Tachidiidae | | | | | | |
| <i>Microarthidion</i> | | | | | | |
| <i>littorale</i> | 1.6 | 0.3 | 0.6 | 0.5 | 0.3 | 0.4 |
| <i>Tachidius</i> | | | | | | |
| <i>triangularis</i> | 2.6 | 2.4 | 0.5 | 1.8 | 0.7 | 1.6 |
| <i>Danielssenia</i> | | | | | | |
| <i>typica</i> | 0.1 | | 1.3 | | 0.1 | 0.1 |
| Laophontidae | 0.1 | 0.3 | 0.2 | 0.2 | 0.4 | 0.5 |
| <i>Paralaophonte</i> | | | | | | |
| <i>congenera</i> | 7.1 | 1.1 | 7.6 | 5.7 | 9.7 | 9.2 |
| <i>Heterolaophonte</i> | | | | | | |
| <i>longisetigera</i> | 0.4 | 0.1 | 0.4 | 0.1 | 0.6 | 0.3 |
| Ameiridae | | | | | | |
| <i>Ameira longipes</i> | 4.8 | 0.1 | 3.9 | 1.1 | 4.8 | 0.9 |
| Cletodidae | 0.1 | | 0.1 | | 0.2 | 0.3 |
| <i>Enhydrosoma</i> sp. | 0.1 | | | | | |
| <i>Huntemannia</i> | | | | | | |
| <i>jadensis</i> | 0.1 | <0.1 | 0.2 | 0.1 | 0.1 | |
| <i>Leimia vaga</i> | 0.1 | 0.1 | | | <0.1 | |
| <i>Acrenhydrosoma</i> | | | | | | |
| <i>karlingi</i> | 0.1 | 0.1 | 0.8 | | 0.4 | |
| Diosaccidae | | | | | | |
| <i>Amonardia normani</i> | 0.4 | | 0.2 | 0.5 | 2.3 | 1.4 |
| <i>Diosaccus spinatus</i> | | | | | | <0.1 |
| <i>Amphiascus</i> sp. | 2.5 | 0.8 | 1.1 | 0.3 | 1.4 | 0.5 |
| <i>A. minutus</i> | | | | 0.1 | | |
| <i>Stenhelia</i> sp. | | 0.1 | | 0.1 | <0.1 | 0.1 |
| <i>S. peniculata</i> | 0.4 | | 2.2 | | 0.8 | 0.4 |
| <i>S. cf. inopinata</i> | 0.6 | | 1.6 | | 1.5 | 1.5 |
| <i>Typhlamphiascus</i> | | | | | | |
| <i>pectinifer</i> | 1.2 | 0.9 | 6.6 | 0.1 | 9.0 | 1.0 |
| <i>Amphiascoides</i> | | | | | | |
| sp. A | 0.8 | 0.3 | 1.0 | 0.2 | 0.2 | 0.9 |
| <i>Robertsonia</i> sp. | | | 0.2 | | | |
| <i>R. proponqua</i> | | 0.3 | | | | |
| <i>R. cf. knoxi</i> | 2.5 | 0.5 | 3.9 | 1.4 | 2.1 | 5.6 |
| Canthocamptidae | | | | | | |
| <i>Bryocamptus</i> sp. | | 2.7 | | | | |
| <i>Mesochra</i> sp. | 2.8 | 0.1 | 0.2 | | 0.5 | 0.1 |
| Thalestridae | | | | | | |
| <i>Dactylopodia</i> | | | | | | |
| <i>vulgaris</i> | 0.2 | | <0.1 | | 0.1 | <0.1 |
| <i>D. crassipes</i> | | | 0.1 | | | |
| <i>D. tisboides</i> | | | 0.2 | 0.1 | | |
| <i>Paradactylopodia</i> sp. | | 0.1 | | 0.1 | 0.1 | |

Table 1—cont'd.

| Taxa | Pre-application 29 June 1988 | | Immediate post-application 1 July 1988 | | Two-week post-application 12 July 1988 | |
|-----------------------------------|---------------------------------|-----|--|-----|--|------|
| | ST | SC | ST | SC | ST | SC |
| <i>P. serrata</i> | | | <0.1 | 0.1 | | |
| <i>Parathalestris californica</i> | | | | | | <0.1 |
| <i>Diarthrodes</i> sp. | 1.4 | 2.0 | 0.8 | 0.6 | 0.7 | 1.9 |
| Parastenheliidae | | | | | | |
| <i>Parastenhelia hornelli</i> | | | | | 0.1 | |
| Cyclopoida | 0.4 | 0.3 | 0.1 | 0.9 | 0.5 | 0.2 |
| Oncaeidae | | | | | | |
| <i>Oncaea</i> sp. | | | | | | <0.1 |
| <i>Corycaeus anglicus</i> | | 0.1 | | | <0.1 | |
| Oithonidae | | | | | | |
| <i>Oithona similis</i> | | 0.1 | | | | |
| Cyclopinidae | 0.1 | | | 0.2 | | 0.1 |
| Balanomorpha | 1.1 | 0.3 | 0.3 | 1.0 | 0.3 | 0.2 |
| Cumacea | | | | | | |
| Leuconide | 0.1 | | | | | |
| <i>Leucon</i> sp. | 0.1 | 0.1 | 0.9 | | 0.4 | 2.1 |
| Diastylidae | | | | | | |
| <i>Diastylis</i> sp. | | | | 0.1 | | <0.1 |
| Nannastacidae | | | | | | |
| <i>Cumella vulgaris</i> | 1.0 | 2.5 | 7.0 | 4.4 | 0.4 | 7.2 |
| Tanaidacea | | | | | | 0.1 |
| <i>Leptochelia savignyi</i> | | 0.1 | 0.2 | 0.1 | 0.1 | 0.3 |
| Isopoda | | | | | | |
| Idoteidae | | | | | | <0.1 |
| Munnidae | | | | | | |
| <i>Munna</i> sp. | | 0.1 | | | | |
| Amphipoda | | | | | | |
| Gammaridea | 0.8 | | <0.1 | | | |
| Ampithoidae | | | | | <0.1 | |
| Corophiidae | | | | | | |
| <i>Corophium</i> sp. | 0.4 | 0.1 | 1.2 | 0.3 | <0.1 | 0.4 |
| <i>C. acherusicum</i> | | | 0.3 | | | |
| Eusiridae | | | | | | |
| <i>Pontogeneia</i> sp. | 0.1 | 0.1 | <0.1 | 0.1 | | 0.1 |
| <i>P.</i> sp. cf. <i>rostrata</i> | 0.3 | | | | | <0.1 |
| Anisogammaridae | | | | | | |
| <i>Anisogammarus pugettensis</i> | | | | | | <0.1 |
| Isaeidae | | | | | | |
| <i>Photis</i> sp. | | | 0.3 | | | |
| Caprellidea | 0.1 | | | 0.1 | | <0.1 |
| Caprellidae | | | | | | |
| <i>Caprella</i> sp. | 0.1 | | 0.4 | | <0.1 | |

Table 1—cont'd.

| Taxa | Pre-application 29 June 1988 | | Immediate post-application 1 July 1988 | | Two-week post-application 12 July 1988 | |
|--|---------------------------------|------|--|------|--|------|
| | ST | SC | ST | SC | ST | SC |
| Decapoda-Pleocyemata | | | | | | |
| Hippolytidae | | 0.3 | | | | |
| Insecta | | | | | | |
| Diptera | | | | | | |
| Chironomidae | | | 0.1 | | | |
| Chaetognatha | | | | | <0.1 | |
| Teleostei | | | | 0.1 | | |
| Shannon-Weiner Diversity (numerical; including discrete life history stages) | 4.77 | 4.25 | 4.80 | 4.12 | 4.90 | 4.85 |

were considered inappropriately sampled by the epibenthic pump. Numerical diversity (Shannon-Weiner H' calculated for all taxa categories including discrete life history stages) was relatively high for a littoral flat assemblage (4.12 to 4.90).

Total epibenthic sample densities averaged between 4.2×10^3 and 20.3×10^3 organisms m^{-2} and generally increased between late June-early July (at the time of the Sevin application), and 2 weeks later (Table 2). Multifactor analysis of variance (ANOVA) indicated that, over the period of the three collections, time (date) was of greater significance than treatment effects (Table 3). This is not unexpected, as many epibenthic taxa, such as harpacticoid copepods, have high population turnover rates (e.g., weeks).

One-way analysis of variance (ANOVA) tests of the differences between treatment and control epibenthic densities 2 days before and immediately after the Sevin application, however, indicated a significant treatment effect for many taxa (Figures 2 and 3; Table 4). Densities of the harpacticoid *Paralaophonte congenera*, total cumaceans, and total gammarid amphipods were significantly different at the 0.01 significance level. Densities of the harpacticoid *Robertsonia* sp. cf *knoxii*, the

Table 2. Summary of densities (no. m⁻²) of epibenthic organisms at Sevin treatment (ST) and control (SC) littoral flats in Willapa Bay, Washington, immediately before, after and two weeks after application of Sevin, June-July 1988.

| Taxa | Pre-application 29 June 1988 | | Immediate post-application 1 July 1988 | | Two-week post-application 12 July 1988 | |
|--|---------------------------------|--------|--|--------|--|--------|
| | ST | SC | ST | SC | ST | SC |
| Total Harpacticoida | | | | | | |
| mean | 3339.2 | 1095.1 | 5450.2 | 2570.8 | 11878.2 | 8301.8 |
| s.d. | 6594.1 | 2253.2 | 6835.9 | 3027.4 | 12654.9 | 8235.7 |
| <i>Longipedia</i> sp. | | | | | | |
| mean | 66.7 | 83.3 | 266.7 | 105.6 | 405.5 | 855.6 |
| s.d. | 122.3 | 160.8 | 307.5 | 155.9 | 301.1 | 490.5 |
| <i>Tisbe</i> sp. | | | | | | |
| mean | 305.6 | 166.7 | 122.2 | 366.7 | 894.5 | 777.7 |
| s.d. | 443.1 | 202.9 | 116.5 | 461.5 | 1272.1 | 821.1 |
| <i>Paralaophonte</i> <i>congenera</i> | | | | | | |
| mean | 400.0 | 50.0 | 1022.1 | 349.9 | 1972.3 | 1416.7 |
| s.d. | 578.1 | 103.2 | 1193.3 | 757.3 | 1309.7 | 1375.4 |
| <i>Robertsonia</i> sp. <i>cf knoxi</i> | | | | | | |
| mean | 200.0 | 22.3 | 516.7 | 83.3 | 416.6 | 866.7 |
| s.d. | 359.3 | 55.1 | 601.9 | 160.4 | 306.2 | 1146.6 |
| Total Cumacea | | | | | | |
| mean | 94.5 | 111.2 | 1055.5 | 277.8 | 177.7 | 1444.5 |
| s.d. | 184.6 | 240.5 | 1519.4 | 621.7 | 215.8 | 1121.9 |
| <i>Cumella vulgaris</i> | | | | | | |
| mean | 57.8 | 105.6 | 933.3 | 272.2 | 88.8 | 1116.7 |
| s.d. | 131.9 | 222.9 | 1402.9 | 604.1 | 140.8 | 861.7 |
| Total Gammaridea | | | | | | |
| mean | 116.9 | 11.2 | 233.4 | 33.5 | 11.2 | 77.9 |
| s.d. | 328.4 | 35.2 | 558.9 | 105.5 | 35.2 | 145.2 |
| <i>Corophium</i> sp. | | | | | | |
| mean | 27.8 | 5.6 | 188.9 | 16.7 | 5.6 | 61.1 |
| s.d. | 47.2 | 17.6 | 448.7 | 52.7 | 17.6 | 92.4 |
| <i>Pontogeneia</i> sp. <i>cf rostrata</i> | | | | | | |
| mean | 22.3 | 5.6 | 5.6 | 5.6 | 0 | 5.6 |
| s.d. | 70.3 | 17.6 | 17.6 | 17.6 | | 17.6 |

Table 2—cont'd.

| Taxa | Pre-application 29 June 1988 | | Immediate post-application 1 July 1988 | | Two-week post-application 12 July 1988 | |
|---------------|---------------------------------|--------|--|--------|--|---------|
| | ST | SC | ST | SC | ST | SC |
| Total Density | | | | | | |
| mean | 7927.8 | 4166.7 | 13416.7 | 6150.0 | 20266.7 | 15494.4 |
| s.d. | 9026.8 | 2039.7 | 9245.3 | 5806.1 | 10458.1 | 6615.6 |
| coef. var. | 1.14 | 0.49 | 0.69 | 0.94 | 0.52 | 0.43 |

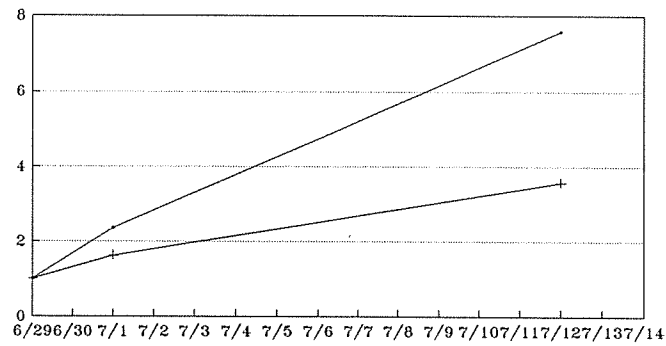
Table 3. Significance levels for multifactor analysis of variance of selected epibenthos density (ln transformed) prior to, immediately after, and two weeks after application of Sevin on a littoral flat in Willapa Bay, Washington, between 29 June and 12 July 1988.

| Epibenthos category | Effects | | |
|---|-----------|--------|--------------|
| | Treatment | Date | Interactions |
| Total Harpacticoida | 0.0442 | 0.0001 | 0.6445 |
| <i>Longipedia</i> sp. | 0.3687 | 0.0000 | 0.1104 |
| <i>Tisbe</i> spp. | 0.8539 | 0.0011 | 0.9971 |
| <i>Paralaophonte congenera</i> | 0.0006 | 0.0000 | 0.0666 |
| <i>Robertsonia</i> sp. cf <i>knoxii</i> | 0.1156 | 0.0000 | 0.2571 |
| Total Cumacea | 0.2340 | 0.0002 | 0.0002 |
| <i>Cumella vulgaris</i> | 0.7418 | 0.0036 | 0.0000 |
| Total Gammaridea | 0.1681 | 0.9113 | 0.0151 |
| <i>Corophium</i> sp. | 0.2579 | 0.7690 | 0.0192 |
| <i>Pontogeneia</i> sp. cf <i>rostrata</i> | 0.9163 | 0.5454 | 0.5454 |
| Total Epibenthos | 0.0241 | 0.0000 | 0.4817 |

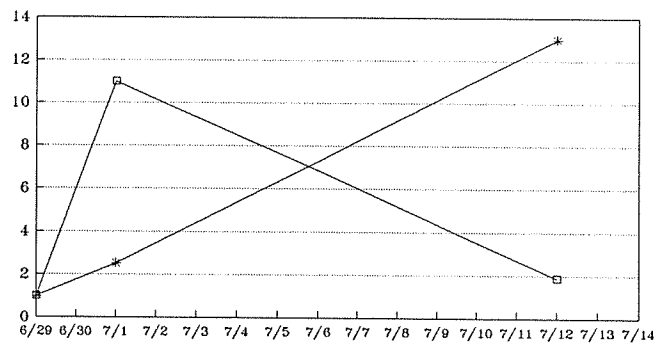
cumacean *Cumella vulgaris*, the gammarid amphipods *Corophium* spp., and total epibenthos were significantly different at or greater than the 0.05 level. Only in the case of *Longipedia* sp., *Robertsonia* and *Cumella* were the effects of date more significant than the treatment effect. Treatment-date interaction effects were not significant for any category.

Thus, for six of the epibenthos categories (including total epibenthos), the null hypothesis that densities were not significantly ($\gg 0.05\%$ confidence level) different as a result of the application of Sevin, within the context of natural variation due to sampling and time, was rejected. In general, however, the direction of density change was not down as anticipated. Of the categories with

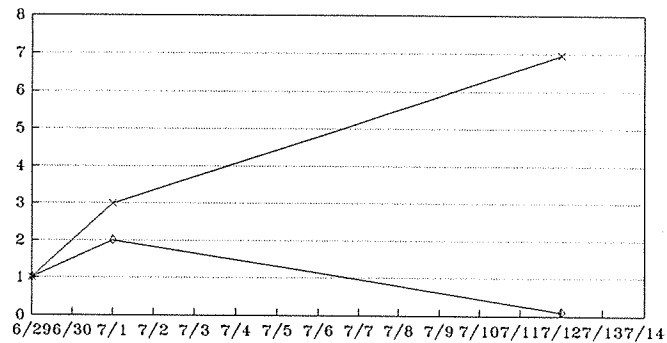
PERCENT CHANGE IN EPIBENTHOS DENSITY
General Orders



a. — Control Harpacted + Treatment Harpacted



b. * Control Cumacean □ Treatment Cumacean



c. x Control Gammarid o Treatment Gammarid

Figure 2. Percent change in the density of all harpacticoid copepods (a), cumaceans (b) and gammarid amphipods (c) 2 days before (29 June 1988), immediately after (1 July 1988) and 11 days (12 July 1988) after application of Sevin on an intertidal flat in Willapa Bay, Washington.

PERCENT CHANGE IN EPIBENTHOS DENSITY
Prey Taxa

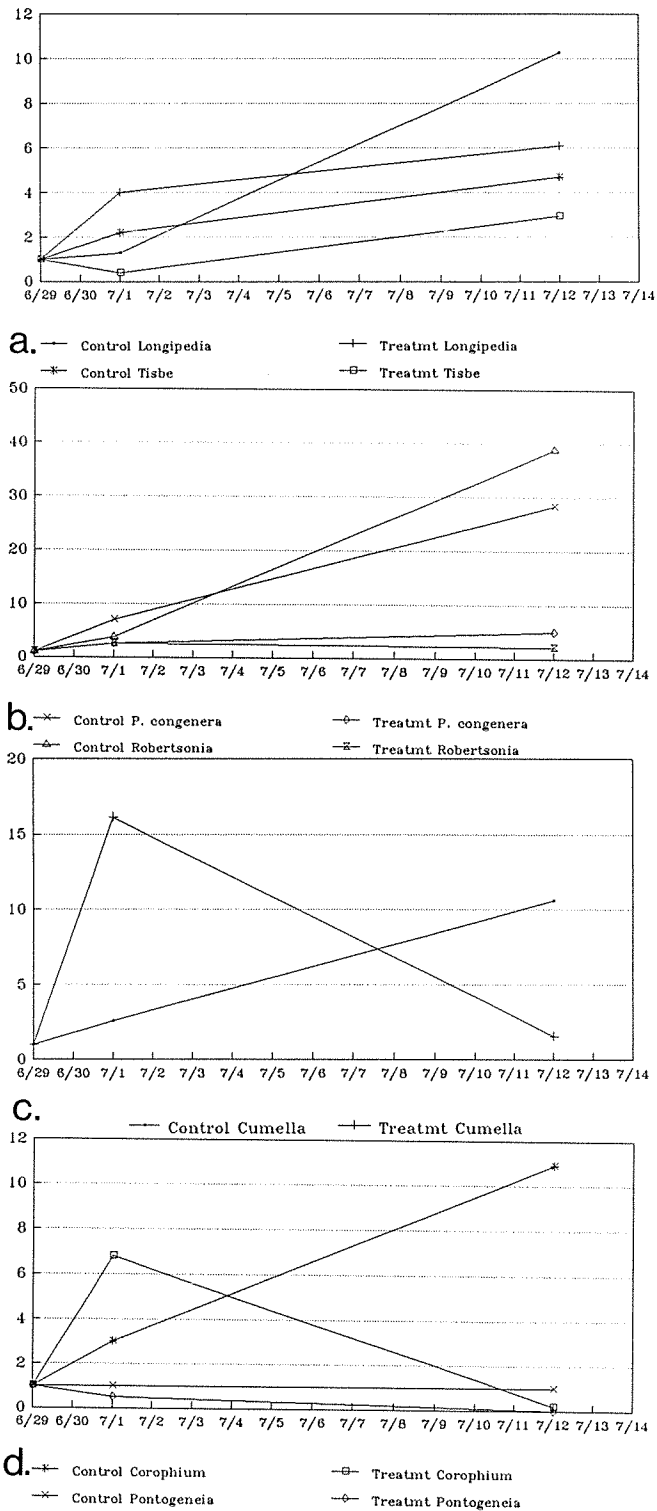


Figure 3. Percent change in the density of the harpacticoid copepods *Longipedia* sp., *Tisbe* sp. (a), *Paralaophonte congenera* and *Robertsonia* sp. of *knoxii* (b), the cumacean *Cumella vulgaris* (c) and the gammarid amphipods *Corophium* spp. and *Pontogeneia* sp. of *rostrata* (d) 2 days before (29 June 1988), immediately after (1 July 1988) and 11 days (12 July 1988) after application of Sevin on an intertidal flat in Willapa Bay, Washington.

Table 4. Significance levels for multifactor analysis of variance of selected epibenthos density (ln transformed) prior to (29 June) and immediately after (1 July) application of Sevin on a littoral flat in Willapa Bay, Washington, 1988.

| Epibenthos category | Effects | | |
|---|-----------|--------|--------------|
| | Treatment | Date | Interactions |
| Total Harpacticoida | 0.0784 | 0.0801 | 0.6495 |
| <i>Longipedia</i> sp. | 0.1513 | 0.0384 | 0.3114 |
| <i>Tisbe</i> spp. | 0.8964 | 0.9492 | 0.9495 |
| <i>Paralaophonte congenera</i> | 0.0007 | 0.1188 | 0.5500 |
| <i>Robertsonia</i> sp. cf <i>knoxii</i> | 0.0448 | 0.0175 | 0.5384 |
| Total Cumacea | 0.0042 | 0.0231 | 0.1812 |
| <i>Cumella vulgaris</i> | 0.0349 | 0.0111 | 0.0934 |
| Total Gammaridea | 0.0072 | 0.8883 | 0.7724 |
| <i>Corophium</i> sp. | 0.0147 | 0.5046 | 0.6111 |
| <i>Pontogeneia</i> sp. cf <i>rostrata</i> | 0.5917 | 0.5917 | 0.5917 |
| Total Epibenthos | 0.0262 | 0.0875 | 0.5129 |

significant change, only the cladocerans decreased; all other taxa actually increased as a result of the Sevin treatment (Table 2). The overall response of the epibenthos appears evident: total density of all epibenthic organisms immediately after Sevin application was twice as high ($13.4 \times 10^3 \text{ m}^{-2}$) at the Sevin treatment site as at the control site ($6.2 \times 10^3 \text{ m}^{-2}$).

After 2 weeks, significant differences in the density of epibenthos at the treatment site persisted for only cumaceans (*Cumella vulgaris*) and gammarid amphipods (*Corophium* sp.). This is reflected in the analysis of variance of indicator taxa density immediately after the application of Sevin as compared to 2 weeks later (Table 5). As expected, time was a strongly significant factor in most taxa, but cumaceans and gammarid amphipods showed no significant changes in density. Treatment effects were evident for only total harpacticoids and the harpacticoid *Paralaophonte congenera*, principally because of the dramatic density increases for these categories at the treatment site. Comparing the proportional changes in density illustrates the magnitude by which the densities of cumaceans (83%; Fig. 2b) and gammarid amphipods (95%; Fig. 2c) and specifically *Cumella vulgaris* (90%; Fig. 3c) and *Corophium* spp. (97%; Fig. 3d), had declined 2 weeks after the application of Sevin, in contrast to increases in all other taxa. These results suggest that,

Table 5. Significance levels for multifactor analysis of variance of selected epibenthos density (ln transformed) immediately after (1 July) and two weeks (12 July) after application of Sevin on a littoral flat in Willapa Bay, Washington, 1988.

| Epibenthos category | Effects | | |
|---|-----------|--------|--------------|
| | Treatment | Date | Interactions |
| Total Harpacticoida | 0.0094 | 0.0001 | 0.1469 |
| <i>Longipedia</i> sp. | 0.2989 | 0.0001 | 0.0138 |
| <i>Tisbe</i> spp. | 0.8367 | 0.0006 | 0.9619 |
| <i>Paralaophonte congenera</i> | 0.0440 | 0.0019 | 0.0939 |
| <i>Robertsonia</i> sp. cf <i>knoxii</i> | 0.2402 | 0.0223 | 0.1065 |
| Total Cumacea | 0.5797 | 0.0721 | 0.0000 |
| <i>Cumella vulgaris</i> | 0.4872 | 0.7083 | 0.0000 |
| Total Gammaridea | 0.9069 | 0.7960 | 0.0268 |
| <i>Corophium</i> sp. | 0.7311 | 0.6187 | 0.0129 |
| <i>Pontogeneia</i> sp. cf <i>rostrata</i> | 0.5734 | 0.5734 | 0.5734 |
| Total Epibenthos | 0.0548 | 0.0019 | 0.2299 |

relative to natural changes in the densities of these taxa at the control site, densities at the treatment site were even more depressed.

DISCUSSION

When significant, the immediate consequence of Sevin application on epibenthic crustaceans was not in the expected direction, i.e., total epibenthos density and the densities of most indicator taxa increased rather than decreased. Several explanations could account for these differences: (1) large-scale mortality of the epibenthic organisms throughout and beyond the Sevin application plot occurred, resulting in transport and concentration of dead animals along the benthic boundary layer; (2) physical conditions (turbulence of the benthic boundary layer caused by wind and current action) were different at the treatment and control site immediately after the Sevin application as compared to the baseline sampling; (3) sublethal effects of Sevin caused modifications in the normal behavior of the epibenthic organisms, which resulted in their becoming more available to sampling in the benthic boundary layer; and (4) modification of the benthic layer (e.g., reduction of dissolved oxygen, increased SO₂) resulted in an indirect behavioral response as in (2). Epibenthos

samples were examined visually at the time of sampling and organisms were generally found to be alive, which reduces the probability that pervasive mortality due to Sevin was the cause of the observed density changes. Similarly, physical conditions were visually equal at both sites during both the baseline and Sevin application sampling dates, reducing the probability that there was differential scouring or other physical alterations in epibenthos availability. We therefore conclude that the epibenthic taxa that did show increased availability in the benthic boundary layer were responding physiologically or behaviorally to a change induced by Sevin. Whether it was direct (sublethal, toxicological) or indirect (behavioral in response to reduced sediment quality) cannot be resolved in the absence of corresponding measurements of sediment chemistry. However, we find such a rapid response in sediment quality questionable, especially during an inundating tide. We suspect that the sublethal effect of Sevin is the more tenable explanation.

In the case of two taxa, *Cumella vulgaris* and *Corophium* spp., there is some indication that residual effects of the Sevin application may have ultimately reduced the population 2 weeks later. While delayed mortality due to Sevin toxicity could have occurred, such a reduction could also have resulted from increased natural mortality (e.g., predation) as a consequence of being concentrated in the benthic boundary layer, rather than because sediment quality remained degraded; all other epibenthic crustaceans, many of which should be equally or more sensitive to Sevin or sediment quality effects, had returned to natural densities relative to the control site. The results of the stomach content analyses of fishes occupying the treatment site immediately after (during tidal inundation) Sevin application should elucidate whether some of these epibenthic taxa were more susceptible or available as prey in the benthic boundary layer (G. Hueckel and R. Buckley, Washington Dept. Fisheries, personal communication).

SUMMARY AND RECOMMENDATIONS

A short-term response of the epibenthic crustacean assemblage on the littoral flats in Willapa Bay treated by Sevin was estimated to be significant for eight of thirteen taxa categories. Rather

than a depression in densities, however, the response resulted in increased numbers of animals in the benthic boundary layer. Subsequent sampling 2 weeks later indicated that most taxa had reached equivalent or significantly higher densities than those found prior to the Sevin application. Densities of cumaceans (*Cumella vulgaris*) and gammarid amphipods (*Corophium* spp.), however, did not respond as did harpacticoids and cladocerans. One likely interpretation of this residual effect of the treatment is that increased availability of *Cumella* and *Corophium* in the benthic boundary layer after the application of Sevin resulted in increased predation by fishes or, alternatively, there was a delayed mortality due to Sevin. Unlike the other taxa (e.g., harpacticoid copepods), which showed rapid recolonization of the treatment site within 2 weeks, *Cumella* and *Corophium* populations may have been impacted over a longer term.

We cannot explicitly explain the differences in the responses by the different epibenthic taxa. *Cumella vulgaris* and *Corophium* spp. are the largest taxa of those examined, which suggests that either the response by the epibenthos, delayed mortality or selectivity by epibenthic predators was size-selective. Given the behavioral and toxicological response by the macroinvertebrates *Callinassa californiensis*, *Upogebia pugettensis* and *Cancer magister*, that even sublethal effects are potentially proportional to the surface area of meiofaunal and small macrofaunal crustaceans.

To further clarify the mechanism of density changes, the diets of the fishes that were captured (by WDF and UW/Sea Grant investigators) over the same or adjacent flats immediately after Sevin application should be compared. The objective of such a comparison would be to evaluate changes in the availability of epibenthic prey taxa, especially *Cumella* and *Corophium*, as a result of the Sevin application; we understand that these data are forthcoming.

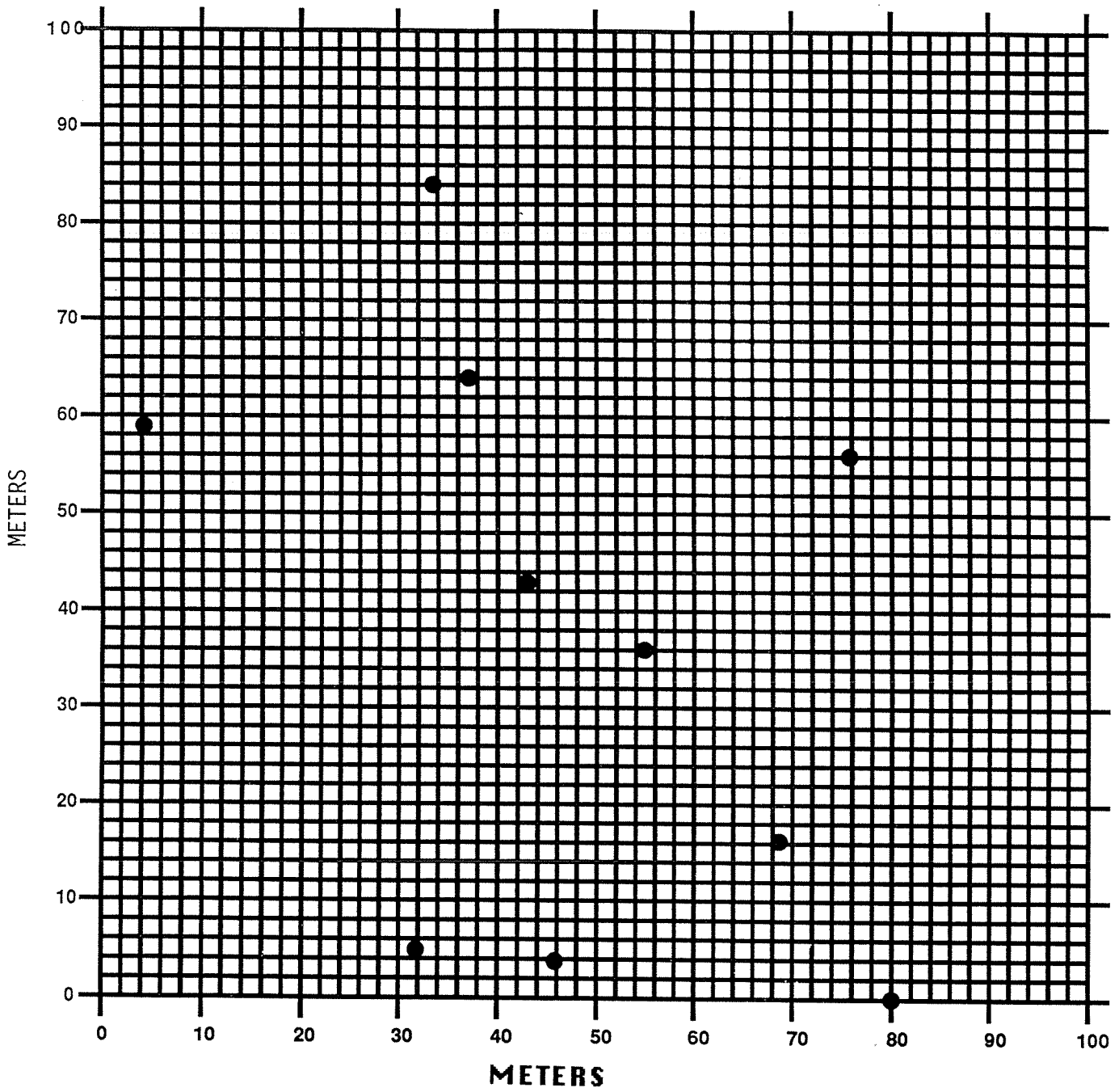
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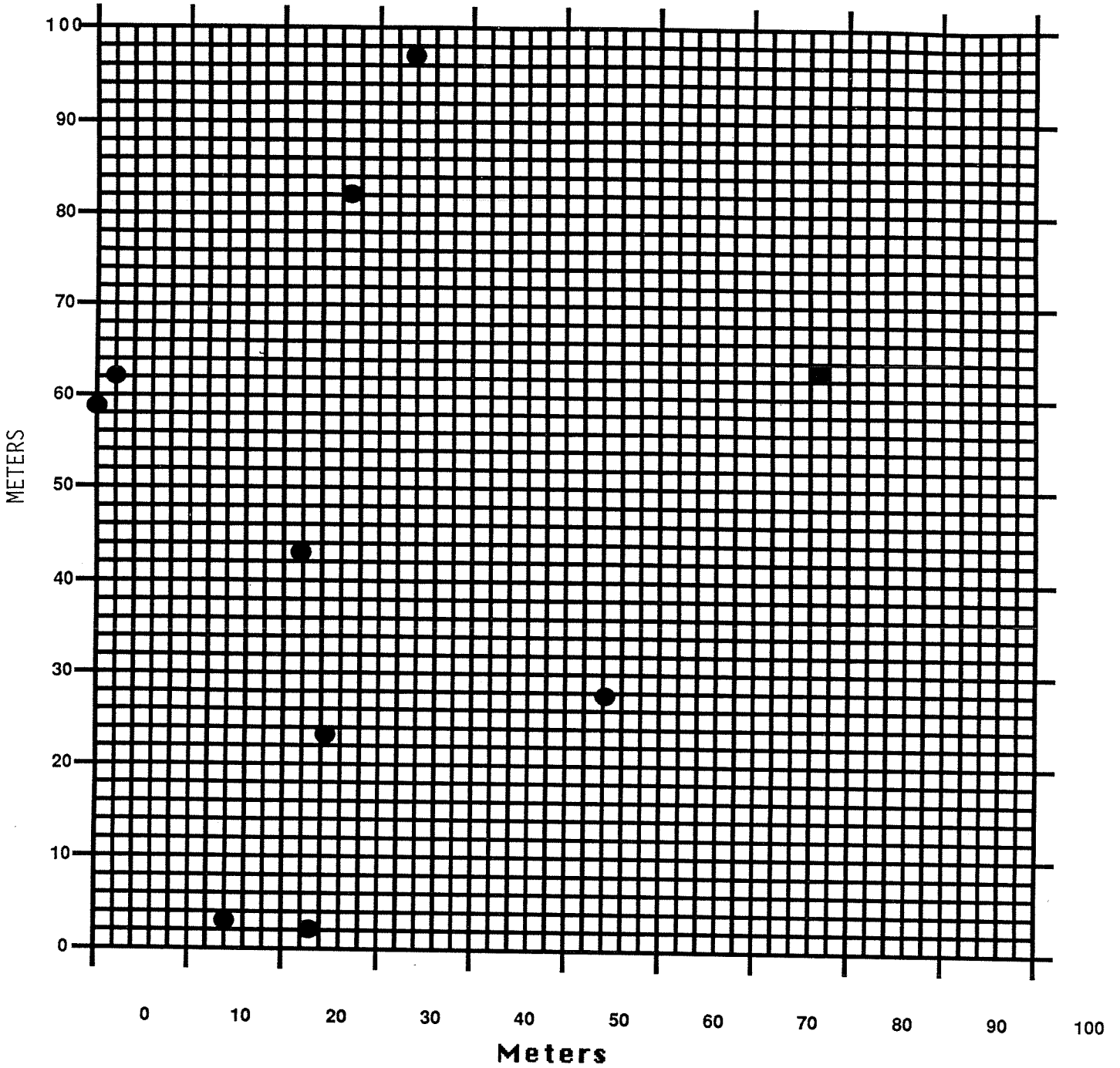
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APPENDIX A

Random Sampling Grid Locations



STUDY NAME_Willapa Bay Sevin Epibenthos
LOCATION_Treatment Site _____
SITE/GRID _____
DATES _____



STUDY NAME_Willapa Bay Sevin Epibenthos
LOCATION_Control Site _____
SITE/GRID _____
DATES _____

APPENDIX B

Taxonomic Composition of Sevin Treatment and Control Collections

(SUPERPLANKTON output)

EPIBENTHIC PLANKTON ANALYSIS

 * GRAND SUMMARY *

| FROM COLLECTIONS: | FILEID | STATION | SAMPLE |
|-------------------|---------|---------|--------|
| | 88JUN29 | 15001 | E 1 |
| | 88JUN29 | 15001 | E 2 |
| | 88JUN29 | 15001 | E 3 |
| | 88JUN29 | 15001 | E 4 |
| | 88JUN29 | 15001 | E 5 |
| | 88JUN29 | 15001 | E 6 |
| | 88JUN29 | 15001 | E 7 |
| | 88JUN29 | 15001 | E 8 |
| | 88JUN29 | 15001 | E 9 |
| | 88JUN29 | 15001 | E 10 |

SPECIES DEFINITION -
 TRUNCATED = NO
 LH-STAGE = COMPLETE
 PARTS CODE UNALTERED

ABUNDANCES AND WEIGHTS ARE ADJUSTED TO AN AREA OF 1.0 SQUARE METERS

| | MEAN | RANGE | S.D. | COEF.VAR |
|------------------------------|---------|----------|---------|----------|
| SAMPLE AREA (M**2) | .018 | .018- | .000 | .000 |
| TOTAL WET WEIGHT (PER M**2) | .206 | .050- | .179 | .868 |
| TOTAL ABUNDANCE (PER M**2) | 7927.78 | 2444.44- | 9026.75 | 1.14 |
| SAMPLE WET WEIGHT (PER M**2) | .116 | .022- | .122 | 1.046 |
| SAMPLE DRY WEIGHT (PER M**2) | .000 | .000- | .000 | .000 |

| ORGANISM NAME | PARTS CODE | LH-STAGE | TOTAL | MEAN | RANGE | S.D. | TOTAL | MEAN | RANGE | S.D. | AVG. BIOMASS | PERCENTAGES |
|----------------|-------------|----------|--------|-------|----------------|-------|-------|------|-------------|------|--------------|------------------------------|
| | | | | | | | | | | | MEAN | * ABUN- * DANCE * MASS |
| NEMATODA | | | 1111.1 | 111.1 | 55.6 - 388.9 | 133.5 | .039 | .004 | .006 - .011 | .00 | .0001 | 1.40 1.89 |
| POLYCHAETA | C-J/A NOSEX | | 722.2 | 72.2 | 55.6 - 222.2 | 64.4 | .044 | .004 | .006 - .006 | .00 | .0001 | .91 2.16 |
| POLYCHAETA | 6-LARVA | | 3500.0 | 350.0 | 222.2 - 1333.3 | 462.6 | .094 | .009 | .006 - .044 | .01 | .0000 | 4.41 4.58 |
| OLIGOCHAETA | C-J/A NOSEX | | 166.7 | 16.7 | 55.6 - 55.6 | 26.8 | .017 | .002 | .006 - .006 | .00 | .0001 | .21 .81 |
| MESOGASTROPODA | C-J/A NOSEX | | 222.2 | 22.2 | 222.2 - 222.2 | 70.3 | .033 | .003 | .033 - .033 | .01 | .0002 | .28 1.62 |
| HALACARIDAE | 7-JUVENILE | | 388.9 | 38.9 | 55.6 - 222.2 | 74.3 | .022 | .002 | .006 - .011 | .00 | .0001 | .49 1.08 |
| HALACARIDAE | C-J/A NOSEX | | | | | | | | | | | |

SUMMARY TABLE, PAGE 2

EPIBENTHIC PLANKTON ANALYSIS

| ORGANISM NAME | PARTS CODE | LH-STAGE | * TOTAL | MEAN | RANGE | S.D. | * TOTAL | WET WEIGHT, GRAMS/M**2 | MEAN | RANGE | S.D. | * AVG. BIOMASS | * ABUN- DANCE | PERCENTAGES BIO- MASS |
|----------------------------|------------|-------------|---------|--------|----------------|-------|---------|------------------------|------|-------|------|----------------|---------------|-----------------------|
| PODON LEUCKARTI | | A-JUV+ADULT | 2388.9 | 238.9 | 55.6 - 777.8 | 234.3 | .056 | .006 | .006 | .006- | .00 | .0000 | .0000 | 3.01 2.70 |
| PODOCOPA | | C-U/A NOSEX | 222.2 | 22.2 | 222.2 - | 70.3 | .011 | .001 | .001 | .011- | .00 | .0000 | .0000 | .28 .54 |
| CALANOIDA | | 2-NAUPLIUS | 111.1 | 11.1 | 111.1 - | 35.1 | .011 | .001 | .001 | .011- | .00 | .0001 | .0000 | .14 .54 |
| CALANOIDA | | F-COPEPODID | 500.0 | 50.0 | 55.6 - 444.4 | 139.7 | .017 | .002 | .002 | .006- | .00 | .0001 | .0001 | .63 .81 |
| PSEUDOCALANUS SP. | | F-COPEPODID | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .001 | .006- | .00 | .0001 | .0000 | .07 .27 |
| CENTROPAGES ABDOMINALIS | | F-COPEPODID | 166.7 | 16.7 | 55.6 - 111.1 | 37.5 | .011 | .001 | .001 | .006- | .00 | .0001 | .0000 | .21 .54 |
| EURYTEMORA AMERICANA | | 8-ADULT | 2333.3 | 233.3 | 55.6 - 1888.9 | 588.4 | .067 | .007 | .007 | .006- | .01 | .0001 | .0000 | 2.94 3.23 |
| EURYTEMORA AMERICANA | | F-COPEPODID | 3166.7 | 316.7 | 55.6 - 1666.7 | 487.9 | .056 | .006 | .006 | .006- | .00 | .0000 | .0000 | 3.99 2.70 |
| EURYTEMORA AMERICANA | | L-EGG-C FEM | 333.3 | 33.3 | 333.3 - | 105.4 | .011 | .001 | .001 | .011- | .00 | .0000 | .0000 | .42 .54 |
| ACARTIA SP. | | 8-ADULT | 12055.6 | 1205.6 | 388.9 - 2333.3 | 811.5 | .178 | .018 | .018 | .006- | .01 | .0000 | .0000 | 15.21 8.63 |
| ACARTIA SP. | | F-COPEPODID | 14944.4 | 1494.4 | 444.4 - 3444.4 | 998.1 | .083 | .008 | .008 | .006- | .01 | .0000 | .0000 | 18.85 4.04 |
| HARPACTICOIDA | | F-COPEPODID | 277.8 | 27.8 | 55.6 - 222.2 | 70.5 | .017 | .002 | .002 | .006- | .00 | .0001 | .0000 | .35 .81 |
| LONGIPEDIA SP. | | 8-ADULT | 666.7 | 66.7 | 55.6 - 388.9 | 122.3 | .028 | .003 | .003 | .006- | .00 | .0001 | .0000 | .84 1.35 |
| LONGIPEDIA SP. | | F-COPEPODID | 1277.8 | 127.8 | 55.6 - 666.7 | 201.2 | .039 | .004 | .004 | .006- | .00 | .0000 | .0000 | 1.61 1.89 |
| ECTINOSOMATIDAE | | 8-ADULT | 3388.9 | 338.9 | 55.6 - 2555.6 | 788.9 | .039 | .004 | .004 | .006- | .00 | .0000 | .0000 | 4.27 1.89 |
| ECTINOSOMATIDAE | | A-JUV+ADULT | 111.1 | 11.1 | 111.1 - | 35.1 | .006 | .001 | .001 | .006- | .00 | .0000 | .0000 | .14 .27 |
| HARPACTICUS SPINULOSUS | | 8-ADULT | 166.7 | 16.7 | 55.6 - 111.1 | 37.5 | .011 | .001 | .001 | .006- | .00 | .0001 | .0000 | .21 .54 |
| HARPACTICUS SPINULOSUS | | U-MATING PR | 111.1 | 11.1 | 111.1 - | 35.1 | .006 | .001 | .001 | .006- | .00 | .0000 | .0000 | .14 .27 |
| TISBE SPP. | | 8-ADULT | 3055.6 | 305.6 | 111.1 - 1444.4 | 443.1 | .039 | .004 | .004 | .006- | .00 | .0000 | .0000 | 3.85 1.89 |
| TISBE SPP. | | F-COPEPODID | 611.1 | 61.1 | 55.6 - 333.3 | 102.9 | .033 | .003 | .003 | .006- | .00 | .0001 | .0000 | .77 1.62 |
| MICROARTHRIIDION LITTORALE | | 8-ADULT | 1222.2 | 122.2 | 55.6 - 555.6 | 184.8 | .039 | .004 | .004 | .006- | .00 | .0001 | .0000 | 1.54 1.89 |
| MICROARTHRIIDION LITTORALE | | L-EGG-C FEM | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .001 | .006- | .00 | .0001 | .0000 | .07 .27 |
| TACHIDIUS TRIANGULARIS | | 8-ADULT | 833.3 | 83.3 | 55.6 - 777.8 | 244.6 | .017 | .002 | .002 | .006- | .00 | .0001 | .0001 | 1.05 .81 |
| TACHIDIUS TRIANGULARIS | | L-EGG-C FEM | 555.6 | 55.6 | 55.6 - 333.3 | 111.1 | .022 | .002 | .002 | .006- | .00 | .0001 | .0000 | .70 1.08 |
| TACHIDIUS TRIANGULARIS | | U-MATING PR | 666.7 | 66.7 | 666.7 - 666.7 | 210.8 | .011 | .001 | .001 | .011- | .00 | .0000 | .0000 | .84 .54 |

SUMMARY TABLE, PAGE 3

EPIBENTHIC PLANKTON ANALYSIS

| ORGANISM NAME | PARTS CODE | LH-STAGE | * TOTAL | MEAN | RANGE | S.D. | * * NUMBERS/M**2 | TOTAL | MEAN | RANGE | S.D. | * * WET WEIGHT, GRAMS/M**2 | MEAN | S.D. | * * AVG. BIOMASS | * ABUN- DANCE | * PERCENTAGES BIO- MASS |
|-------------------------------|-------------|----------|---------|-------|----------------|-------|---------------------|-------|------|-------------|------|-------------------------------|-------|------|---------------------|------------------|-------------------------------|
| DANIELSSENIA TYPICA | 8-ADULT | | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .00 | .14 | .27 | |
| LAOPHONTIDAE | F-COPEPODID | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .00 | .07 | .27 | |
| PARALAOPHONTE CONGENERA | 8-ADULT | | 2111.1 | 211.1 | 55.6 - 777.8 | 235.4 | | .056 | .006 | .006 - .011 | .00 | .0001 | .0000 | .00 | 2.66 | 2.70 | |
| PARALAOPHONTE CONGENERA | L-EGG-C FEM | | 1888.9 | 188.9 | 111.1 - 1111.1 | 342.7 | | .033 | .003 | .006 - .011 | .00 | .0000 | .0000 | .00 | 2.38 | 1.62 | |
| PARALAOPHONTE CONGENERA | U-MATING PR | | 1666.7 | 166.7 | 111.1 - 666.7 | 235.7 | | .033 | .003 | .006 - .011 | .00 | .0000 | .0000 | .00 | 2.10 | 1.62 | |
| LAOPHONTIDAE | 7-JUVENILE | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .00 | .07 | .27 | |
| HETEROLAOPHONTE LONGISETIGERA | 8-ADULT | | 277.8 | 27.8 | 55.6 - 111.1 | 39.3 | | .028 | .003 | .006 - .011 | .00 | .0001 | .0000 | .00 | .35 | 1.35 | |
| AMEIRA LONGIPES | 8-ADULT | | 3055.6 | 305.6 | 55.6 - 2111.1 | 651.7 | | .044 | .004 | .006 - .011 | .00 | .0001 | .0000 | .00 | 3.85 | 2.16 | |
| AMEIRA LONGIPES | L-EGG-C FEM | | 777.8 | 77.8 | 55.6 - 666.7 | 208.2 | | .022 | .002 | .006 - .011 | .00 | .0001 | .0000 | .00 | .98 | 1.08 | |
| ENHYDROSOMA SP. | 8-ADULT | | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | | .011 | .001 | .011 - .011 | .00 | .0001 | .0000 | .00 | .14 | .54 | |
| LEIMIA VAGA | 8-ADULT | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .00 | .07 | .27 | |
| ACRENHYDROSOMA KARLINGI | 8-ADULT | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .00 | .07 | .27 | |
| CLETODIDAE | 8-ADULT | | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .00 | .14 | .27 | |
| AMONARDIA NORMANI | 8-ADULT | | 277.8 | 27.8 | 55.6 - 111.1 | 47.2 | | .022 | .002 | .006 - .011 | .00 | .0001 | .0000 | .00 | .35 | 1.08 | |
| AMPHIASCUS SP. | 8-ADULT | | 1722.2 | 172.2 | 55.6 - 1333.3 | 414.5 | | .028 | .003 | .006 - .011 | .00 | .0000 | .0000 | .00 | 2.17 | 1.35 | |
| AMPHIASCUS SP. | L-EGG-C FEM | | 222.2 | 22.2 | 55.6 - 111.1 | 38.8 | | .022 | .002 | .006 - .011 | .00 | .0001 | .0000 | .00 | .28 | 1.08 | |
| STENHELIA PENICULATA | 8-ADULT | | 277.8 | 27.8 | 55.6 - 222.2 | 70.5 | | .011 | .001 | .006 - .006 | .00 | .0001 | .0001 | .00 | .35 | .54 | |
| STENHELIA CF. INOPTINATA | 8-ADULT | | 444.4 | 44.4 | 55.6 - 333.3 | 104.1 | | .022 | .002 | .006 - .011 | .00 | .0001 | .0000 | .00 | .56 | 1.08 | |
| TYPHLAMPHIASCUS PECTINIFER | 8-ADULT | | 444.4 | 44.4 | 111.1 - 222.2 | 77.7 | | .017 | .002 | .006 - .006 | .00 | .0000 | .0000 | .00 | .56 | .81 | |
| TYPHLAMPHIASCUS PECTINIFER | F-COPEPODID | | 500.0 | 50.0 | 55.6 - 222.2 | 80.5 | | .028 | .003 | .006 - .011 | .00 | .0001 | .0000 | .00 | .63 | 1.35 | |
| AMPHIASCOIDES SP. A | 8-ADULT | | 333.3 | 33.3 | 55.6 - 222.2 | 70.3 | | .022 | .002 | .006 - .011 | .00 | .0001 | .0000 | .00 | .42 | 1.08 | |
| AMPHIASCOIDES SP. A | L-EGG-C FEM | | 333.3 | 33.3 | 333.3 - 333.3 | 105.4 | | .011 | .001 | .011 - .011 | .00 | .0000 | .0000 | .00 | .42 | .54 | |
| ROBERTSONIA SP. CF KNOXI | 8-ADULT | | 1722.2 | 172.2 | 55.6 - 777.8 | 271.5 | | .044 | .004 | .006 - .011 | .00 | .0001 | .0000 | .00 | 2.17 | 2.16 | |
| ROBERTSONIA SP. CF KNOXI | L-EGG-C FEM | | 277.8 | 27.8 | 277.8 - 277.8 | 87.8 | | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .00 | .35 | .27 | |
| MESOCYTRA SP. | 8-ADULT | | 1277.8 | 127.8 | 55.6 - 1111.1 | 346.5 | | .028 | .003 | .006 - .011 | .00 | .0001 | .0000 | .00 | 1.61 | 1.35 | |

EPIBENTHIC PLANKTON ANALYSIS

| ORGANISM NAME | PARTS CODE | LH-STAGE | * TOTAL | MEAN | RANGE | S.D. | * TOTAL | MEAN | RANGE | S.D. | * AVG. BIOMASS | * ABUN- | PERCENTAGES |
|-----------------------|------------|-------------|---------|-------|---------------|-------|---------|------|-------------|------|----------------|---------|-------------|
| | | | | | | | | | | | | * DANCE | BIOMASS |
| | | | | | | | | | | | | | |
| MESOCYRA SP. | | | 944.4 | 94.4 | 55.6 - 666.7 | 208.0 | .028 | .003 | .006 - .011 | .00 | .0001 | .0000 | 1.19 1.35 |
| DACTYLOPODIA VULGARIS | | L-EGG-C FEM | 111.1 | 11.1 | 55.6 - 55.6 | 23.4 | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .14 .54 |
| DACTYLOPODIA VULGARIS | | 8-ADULT | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .07 .27 |
| DIARTHRODES SP. | | L-EGG-C FEM | 1111.1 | 111.1 | 111.1 - 388.9 | 136.1 | .028 | .003 | .006 - .006 | .00 | .0000 | .0000 | 1.40 1.35 |
| CYCLOPOIDA | | 8-ADULT | 277.8 | 27.8 | 55.6 - 111.1 | 39.3 | .028 | .003 | .006 - .011 | .00 | .0001 | .0000 | .35 1.35 |
| CYCLOPINIDAE | | C-J/A NOSEX | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | .011 | .001 | .011 - .011 | .00 | .0001 | .0000 | .14 .54 |
| BALANOMORPHA | | 8-ADULT | 722.2 | 72.2 | 111.1 - 222.2 | 64.4 | .050 | .005 | .006 - .011 | .00 | .0001 | .0000 | .91 2.43 |
| BALANOMORPHA | | 2-NAUPLIUS | 111.1 | 11.1 | 55.6 - 55.6 | 23.4 | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .14 .54 |
| LEUCON SP | | E-CYPRIS | 111.1 | 11.1 | 55.6 - 111.1 | 35.1 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .14 .27 |
| LEUCONIDAE | | C-J/A NOSEX | 55.6 | 5.6 | 55.6 - 111.1 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .07 .27 |
| CUMELLA VULGARIS | | C-J/A NOSEX | 722.2 | 72.2 | 55.6 - 333.3 | 114.3 | .033 | .003 | .006 - .011 | .00 | .0001 | .0000 | .91 1.62 |
| CUMELLA VULGARIS | | 7-JUVENILE | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .07 .27 |
| GAMMARIDEA | | 8-ADULT | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .07 .27 |
| COROPHIUM SP. | | 7-JUVENILE | 277.8 | 27.8 | 55.6 - 111.1 | 47.2 | .022 | .002 | .006 - .011 | .00 | .0001 | .0000 | .35 1.08 |
| PONTOGENEIA SP. | | 7-JUVENILE | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .07 .27 |
| PONTOGENEIA SP. CF | | 7-JUVENILE | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .017 | .002 | .017 - .017 | .01 | .0003 | .0000 | .07 .81 |
| PONTOGENEIA SP. CF | | 7-JUVENILE | 166.7 | 16.7 | 55.6 - 166.7 | 52.7 | .083 | .008 | .083 - .083 | .03 | .0005 | .0000 | .21 4.04 |
| GAMMARIDEA | | C-J/A NOSEX | 555.6 | 55.6 | 166.7 - 555.6 | 175.7 | .011 | .001 | .011 - .011 | .00 | .0000 | .0000 | .70 .54 |
| CAPRELLIDEA | | 8-ADULT | 111.1 | 11.1 | 55.6 - 55.6 | 23.4 | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .14 .54 |
| CAPRELLA SP. | | 7-JUVENILE | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .094 | .009 | .094 - .094 | .03 | .0017 | .0000 | .07 4.58 |

TOTAL NUMBER OF PLANKTON CATEGORIES 76

SHANNON-WEINER DIVERSITY INDEX NUMBERS 4.76

BRILLOUIN-S DIVERSITY INDEX BASED ON NUMBERS BIOMASS 5.71

BRILLOUIN-S DIVERSITY INDEX BASED ON NUMBERS BIOMASS 4.75

 * GRAND SUMMARY *

FROM COLLECTIONS:

| FILEID | STATION | SAMPLE |
|---------|---------|--------|
| 88JUN29 | 15002 | E 1 |
| 88JUN29 | 15002 | E 2 |
| 88JUN29 | 15002 | E 3 |
| 88JUN29 | 15002 | E 4 |
| 88JUN29 | 15002 | E 5 |
| 88JUN29 | 15002 | E 6 |
| 88JUN29 | 15002 | E 7 |
| 88JUN29 | 15002 | E 8 |
| 88JUN29 | 15002 | E 9 |
| 88JUN29 | 15002 | E10 |

SPECIES DEFINITION -
 TRUNCATED = NO
 LH-STAGE = COMPLETE
 PARTS CODE UNALTERED

ABUNDANCES AND WEIGHTS ARE ADJUSTED TO AN AREA OF 1.0 SQUARE METERS

| | MEAN | RANGE | S.D. | COEF. VAR |
|------------------------------|---------|---------|---------|-----------|
| SAMPLE AREA (M**2) | .018 | .018- | .000 | .000 |
| TOTAL WET WEIGHT (PER M**2) | .119 | .033- | .071 | .592 |
| TOTAL ABUNDANCE (PER M**2) | 4166.67 | 666.67- | 2039.73 | .49 |
| SAMPLE WET WEIGHT (PER M**2) | .056 | .006- | .039 | .702 |
| SAMPLE DRY WEIGHT (PER M**2) | .000 | .000- | .000 | .000 |

| ORGANISM NAME | PARTS CODE | LH-STAGE | * TOTAL | MEAN | RANGE | S.D. | * TOTAL | MEAN | RANGE | S.D. | * AVG. BIOMASS | * ABUN- DANCE | * PERCENTAGES BIO- MASS | |
|-----------------|------------|----------|---------|-------|--------|-------|---------|------|-------|------|----------------|---------------|-------------------------|------|
| NEMATODA | | | 1888.9 | 188.9 | 55.6- | 315.6 | .022 | .002 | .006- | .00 | .0000 | .0000 | 4.53 | 1.86 |
| | | | | | 833.3 | | | | .006 | | | | | |
| POLYCHAETA | | | 333.3 | 33.3 | 55.6- | 59.7 | .017 | .002 | .006- | .00 | .0001 | .0000 | .80 | 1.40 |
| | | | | | 166.7 | | | | .006 | | | | | |
| POLYCHAETA | | | 888.9 | 88.9 | 222.2- | 214.7 | .011 | .001 | .006- | .00 | .0000 | .0000 | 2.13 | .93 |
| | | | | | 666.7 | | | | .006 | | | | | |
| OLIGOCHAETA | | | 444.4 | 44.4 | 55.6- | 104.1 | .028 | .003 | .006- | .01 | .0001 | .0000 | 1.07 | 2.33 |
| | | | | | 333.3 | | | | .017 | | | | | |
| MESOGASTROPODA | | | 111.1 | 11.1 | 111.1- | 35.1 | .017 | .002 | .017- | .01 | .0002 | .0000 | .27 | 1.40 |
| | | | | | 111.1 | | | | .017 | | | | | |
| OPISTHOBRANCHIA | | | 55.6 | 5.6 | 55.6- | 17.6 | .028 | .003 | .028- | .01 | .0005 | .0000 | .13 | 2.33 |
| | | | | | 55.6 | | | | .028 | | | | | |
| 7-JUVENILE | | | | | | | | | | | | | | |

EPIBENTHIC PLANKTON ANALYSIS

SUMMARY TABLE, PAGE 3

| ORGANISM NAME | PARTS CODE | LH-STAGE | NUMBERS/M**2 | | | WET WEIGHT, GRAMS/M**2 | | | * AVG. BIOMASS | | | * PERCENTAGES | | |
|--------------------------------|------------|----------|--------------|------|---------------|------------------------|---------|------|----------------|--------|--------|---------------|---------|-----------------|
| | | | * TOTAL | MEAN | RANGE | * S.D. | * TOTAL | MEAN | RANGE | * S.D. | * MEAN | S.D. | * DANCE | * ABUN- MASS |
| TACHIDIUS TRIANGULARIS | | | 500.0 | 50.0 | 55.6 - 166.7 | 55.2 | .033 | .003 | .006 - .006 | .00 | .0001 | .0000 | 1.20 | 2.79 |
| 8-ADULT | | | | | | | | | | | | | | |
| TACHIDIUS TRIANGULARIS | | | 500.0 | 50.0 | 55.6 - 444.4 | 139.7 | .011 | .001 | .006 - .006 | .00 | .0001 | .0001 | 1.20 | .93 |
| L-EGG-C FEM | | | | | | | | | | | | | | |
| LAOPHONTIDAE | | | 111.1 | 11.1 | 55.6 - 55.6 | 23.4 | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .27 | .93 |
| F-COPEPODID | | | | | | | | | | | | | | |
| PARALAOPHONTE CONGENERA | | | 222.2 | 22.2 | 55.6 - 111.1 | 38.8 | .017 | .002 | .006 - .006 | .00 | .0001 | .0000 | .53 | 1.40 |
| 8-ADULT | | | | | | | | | | | | | | |
| PARALAOPHONTE CONGENERA | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| L-EGG-C FEM | | | | | | | | | | | | | | |
| PARALAOPHONTE CONGENERA | | | 222.2 | 22.2 | 111.1 - 111.1 | 46.8 | .011 | .001 | .006 - .006 | .00 | .0000 | .0000 | .53 | .93 |
| U-MATING PR | | | | | | | | | | | | | | |
| HETEROLAOPHONTE LONGISEITIGERA | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| 8-ADULT | | | | | | | | | | | | | | |
| AMEIRA LONGIPES | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| 8-ADULT | | | | | | | | | | | | | | |
| HUNTEMANNIA JADENSIS | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| 8-ADULT | | | | | | | | | | | | | | |
| LEIMIA VAGA | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| 8-ADULT | | | | | | | | | | | | | | |
| ACRENHYDROSOMA KARLINGI | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| F-COPEPODID | | | | | | | | | | | | | | |
| AMPHIASCUS SP. | | | 277.8 | 27.8 | 55.6 - 222.2 | 70.5 | .011 | .001 | .006 - .006 | .00 | .0001 | .0001 | .67 | .93 |
| 8-ADULT | | | | | | | | | | | | | | |
| AMPHIASCUS SP. | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| L-EGG-C FEM | | | | | | | | | | | | | | |
| STENHELIA SP. | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| 8-ADULT | | | | | | | | | | | | | | |
| TYPHLAMPHIASCUS PECTINIFER | | | 333.3 | 33.3 | 55.6 - 277.8 | 87.6 | .011 | .001 | .006 - .006 | .00 | .0001 | .0001 | .80 | .93 |
| 8-ADULT | | | | | | | | | | | | | | |
| TYPHLAMPHIASCUS PECTINIFER | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| L-EGG-C FEM | | | | | | | | | | | | | | |
| AMPHIASCOIDES SP. A | | | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .27 | .47 |
| 8-ADULT | | | | | | | | | | | | | | |
| ROBERTSONIA PROPINQUA | | | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .27 | .47 |
| 8-ADULT | | | | | | | | | | | | | | |
| ROBERTSONIA SP. CF KNOXI | | | 166.7 | 16.7 | 55.6 - 111.1 | 37.5 | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .40 | .93 |
| 8-ADULT | | | | | | | | | | | | | | |
| ROBERTSONIA SP. CF KNOXI | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| L-EGG-C FEM | | | | | | | | | | | | | | |
| BRYOCAMPTUS SP. | | | 611.1 | 61.1 | 611.1 - 611.1 | 193.3 | .011 | .001 | .011 - .011 | .00 | .0000 | .0000 | 1.47 | .93 |
| 8-ADULT | | | | | | | | | | | | | | |
| BRYOCAMPTUS SP. | | | 500.0 | 50.0 | 500.0 - 500.0 | 158.1 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | 1.20 | .47 |
| F-COPEPODID | | | | | | | | | | | | | | |
| MESOCHRA SP. | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| 8-ADULT | | | | | | | | | | | | | | |
| PARADACTYLOPODIA SP. | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| 8-ADULT | | | | | | | | | | | | | | |
| DIARTHRODES SP. | | | 611.1 | 61.1 | 222.2 - 388.9 | 134.7 | .011 | .001 | .006 - .006 | .00 | .0000 | .0000 | 1.47 | .93 |
| 8-ADULT | | | | | | | | | | | | | | |

EPIBENTHIC PLANKTON ANALYSIS

SUMMARY TABLE, PAGE 4

| ORGANISM NAME | * PARTS CODE | * LH-STAGE | * TOTAL | MEAN | RANGE | S.D. | * TOTAL | WET WEIGHT, GRAMS/M**2 | MEAN | RANGE | S.D. | * AVG. BIOMASS | * ABUN- DANCE | * PERCENTAGES BIO- MASS |
|----------------------|--------------|------------|---------|-------|---------------|-------|---------|------------------------|-------------|-------|-------|----------------|---------------|-------------------------|
| DIARTHRODES SP. | | | 166.7 | 16.7 | 166.7 - 166.7 | 52.7 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .40 | .47 |
| DIARTHRODES SP. | A-JUV+ADULT | | 55.6 | 5.6 | 55.6 - 166.7 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| CYCLOPOIDA | F-COPEPODID | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| CYCLOPOIDA | 8-ADULT | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| CORYCAEUS ANGLICUS | F-COPEPODID | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| OITHONA SIMILIS | A-JUV+ADULT | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| BALANOMORPHA | 8-ADULT | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| BALANOMORPHA | 2-NAUPLIUS | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| LEUCON SP | E-CYPRIS | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| CUMELLA VULGARIS | C-U/A NOSEX | | 1055.6 | 105.6 | 55.6 - 55.6 | 222.9 | .039 | .004 | .006 - .006 | .01 | .0001 | .0000 | 2.53 | 3.26 |
| LEPTOCHELIA SAVIGNYI | 7-JUVENILE | | 55.6 | 5.6 | 722.2 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| MUNNA SP. | C-U/A NOSEX | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| COROPHIUM SP. | 7-JUVENILE | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| PONTOGENEIA SP. | 7-JUVENILE | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .13 | .47 |
| HIPPOLYTIIDAE | 7-JUVENILE | | 111.1 | 11.1 | 55.6 - 111.1 | 35.1 | .094 | .009 | .006 - .094 | .03 | .0009 | .0000 | .27 | 7.91 |

TOTAL NUMBER OF PLANKTON CATEGORIES 71

SHANNON-WEINER DIVERSITY INDEX NUMBERS 4.25
 BIOMASS 5.41
 BRILLOUIN-S DIVERSITY INDEX BASED ON NUMBERS 4.25

EPIBENTHIC PLANKTON ANALYSIS

SUMMARY TABLE, PAGE 2

| ORGANISM NAME | PARTS CODE | LH-STAGE | * TOTAL | MEAN | RANGE | S.D. | * TOTAL | WET WEIGHT, GRAMS/M**2 | RANGE | S.D. | * AVG. BIOMASS | * ABUN- DANCE | * PERCENTAGES BIO- MASS |
|----------------------------|------------|-------------|---------|--------|----------------|-------|---------|------------------------|-------------|------|----------------|---------------|-------------------------|
| BIVALVIA | | 7-JUVENILE | 1444.4 | 144.4 | 55.6 - 444.4 | 196.3 | .056 | .006 | .006 - .022 | .01 | .0001 | .0000 | 1.08 1.55 |
| BIVALVIA | | C-J/A NOSEX | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 .16 |
| HALACARIDAE | | C-J/A NOSEX | 722.2 | 72.2 | 55.6 - 277.8 | 101.6 | .028 | .003 | .006 - .006 | .00 | .0001 | .0000 | .54 .78 |
| PODON LEUCKARTI | | A-JUV+ADULT | 1166.7 | 116.7 | 55.6 - 222.2 | 61.1 | .061 | .006 | .006 - .011 | .00 | .0001 | .0000 | .87 1.71 |
| PODOCOPA | | C-J/A NOSEX | 1222.2 | 122.2 | 55.6 - 333.3 | 133.0 | .039 | .004 | .006 - .006 | .00 | .0001 | .0000 | .91 1.09 |
| PODOCOPA | | F-COPEPODID | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 .16 |
| CALANOIDA | | 2-NAUPLIUS | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 .16 |
| CALANOIDA | | F-COPEPODID | 166.7 | 16.7 | 55.6 - 55.6 | 26.8 | .017 | .002 | .006 - .006 | .00 | .0001 | .0000 | .12 .47 |
| PSEUDOCALANUS SP. | | F-COPEPODID | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 .16 |
| CENTROPAGES ABDOMINALIS | | F-COPEPODID | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 .16 |
| EURYTEMORA AMERICANA | | 8-ADULT | 500.0 | 50.0 | 55.6 - 166.7 | 61.1 | .033 | .003 | .006 - .011 | .00 | .0001 | .0000 | .37 .93 |
| EURYTEMORA AMERICANA | | F-COPEPODID | 1611.1 | 161.1 | 55.6 - 388.9 | 137.2 | .050 | .005 | .006 - .011 | .00 | .0000 | .0000 | 1.20 1.40 |
| ACARTIA SP. | | 8-ADULT | 9444.4 | 944.4 | 277.8 - 2000.0 | 538.6 | .122 | .012 | .006 - .028 | .01 | .0000 | .0000 | 7.04 3.42 |
| ACARTIA SP. | | F-COPEPODID | 13555.6 | 1355.6 | 222.2 - 2555.6 | 783.6 | .083 | .008 | .006 - .017 | .00 | .0000 | .0000 | 10.10 2.33 |
| HARPACTICOIDA | | F-COPEPODID | 1000.0 | 100.0 | 55.6 - 222.2 | 77.7 | .050 | .005 | .006 - .011 | .00 | .0001 | .0000 | .75 1.40 |
| LONGIPEDIA SP. | | 8-ADULT | 2555.6 | 255.6 | 55.6 - 888.9 | 272.4 | .050 | .005 | .006 - .011 | .00 | .0000 | .0000 | 1.90 1.40 |
| LONGIPEDIA SP. | | F-COPEPODID | 1333.3 | 133.3 | 55.6 - 444.4 | 139.1 | .044 | .004 | .006 - .011 | .00 | .0000 | .0000 | .99 1.24 |
| LONGIPEDIA SP. | | L-EGG-C FEM | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .08 .16 |
| LONGIPEDIIDAE | | F-COPEPODID | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .08 .16 |
| ECTINOSOMATIDAE | | 8-ADULT | 2277.8 | 227.8 | 55.6 - 888.9 | 293.3 | .044 | .004 | .006 - .011 | .00 | .0000 | .0000 | 1.70 1.24 |
| ECTINOSOMATIDAE | | A-JUV+ADULT | 277.8 | 27.8 | 277.8 - 277.8 | 87.8 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .21 .16 |
| HARPACTICUS SPINULOSUS | | 8-ADULT | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 .16 |
| TISBE SPP. | | 8-ADULT | 1222.2 | 122.2 | 55.6 - 277.8 | 116.5 | .044 | .004 | .006 - .011 | .00 | .0001 | .0000 | .91 1.24 |
| TISBE SPP. | | F-COPEPODID | 555.6 | 55.6 | 55.6 - 166.7 | 64.2 | .033 | .003 | .006 - .011 | .00 | .0001 | .0000 | .41 .93 |
| MICROARTHRIIDION LITTORALE | | 8-ADULT | 833.3 | 83.3 | 55.6 - 222.2 | 87.8 | .033 | .003 | .006 - .011 | .00 | .0001 | .0000 | .62 .93 |

SUMMARY TABLE, PAGE 3

EPIBENTHIC PLANKTON ANALYSIS

| ORGANISM NAME | PARTS CODE | LH-STAGE | * TOTAL | MEAN | RANGE | S.D. | * TOTAL | MEAN | RANGE | S.D. | * AVG. BIOMASS | * ABUN- DANCE | * PERCENTAGES |
|-------------------------------|------------|----------|---------|-------|----------------|-------|---------|------|-------------|------|----------------|---------------|---------------|
| | | | | | | | | | | | | | |
| TACHIDIUS TRIANGULARIS | | | 611.1 | 61.1 | 55.6 - 222.2 | 80.5 | .028 | .003 | .006 - .006 | .00 | .0001 | .0000 | .46 |
| 8-ADULT | | | 1722.2 | 172.2 | 55.6 - 666.7 | 205.3 | .044 | .004 | .006 - .011 | .00 | .0000 | .0000 | 1.28 |
| DANIELSSENIA TYPICA | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 |
| 8-ADULT | | | 222.2 | 22.2 | 55.6 - 111.1 | 38.8 | .017 | .002 | .006 - .006 | .00 | .0001 | .0000 | .17 |
| LAOPHONTIDAE | | | 5944.4 | 594.4 | 111.1 - 1777.8 | 605.2 | .061 | .006 | .006 - .011 | .00 | .0000 | .0000 | 4.43 |
| 8-ADULT | | | 2833.3 | 283.3 | 55.6 - 1222.2 | 359.5 | .056 | .006 | .006 - .011 | .00 | .0000 | .0000 | 2.11 |
| PARALAOPHONTE CONGENERA | | | 1444.4 | 144.4 | 111.1 - 666.7 | 228.6 | .033 | .003 | .006 - .011 | .00 | .0000 | .0000 | 1.08 |
| L-EGG-C FEM | | | 388.9 | 38.9 | 55.6 - 277.8 | 87.1 | .017 | .002 | .006 - .006 | .00 | .0001 | .0000 | .29 |
| 8-ADULT | | | 166.7 | 16.7 | 55.6 - 111.1 | 37.5 | .017 | .002 | .006 - .011 | .00 | .0001 | .0000 | .12 |
| HETEROLAOPHONTE LONGISETIGERA | | | 4888.9 | 488.9 | 55.6 - 1444.4 | 478.5 | .050 | .005 | .006 - .011 | .00 | .0000 | .0000 | 3.64 |
| 8-ADULT | | | 333.3 | 33.3 | 55.6 - 111.1 | 46.8 | .028 | .003 | .006 - .011 | .00 | .0001 | .0000 | .25 |
| L-EGG-C FEM | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 |
| 8-ADULT | | | 1166.7 | 116.7 | 55.6 - 500.0 | 160.3 | .039 | .004 | .006 - .011 | .00 | .0001 | .0000 | .87 |
| ACRENHYDROSOMA KARLINGI | | | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | .011 | .001 | .011 - .011 | .00 | .0001 | .0000 | .08 |
| 8-ADULT | | | 111.1 | 11.1 | 111.1 - 55.6 | 35.1 | .011 | .001 | .011 - .006 | .00 | .0001 | .0000 | .08 |
| AMONARDIA NORMANI | | | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | .011 | .001 | .011 - .011 | .00 | .0001 | .0000 | .08 |
| 8-ADULT | | | 1111.1 | 111.1 | 55.6 - 444.4 | 148.1 | .039 | .004 | .006 - .011 | .00 | .0001 | .0000 | .83 |
| F-COPEPODID | | | 388.9 | 38.9 | 55.6 - 111.1 | 45.7 | .033 | .003 | .006 - .011 | .00 | .0001 | .0000 | .29 |
| 8-ADULT | | | 2944.4 | 294.4 | 55.6 - 1000.0 | 371.3 | .044 | .004 | .006 - .011 | .00 | .0000 | .0000 | 2.19 |
| AMPHIASCUS SP. | | | 2111.1 | 211.1 | 111.1 - 555.6 | 179.2 | .050 | .005 | .006 - .011 | .00 | .0000 | .0000 | 1.57 |
| 8-ADULT | | | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .08 |
| F-COPEPODID | | | 6333.3 | 633.3 | 111.1 - 2777.8 | 800.5 | .083 | .008 | .006 - .033 | .01 | .0000 | .0000 | 4.72 |
| 8-ADULT | | | 1777.8 | 177.8 | 55.6 - 777.8 | 235.4 | .050 | .005 | .006 - .011 | .00 | .0001 | .0000 | 1.33 |
| TYPHILAMPHIASCUS PECTINIFER | | | 777.8 | 77.8 | 55.6 - 444.4 | 136.6 | .033 | .003 | .006 - .011 | .00 | .0001 | .0000 | .58 |
| 8-ADULT | | | 500.0 | 50.0 | 55.6 - 222.2 | 80.5 | .022 | .002 | .006 - .006 | .00 | .0001 | .0000 | .37 |
| F-COPEPODID | | | | | | | | | | | | | .62 |
| 8-ADULT | | | | | | | | | | | | | .06 |

EPIBENTHIC PLANKTON ANALYSIS

SUMMARY TABLE, PAGE 4

| ORGANISM NAME | PARTS CODE | LH-STAGE | * TOTAL | MEAN | RANGE | S.D. | * TOTAL | WET WEIGHT, GRAMS/M**2 | MEAN | RANGE | S.D. | * AVG. BIOMASS | * ABUN- DANCE | * PERCENTAGES BIO- MASS |
|--------------------------|-------------|----------|---------|-------|---------------|--------|---------|------------------------|-------------|-------|-------|----------------|---------------|-------------------------|
| AMPHIASCOIDES SP. A | F-COPEPODID | | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .08 | .16 |
| AMPHIASCOIDES SP. A | L-EGG-C FEM | | 666.7 | 66.7 | 55.6 - 555.6 | 173.3 | .022 | .002 | .006 - .011 | .00 | .0001 | .0000 | .50 | .62 |
| ROBERTSONIA SP. | 8-ADULT | | 166.7 | 16.7 | 166.7 - 166.7 | 52.7 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .12 | .16 |
| ROBERTSONIA SP. | L-EGG-C FEM | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 | .16 |
| ROBERTSONIA SP. CF | 8-ADULT | | 3666.7 | 366.7 | 55.6 - 1055.6 | 432.1 | .056 | .006 | .006 - .011 | .00 | .0000 | .0000 | 2.73 | 1.55 |
| ROBERTSONIA SP. CF | L-EGG-C FEM | | 1500.0 | 150.0 | 55.6 - 444.4 | 169.8 | .039 | .004 | .006 - .011 | .00 | .0000 | .0000 | 1.12 | 1.09 |
| MESOCHRA SP. | 8-ADULT | | 166.7 | 16.7 | 55.6 - 111.1 | 37.5 | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .12 | .31 |
| MESOCHRA SP. | L-EGG-C FEM | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 | .16 |
| DACTYLOPODIA VULGARIS | 8-ADULT | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 | .16 |
| DACTYLOPODIA CRASSIPES | 8-ADULT | | 111.1 | 11.1 | 55.6 - 55.6 | 23.4 | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .08 | .31 |
| DACTYLOPODIA TISBOIDES | 8-ADULT | | 222.2 | 22.2 | 55.6 - 111.1 | 38.8 | .022 | .002 | .006 - .011 | .00 | .0001 | .0000 | .17 | .62 |
| PARADACTYLOPODIA SERRATA | 8-ADULT | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 | .16 |
| DIARTHRODES SP. | 8-ADULT | | 1111.1 | 111.1 | 111.1 - 222.2 | 86.9 | .044 | .004 | .006 - .011 | .00 | .0000 | .0000 | .83 | 1.24 |
| CYCLOPOIDA | C-J/A NOSEX | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 | .16 |
| CYCLOPOIDA | F-COPEPODID | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 | .16 |
| OITHONA SIMILIS | 8-ADULT | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 | .16 |
| BALANOMORPHA | 2-NAUPLIUS | | 277.8 | 27.8 | 55.6 - 111.1 | 39.3 | .028 | .003 | .006 - .011 | .00 | .0001 | .0000 | .21 | .78 |
| BALANOMORPHA | E-CYPRIS | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 | .16 |
| LEUCON SP | C-J/A NOSEX | | 1222.2 | 122.2 | 55.6 - 333.3 | 116.5 | .067 | .007 | .006 - .022 | .01 | .0001 | .0000 | .91 | 1.86 |
| CUMELLA VULGARIS | 7-JUVENILE | | 8611.1 | 861.1 | 55.6 - 4333.3 | 1259.3 | .333 | .033 | .006 - .133 | .04 | .0001 | .0000 | 6.42 | 9.32 |
| CUMELLA VULGARIS | 8-ADULT | | 722.2 | 72.2 | 111.1 - 444.4 | 143.6 | .033 | .003 | .006 - .022 | .01 | .0000 | .0000 | .54 | .93 |
| LEPTOCHELIA SAVIGNYI | 7-JUVENILE | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 | .16 |
| LEPTOCHELIA SAVIGNYI | C-J/A NOSEX | | 166.7 | 16.7 | 55.6 - 111.1 | 37.5 | .033 | .003 | .011 - .022 | .01 | .0002 | .0000 | .12 | .93 |
| GAMMARIDEA | 7-JUVENILE | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 | .16 |
| COROPHIUM SP. | 7-JUVENILE | | 1555.6 | 155.6 | 55.6 - 1111.1 | 343.3 | .067 | .007 | .006 - .044 | .01 | .0001 | .0000 | 1.16 | 1.86 |

SUMMARY TABLE, PAGE 5

EPIBENTHIC PLANKTON ANALYSIS

| ORGANISM NAME | * PARTS CODE | * LH-STAGE | * TOTAL | NUMBERS/M**2 | MEAN | RANGE | S.D. | * TOTAL | WET WEIGHT, GRAMS/M**2 | MEAN | RANGE | S.D. | * AVG. BIOMASS | * ABUN-DANCE | * PERCENTAGES BIOMASS | |
|------------------------|--------------|-------------|---------|--------------|---------------|-------|------|---------|------------------------|------|-------------|------|----------------|--------------|-----------------------|------|
| COROPHIUM ASCHERUSICUM | | | 333.3 | 33.3 | 333.3 - 333.3 | 105.4 | .156 | .156 | .016 | .016 | .156 - .156 | .05 | .0005 | .0000 | .25 | 4.35 |
| PONTOGENEIA SP. | | 8-ADULT | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .006 | .001 | .001 | .006 - .006 | .00 | .0001 | .0000 | .04 | .16 |
| PHOTIS SP. | | 7-JUVENILE | 333.3 | 33.3 | 111.1 - 55.6 | 75.0 | .050 | .050 | .005 | .005 | .017 - .006 | .01 | .0002 | .0000 | .25 | 1.40 |
| CAPRELLA SP. | | 7-JUVENILE | 222.2 | 22.2 | 222.2 - 222.2 | 70.3 | .100 | .100 | .010 | .010 | .100 - .033 | .03 | .0005 | .0000 | .17 | 2.80 |
| CAPRELLA SP. | | 8-ADULT | 111.1 | 11.1 | 111.1 - 222.2 | 35.1 | .028 | .028 | .003 | .003 | .028 - .100 | .01 | .0003 | .0000 | .08 | .78 |
| CAPRELLA SP. | | A-JUV+ADULT | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | .133 | .133 | .013 | .013 | .028 - .133 | .04 | .0012 | .0000 | .08 | 3.73 |
| DIPTERA-CHIRONOMIDAE | | L-EGG-C FEM | 166.7 | 16.7 | 111.1 - 111.1 | 37.5 | .017 | .017 | .002 | .002 | .133 - .006 | .00 | .0001 | .0000 | .12 | .47 |
| | | 6-LARVA | | | 111.1 | | | | | | .011 | | | | | |

TOTAL NUMBER OF PLANKTON CATEGORIES 88

SHANNON-WEINER DIVERSITY INDEX NUMBERS 4.80
 BIOMASS 5.58

BRILLOUIN-S DIVERSITY INDEX BASED ON NUMBERS 4.79

 * GRAND SUMMARY *

| FROM COLLECTIONS: | FILEID | STATION | SAMPLE |
|-------------------|--------|---------|--------|
| | 88JYO1 | 15002 | E 1 |
| | 88JYO1 | 15002 | E 2 |
| | 88JYO1 | 15002 | E 3 |
| | 88JYO1 | 15002 | E 4 |
| | 88JYO1 | 15002 | E 5 |
| | 88JYO1 | 15002 | E 6 |
| | 88JYO1 | 15002 | E 7 |
| | 88JYO1 | 15002 | E 8 |
| | 88JYO1 | 15002 | E 9 |
| | 88JYO1 | 15002 | E 10 |

SPECIES DEFINITION -
 TRUNCATED = NO
 LH-STAGE = COMPLETE
 PARTS CODE UNALTERED

ABUNDANCES AND WEIGHTS ARE ADJUSTED TO AN AREA OF 1.0 SQUARE METERS

| | MEAN | RANGE | S. D. | COEF. VAR |
|------------------------------|---------|----------|---------|-----------|
| SAMPLE AREA (M**2) | .018 | .018- | .000 | .000 |
| TOTAL WET WEIGHT (PER M**2) | .146 | .067- | .105 | .717 |
| TOTAL ABUNDANCE (PER M**2) | 6150.00 | 2111.11- | 5806.08 | .94 |
| SAMPLE WET WEIGHT (PER M**2) | .075 | .022- | .085 | 1.133 |
| SAMPLE DRY WEIGHT (PER M**2) | .000 | .000- | .000 | .000 |

| ORGANISM NAME | * PARTS CODE | * LH-STAGE | * TOTAL | * MEAN | * RANGE | * S. D. | * TOTAL | * MEAN | * RANGE | * S. D. | * AVG. BIOMASS | * ABUN- DANCE | * PERCENTAGES BIO- MASS |
|---------------|--------------|------------|---------|--------|---------|---------|---------|--------|---------|---------|----------------|---------------|-------------------------|
| TURBELLARIA | | | 55.6 | 5.6 | 55.6 - | 17.6 | .006 | .001 | .006- | .00 | .0001 | .09 | .38 |
| | C-J/A NOSEX | | 2555.6 | 255.6 | 55.6 - | 423.3 | .044 | .004 | .006- | .00 | .0001 | 4.16 | 3.04 |
| NEMATODA | | | 333.3 | 33.3 | 1055.6 | 38.8 | .028 | .003 | .006- | .00 | .0001 | .54 | 1.90 |
| POLYCHAETA | | | 2166.7 | 216.7 | 111.1 | 628.8 | .039 | .004 | .006- | .01 | .0000 | 3.52 | 2.66 |
| | C-J/A NOSEX | | 500.0 | 50.0 | 2000.0 | 106.2 | .022 | .002 | .006- | .00 | .0001 | .81 | 1.52 |
| BIVALVIA | | | 55.6 | 5.6 | 333.3 | 17.6 | .006 | .001 | .006- | .00 | .0001 | .09 | .38 |
| HALACARIDAE | | | 55.6 | 5.6 | 55.6 | | | | | | | | |

EPIBENTHIC PLANKTON ANALYSIS

SUMMARY TABLE, PAGE 2

| ORGANISM NAME | PARTS CODE | LH-STAGE | NUMBERS/M**2 | | | WET WEIGHT, GRAMS/M**2 | | | * AVG. BIOMASS * PERCENTAGES | | | | | |
|----------------------------|------------|-------------|--------------|--------|----------------|------------------------|-------|------|------------------------------|------|-------|-------|--------------------|--------|
| | | | TOTAL | MEAN | RANGE | S.D. | TOTAL | MEAN | RANGE | S.D. | MEAN | S.D. | * ABUN- * DANCE | * MASS |
| PODON LEUCKARTI | | A-JUV+ADULT | 2555.6 | 255.6 | 111.1 - 555.6 | 159.7 | .050 | .005 | .006 - .006 | .00 | .0000 | .0000 | 4.16 | 3.42 |
| PODOCOPA | | C-J/A NOSEX | 666.7 | 66.7 | 111.1 - 555.6 | 175.3 | .011 | .001 | .006 - .006 | .00 | .0000 | .0000 | 1.08 | .76 |
| COPEPODA | | 2-NAUPLIUS | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .09 | .38 |
| CALANOIDA | | F-COPEPODID | 500.0 | 50.0 | 55.6 - 166.7 | 61.1 | .028 | .003 | .006 - .006 | .00 | .0001 | .0000 | .81 | 1.90 |
| CENTROPAGES ABDOMINALIS | | F-COPEPODID | 333.3 | 33.3 | 111.1 - 222.2 | 75.0 | .011 | .001 | .006 - .006 | .00 | .0000 | .0000 | .54 | .76 |
| EURYTEMORA AMERICANA | | 8-ADULT | 166.7 | 16.7 | 55.6 - 55.6 | 26.8 | .017 | .002 | .006 - .006 | .00 | .0001 | .0000 | .27 | 1.14 |
| EURYTEMORA AMERICANA | | A-JUV+ADULT | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .18 | .38 |
| EURYTEMORA AMERICANA | | F-COPEPODID | 1444.4 | 144.4 | 55.6 - 333.3 | 128.8 | .039 | .004 | .006 - .006 | .00 | .0000 | .0000 | 2.35 | 2.66 |
| ACARTIA SP. | | 8-ADULT | 1111.1 | 111.1 | 444.4 - 222.2 | 511.9 | .156 | .016 | .006 - .033 | .01 | .0000 | .0000 | 18.07 | 10.65 |
| ACARTIA SP. | | F-COPEPODID | 17055.6 | 1705.6 | 555.6 - 4500.0 | 1204.4 | .100 | .010 | .006 - .028 | .01 | .0000 | .0000 | 27.73 | 6.84 |
| HARPACTICOIDA | | F-COPEPODID | 444.4 | 44.4 | 222.2 | 73.1 | .022 | .002 | .006 - .006 | .00 | .0001 | .0000 | .72 | 1.52 |
| LONGIPEDIA SP. | | 8-ADULT | 1055.6 | 105.6 | 55.6 - 444.4 | 155.9 | .033 | .003 | .006 - .006 | .00 | .0001 | .0000 | 1.72 | 2.28 |
| LONGIPEDIA SP. | | F-COPEPODID | 1944.4 | 194.4 | 55.6 - 833.3 | 251.5 | .050 | .005 | .006 - .006 | .00 | .0001 | .0000 | 3.16 | 3.42 |
| ECTINOSOMATIDAE | | 8-ADULT | 444.4 | 44.4 | 277.8 | 86.1 | .022 | .002 | .006 - .006 | .00 | .0001 | .0000 | .72 | 1.52 |
| ECTINOSOMATIDAE | | L-EGG-C FEM | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .09 | .38 |
| HARPACTICUS SPINULOSUS | | 8-ADULT | 444.4 | 44.4 | 55.6 - 166.7 | 68.3 | .022 | .002 | .006 - .006 | .00 | .0001 | .0000 | .72 | 1.52 |
| HARPACTICUS SPINULOSUS | | U-MATING PR | 222.2 | 22.2 | 222.2 - 222.2 | 70.3 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .36 | .38 |
| TISBE SPP. | | 1-EGG | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .18 | .38 |
| TISBE SPP. | | 8-ADULT | 3611.1 | 361.1 | 111.1 - 1055.6 | 443.9 | .067 | .007 | .006 - .022 | .01 | .0000 | .0000 | 5.87 | 4.56 |
| TISBE SPP. | | F-COPEPODID | 888.9 | 88.9 | 55.6 - 333.3 | 117.7 | .028 | .003 | .006 - .006 | .00 | .0000 | .0000 | 1.45 | 1.90 |
| TISBE SPP. | | L-EGG-C FEM | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .09 | .38 |
| MICROARTHRIIDION LITTORALE | | 8-ADULT | 222.2 | 22.2 | 55.6 - 166.7 | 53.7 | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .36 | .76 |
| MICROARTHRIIDION LITTORALE | | L-EGG-C FEM | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .09 | .38 |
| TACHIDIUS TRIANGULARIS | | 8-ADULT | 722.2 | 72.2 | 55.6 - 166.7 | 64.4 | .039 | .004 | .006 - .006 | .00 | .0001 | .0000 | 1.17 | 2.66 |
| TACHIDIUS TRIANGULARIS | | L-EGG-C FEM | 277.8 | 27.8 | 55.6 - 111.1 | 39.3 | .022 | .002 | .006 - .006 | .00 | .0001 | .0000 | .45 | 1.52 |

 * GRAND SUMMARY *

FROM COLLECTIONS: FILEID STATION SAMPLE

| FILEID | STATION | SAMPLE |
|--------|---------|--------|
| 88JY12 | 15001 | E 1 |
| 88JY12 | 15001 | E 2 |
| 88JY12 | 15001 | E 3 |
| 88JY12 | 15001 | E 4 |
| 88JY12 | 15001 | E 5 |
| 88JY12 | 15001 | E 6 |
| 88JY12 | 15001 | E 7 |
| 88JY12 | 15001 | E 8 |
| 88JY12 | 15001 | E 9 |
| 88JY12 | 15001 | E10 |

SPECIES DEFINITION -

TRUNCATED = NO
 LH-STAGE = COMPLETE
 PARTS CODE UNALTERED

ABUNDANCES AND WEIGHTS ARE ADJUSTED TO AN AREA OF 1.0 SQUARE METERS

| | MEAN | RANGE | S.D. | COEF.VAR |
|------------------------------|----------|----------|----------|----------|
| SAMPLE AREA (M**2) | .018 | .018- | .000 | .000 |
| TOTAL WET WEIGHT (PER M**2) | .415 | .100- | .198 | .477 |
| TOTAL ABUNDANCE (PER M**2) | 20266.67 | 2277.78- | 10458.09 | .52 |
| SAMPLE WET WEIGHT (PER M**2) | .346 | .022- | .192 | .554 |
| SAMPLE DRY WEIGHT (PER M**2) | .000 | .000- | .000 | .000 |

| ORGANISM NAME | * PARTS CODE | * LH-STAGE | * TOTAL | * MEAN | * RANGE | * S.D. | * TOTAL | * MEAN | * RANGE | * S.D. | * WET WEIGHT, GRAMS/M**2 | * AVG. BIOMASS | * PERCENTAGES |
|-----------------|--------------|------------|---------|--------|----------|--------|---------|--------|---------|--------|--------------------------|----------------|---------------|
| | | | | | | | | | | | | | |
| TURBELLARIA | C-J/A NOSEX | | 777.8 | 77.8 | 55.6 - | 111.7 | .044 | .004 | .006- | .01 | .0001 | .0000 | .38 1.07 |
| NEMATODA | C-J/A NOSEX | | 18833.3 | 1883.3 | 333.3 - | 1443.8 | .083 | .008 | .006- | .01 | .0000 | .0000 | 9.29 2.01 |
| POLYCHAETA | 6-LARVA | | 388.9 | 38.9 | 55.6 - | 74.3 | .022 | .002 | .006- | .00 | .0001 | .0000 | .19 .54 |
| POLYCHAETA | C-J/A NOSEX | | 29833.3 | 2983.3 | 222.2 - | 2011.3 | .622 | .062 | .006- | .05 | .0000 | .0000 | 14.72 14.99 |
| OLIGOCHAETA | C-J/A NOSEX | | 3444.4 | 344.4 | 6777.8 - | 424.6 | .139 | .014 | .006- | .02 | .0001 | .0000 | 1.70 3.35 |
| OPISTHOBRANCHIA | C-J/A NOSEX | | 55.6 | 5.6 | 1444.4 - | 17.6 | .094 | .009 | .094- | .03 | .0017 | .0000 | .03 2.28 |

EPIBENTHIC PLANKTON ANALYSIS

SUMMARY TABLE, PAGE 3

| ORGANISM NAME | PARTS CODE | LH-STAGE | * TOTAL | MEAN | RANGE | S.D. | * NUMBERS/M**2 | * TOTAL | MEAN | RANGE | S.D. | * WET WEIGHT, GRAMS/M**2 | * AVG. BIOMASS | * MEAN | S.D. | * ABUN- * DANCE | * PERCENTAGES |
|-------------------------------|------------|----------|---------|-------|----------------|--------|----------------|---------|------|-------------|------|--------------------------|----------------|--------|-------|-----------------|---------------|
| | | | | | | | | | | | | | | | | | |
| MICROARTHRIIDION LITTORALE | | | 611.1 | 61.1 | 55.6 - 222.2 | 76.1 | | .033 | .003 | .006 - .011 | .00 | .0001 | .0000 | .0001 | .0000 | .30 | .80 |
| TACHIDIUS TRIANGULARIS | | | 1166.7 | 116.7 | 55.6 - 333.3 | 109.4 | | .050 | .005 | .006 - .011 | .00 | .0001 | .0000 | .0001 | .0000 | .58 | 1.20 |
| TACHIDIUS TRIANGULARIS | | | 333.3 | 33.3 | 55.6 - 111.1 | 46.8 | | .028 | .003 | .006 - .011 | .00 | .0001 | .0000 | .0001 | .0000 | .16 | .67 |
| L-EGG-C FEM | | | 166.7 | 16.7 | 55.6 - 111.1 | 37.5 | | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .0001 | .0000 | .08 | .27 |
| 8-ADULT | | | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .0000 | .0000 | .05 | .13 |
| 8-ADULT | | | 666.7 | 66.7 | 55.6 - 444.4 | 138.1 | | .028 | .003 | .006 - .011 | .00 | .0001 | .0000 | .0001 | .0000 | .33 | .67 |
| F-COPEPODID | | | 6277.8 | 627.8 | 277.8 - 1111.1 | 340.5 | | .067 | .007 | .006 - .011 | .00 | .0000 | .0000 | .0000 | .0000 | 3.10 | 1.61 |
| 8-ADULT | | | 6555.6 | 655.6 | 111.1 - 1277.8 | 405.6 | | .089 | .009 | .006 - .017 | .00 | .0000 | .0000 | .0000 | .0000 | 3.23 | 2.14 |
| L-EGG-C FEM | | | 6888.9 | 688.9 | 111.1 - 1777.8 | 563.6 | | .067 | .007 | .006 - .011 | .00 | .0000 | .0000 | .0000 | .0000 | 3.40 | 1.61 |
| 8-ADULT | | | 666.7 | 66.7 | 55.6 - 277.8 | 100.8 | | .028 | .003 | .006 - .006 | .00 | .0001 | .0000 | .0001 | .0000 | .33 | .67 |
| HETEROLAOPHONTE LONGISETIGERA | | | 277.8 | 27.8 | 55.6 - 111.1 | 47.2 | | .017 | .002 | .006 - .006 | .00 | .0001 | .0000 | .0001 | .0000 | .14 | .40 |
| L-EGG-C FEM | | | 222.2 | 22.2 | 111.1 - 111.1 | 46.8 | | .011 | .001 | .006 - .006 | .00 | .0000 | .0000 | .0000 | .0000 | .11 | .27 |
| 8-ADULT | | | 6833.3 | 683.3 | 111.1 - 3444.4 | 1045.0 | | .061 | .006 | .006 - .011 | .00 | .0000 | .0000 | .0000 | .0000 | 3.37 | 1.47 |
| 8-ADULT | | | 2833.3 | 283.3 | 55.6 - 1111.1 | 422.7 | | .039 | .004 | .006 - .011 | .00 | .0000 | .0000 | .0000 | .0000 | 1.40 | .94 |
| L-EGG-C FEM | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .0001 | .0000 | .03 | .13 |
| 8-ADULT | | | 222.2 | 22.2 | 55.6 - 111.1 | 38.8 | | .022 | .002 | .006 - .011 | .00 | .0001 | .0000 | .0001 | .0000 | .11 | .54 |
| 8-ADULT | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .0001 | .0000 | .03 | .13 |
| ACRENHYDROSOMA KARLINGI | | | 888.9 | 88.9 | 55.6 - 333.3 | 111.7 | | .044 | .004 | .006 - .011 | .00 | .0001 | .0000 | .0001 | .0000 | .44 | 1.07 |
| 8-ADULT | | | 166.7 | 16.7 | 55.6 - 55.6 | 26.8 | | .017 | .002 | .006 - .006 | .00 | .0001 | .0000 | .0001 | .0000 | .08 | .40 |
| 8-ADULT | | | 166.7 | 16.7 | 55.6 - 111.1 | 37.5 | | .017 | .002 | .006 - .011 | .00 | .0001 | .0000 | .0001 | .0000 | .08 | .40 |
| L-EGG-C FEM | | | 3277.8 | 327.8 | 55.6 - 1000.0 | 328.6 | | .061 | .006 | .006 - .011 | .00 | .0000 | .0000 | .0000 | .0000 | 1.62 | 1.47 |
| 8-ADULT | | | 944.4 | 94.4 | 55.6 - 666.7 | 212.8 | | .022 | .002 | .006 - .011 | .00 | .0000 | .0000 | .0000 | .0000 | .47 | .54 |
| F-COPEPODID | | | 500.0 | 50.0 | 55.6 - 222.2 | 92.4 | | .022 | .002 | .006 - .011 | .00 | .0001 | .0000 | .0001 | .0000 | .25 | .54 |
| L-EGG-C FEM | | | 1666.7 | 166.7 | 55.6 - 444.4 | 154.9 | | .044 | .004 | .006 - .011 | .00 | .0000 | .0000 | .0000 | .0000 | .82 | 1.07 |
| 8-ADULT | | | 1111.1 | 111.1 | 55.6 - 388.9 | 122.8 | | .044 | .004 | .006 - .011 | .00 | .0001 | .0000 | .0001 | .0000 | .55 | 1.07 |
| L-EGG-C FEM | | | | | | | | | | | | | | | | | |

EPIBENTHIC PLANKTON ANALYSIS

| ORGANISM NAME | * PARTS CODE | * LH-STAGE | * TOTAL | MEAN | RANGE | S.D. | * TOTAL | WET WEIGHT, GRAMS/M**2 | MEAN | RANGE | S.D. | * AVG. BIOMASS | * ABUN-DANCE | * PERCENTAGES BIO-MASS |
|----------------------|--------------|-------------|---------|------|---------------|------|---------|------------------------|-------------|-------|-------|----------------|--------------|------------------------|
| CUMELLA VULGARIS | | 7-JUVENILE | 444.4 | 44.4 | 55.6 - 166.7 | 63.1 | .033 | .003 | .006 - .011 | .00 | .0001 | .0000 | .22 | .80 |
| CUMELLA VULGARIS | | 8-ADULT | 444.4 | 44.4 | 111.1 - 222.2 | 77.7 | .033 | .003 | .011 - .011 | .01 | .0001 | .0000 | .22 | .80 |
| LEPTOCHELIA SAVIGNYI | | 7-JUVENILE | 166.7 | 16.7 | 55.6 - 111.1 | 37.5 | .017 | .002 | .006 - .011 | .00 | .0001 | .0000 | .08 | .40 |
| LEPTOCHELIA SAVIGNYI | | C-J/A NOSEX | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .017 | .002 | .017 - .017 | .01 | .0003 | .0000 | .03 | .40 |
| AMPITHOIDEAE | | 7-JUVENILE | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .022 | .002 | .022 - .022 | .01 | .0004 | .0000 | .03 | .54 |
| COROPHIUM SP. | | 7-JUVENILE | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .03 | .13 |
| CAPRELLA SP. | | C-J/A NOSEX | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .017 | .002 | .017 - .017 | .01 | .0003 | .0000 | .03 | .40 |
| CHAETOGNATHA | | 7-JUVENILE | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .03 | .13 |

TOTAL NUMBER OF PLANKTON CATEGORIES 89

SHANNON-WEINER DIVERSITY INDEX NUMBERS 4.91
 BIOMASS 5.65
 BRILLOUIN-S DIVERSITY INDEX BASED ON NUMBERS 4.91

 * GRAND SUMMARY *

FROM COLLECTIONS: FILEID STATION SAMPLE

| FILEID | STATION | SAMPLE |
|--------|---------|--------|
| 88JY12 | 15002 | E 1 |
| 88JY12 | 15002 | E 2 |
| 88JY12 | 15002 | E 3 |
| 88JY12 | 15002 | E 4 |
| 88JY12 | 15002 | E 5 |
| 88JY12 | 15002 | E 6 |
| 88JY12 | 15002 | E 7 |
| 88JY12 | 15002 | E 8 |
| 88JY12 | 15002 | E 9 |
| 88JY12 | 15002 | E10 |

SPECIES DEFINITION -
 TRUNCATED = NO
 LH-STAGE = COMPLETE
 PARTS CODE UNALTERED

ABUNDANCES AND WEIGHTS ARE ADJUSTED TO AN AREA OF 1.0 SQUARE METERS

| | MEAN | RANGE | S.D. | COEF. VAR |
|------------------------------|----------|----------|---------|-----------|
| SAMPLE AREA (M**2) | .018 | .018- | .000 | .000 |
| TOTAL WET WEIGHT (PER M**2) | .409 | .172- | .197 | .483 |
| TOTAL ABUNDANCE (PER M**2) | 15494.44 | 6666.67- | 6615.62 | .43 |
| SAMPLE WET WEIGHT (PER M**2) | .352 | .078- | .212 | .602 |
| SAMPLE DRY WEIGHT (PER M**2) | .000 | .000- | .000 | .000 |

| ORGANISM NAME | PARTS CODE | LH-STAGE | * TOTAL | MEAN | RANGE | S.D. | * TOTAL | MEAN | RANGE | S.D. | * AVG. BIOMASS | * ABUN-DANCE | * PERCENTAGES |
|---------------|-------------|----------|---------|--------|----------------|--------|---------|------|------------|------|----------------|--------------|---------------|
| TURBELLARIA | C-J/A NOSEX | | 388.9 | 38.9 | 55.6 - 111.1 | 45.7 | .033 | .003 | .006- .011 | .00 | .0001 | .25 | .82 |
| NEMATODA | C-J/A NOSEX | | 25500.0 | 2550.0 | 555.6 - 6777.8 | 1802.6 | .106 | .011 | .006- .022 | .01 | .0000 | 16.46 | 2.58 |
| POLYCHAETA | 6-LARVA | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006- .006 | .00 | .0001 | .04 | .14 |
| POLYCHAETA | C-J/A NOSEX | | 14666.7 | 1466.7 | 111.1 - 6166.7 | 1846.0 | .467 | .047 | .006- .150 | .04 | .0000 | 9.47 | 11.41 |
| OLIGOCHAETA | C-J/A NOSEX | | 2555.6 | 255.6 | 111.1 - 555.6 | 201.5 | .061 | .006 | .006- .011 | .00 | .0000 | 1.65 | 1.49 |
| BIVALVIA | 7-JUVENILE | | 3000.0 | 300.0 | 55.6 - 1111.1 | 399.1 | .150 | .015 | .006- .044 | .02 | .0001 | 1.94 | 3.67 |

EPIBENTHIC PLANKTON ANALYSIS

| ORGANISM NAME | PARTS CODE | LH-STAGE | * TOTAL | MEAN | RANGE | S.D. | * TOTAL | MEAN | RANGE | S.D. | * AVG. BIOMASS | * ABUN- DANCE | * PERCENTAGES BIO- MASS |
|----------------------------|------------|-------------|---------|--------|----------------|-------|---------|------|-------|------|----------------|---------------|-------------------------|
| | | | | | | | | | | | | | |
| BIVALVIA | | | 388.9 | 38.9 | 388.9 - 388.9 | 123.0 | .006 | .001 | .006- | .00 | .0000 | .25 | .14 |
| HALACARIDAE | | C-J/A NOSEX | 222.2 | 22.2 | 55.6 - 166.7 | 53.7 | .011 | .001 | .006- | .00 | .0001 | .14 | .27 |
| PODON LEUCKARTI | | C-J/A NOSEX | 166.7 | 16.7 | 166.7 - 166.7 | 52.7 | .006 | .001 | .006- | .00 | .0000 | .11 | .14 |
| PODOCOPA | | A-JUV+ADULT | 1777.8 | 177.8 | 55.6 - 444.4 | 154.5 | .044 | .004 | .006- | .00 | .0000 | 1.15 | 1.09 |
| PSEUDOCALANUS SP. | | C-J/A NOSEX | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006- | .00 | .0001 | .04 | .14 |
| STEPHIDAE | | F-COPEPODID | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006- | .00 | .0001 | .04 | .14 |
| CENTROPAGES ABDOMINALIS | | 8-ADULT | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006- | .00 | .0001 | .04 | .14 |
| EURYTEMORA AMERICANA | | F-COPEPODID | 944.4 | 94.4 | 55.6 - 55.6 | 87.1 | .039 | .004 | .006- | .00 | .0001 | .61 | .95 |
| ACARTIA SP. | | F-COPEPODID | 1388.9 | 138.9 | 55.6 - 444.4 | 131.6 | .044 | .004 | .006- | .00 | .0000 | .90 | 1.09 |
| ACARTIA SP. | | 8-ADULT | 4000.0 | 400.0 | 166.7 - 1222.2 | 335.2 | .050 | .005 | .006- | .00 | .0000 | 2.58 | 1.22 |
| HARPACTICOIDA | | F-COPEPODID | 777.8 | 77.8 | 55.6 - 222.2 | 70.3 | .044 | .004 | .006- | .00 | .0001 | .50 | 1.09 |
| LONGIPEDIA SP. | | F-COPEPODID | 7388.9 | 738.9 | 222.2 - 1611.1 | 398.1 | .150 | .015 | .006- | .01 | .0000 | 4.77 | 3.67 |
| LONGIPEDIA SP. | | 8-ADULT | 15388.9 | 1538.9 | 611.1 - 3388.9 | 758.2 | .144 | .014 | .006- | .01 | .0000 | 9.93 | 3.53 |
| LONGIPEDIA SP. | | F-COPEPODID | 1166.7 | 116.7 | 55.6 - 222.2 | 92.4 | .044 | .004 | .006- | .00 | .0001 | .75 | 1.09 |
| ECTINOSOMATIDAE | | L-EGG-C FEM | 2388.9 | 238.9 | 55.6 - 500.0 | 185.3 | .044 | .004 | .006- | .00 | .0000 | 1.54 | 1.09 |
| ECTINOSOMATIDAE | | 8-ADULT | 611.1 | 61.1 | 55.6 - 166.7 | 61.1 | .033 | .003 | .006- | .00 | .0001 | .39 | .82 |
| ECTINOSOMATIDAE | | L-EGG-C FEM | 555.6 | 55.6 | 111.1 - 222.2 | 94.4 | .017 | .002 | .006- | .00 | .0000 | .36 | .41 |
| HARPACTICUS SPINULOSUS | | U-MATING PR | 1833.3 | 183.3 | 55.6 - 888.9 | 272.2 | .044 | .004 | .006- | .00 | .0001 | 1.18 | 1.09 |
| HARPACTICUS SPINULOSUS | | 8-ADULT | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006- | .00 | .0001 | .04 | .14 |
| HARPACTICUS SPINULOSUS | | L-EGG-C FEM | 888.9 | 88.9 | 111.1 - 333.3 | 114.8 | .028 | .003 | .006- | .00 | .0000 | .57 | .68 |
| TISBE SPP. | | U-MATING PR | 6833.3 | 683.3 | 55.6 - 2500.0 | 695.4 | .144 | .014 | .006- | .02 | .0000 | 4.41 | 3.53 |
| TISBE SPP. | | 8-ADULT | 2777.8 | 277.8 | 111.1 - 1000.0 | 313.2 | .050 | .005 | .006- | .00 | .0000 | 1.79 | 1.22 |
| TISBE SPP. | | F-COPEPODID | 944.4 | 94.4 | 55.6 - 388.9 | 125.7 | .044 | .004 | .006- | .01 | .0001 | .61 | 1.09 |
| MICROARTHRIIDION LITTORALE | | L-EGG-C FEM | 555.6 | 55.6 | 55.6 - 222.2 | 82.8 | .022 | .002 | .006- | .00 | .0001 | .36 | .54 |
| MICROARTHRIIDION LITTORALE | | 8-ADULT | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006- | .00 | .0001 | .04 | .14 |
| MICROARTHRIIDION LITTORALE | | L-EGG-C FEM | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006- | .00 | .0001 | .04 | .14 |

EPIBENTHIC PLANKTON ANALYSIS

SUMMARY TABLE, PAGE 5

| ORGANISM NAME | * PARTS CODE | LH-STAGE | * TOTAL | MEAN | RANGE | S.D. | * TOTAL | MEAN | RANGE | S.D. | * AVG. BIOMASS | * ABUN-DANCE | * PERCENTAGES |
|-----------------------------|--------------|----------|---------|------|---------------|------|---------|------|-------|------|----------------|--------------|---------------|
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| TANAIDACEA-DIKONOPHORA | | | 222.2 | 22.2 | 222.2 - 222.2 | 70.3 | .006 | .001 | .006- | .00 | .0000 | .14 | .14 |
| 7-JUVENILE | | | 388.9 | 38.9 | 222.2 - 55.6 | 74.3 | .033 | .003 | .006- | .01 | .0001 | .25 | .82 |
| LEPTOCHELIA SAVIGNYI | | | 55.6 | 5.6 | 222.2 - 55.6 | 17.6 | .017 | .002 | .017- | .01 | .0003 | .04 | .41 |
| 7-JUVENILE | | | 611.1 | 61.1 | 55.6 - 222.2 | 92.4 | .039 | .004 | .006- | .01 | .0001 | .39 | .95 |
| COROPHIUM SP. | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006- | .00 | .0001 | .04 | .14 |
| PONTOGENEIA SP. | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .050 | .005 | .050- | .02 | .0009 | .04 | 1.22 |
| PONTOGENEIA SP. CF ROSTRATA | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .161 | .016 | .161- | .05 | .0029 | .04 | 3.94 |
| 7-JUVENILE | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006- | .00 | .0001 | .04 | .14 |
| ANISOGAMMARUS PUGETTENSIS | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006- | .00 | .0001 | .04 | .14 |
| 7-JUVENILE | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006- | .00 | .0001 | .04 | .14 |
| CAPRELLIDEA | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006- | .00 | .0001 | .04 | .14 |
| 7-JUVENILE | | | | | | | | | | | | | |

TOTAL NUMBER OF PLANKTON CATEGORIES 89

SHANNON-WEINER DIVERSITY INDEX NUMBERS 4.85
 BIOMASS 5.51

BRILLOUIN-S DIVERSITY INDEX BASED ON NUMBERS 4.85

 * GRAND SUMMARY *

| FROM COLLECTIONS: | FILEID | STATION | SAMPLE |
|-------------------|---------|---------|--------|
| | 88JUN28 | 15003 | ES1 |
| | 88JUN28 | 15003 | ES2 |
| | 88JUN28 | 15003 | ES3 |
| | 88JUN28 | 15003 | ES4 |
| | 88JUN28 | 15003 | ES5 |
| | 88JUN28 | 15003 | ES7 |
| | 88JUN28 | 15003 | ES8 |
| | 88JUN28 | 15003 | ES9 |
| | 88JUN28 | 15003 | ESO |

SPECIES DEFINITION -

TRUNCATED = NO
 LH-STAGE = COMPLETE
 PARTS CODE UNALTERED

ABUNDANCES AND WEIGHTS ARE ADJUSTED TO AN AREA OF 1.0 SQUARE METERS

| | MEAN | RANGE | S.D. | COEF. VAR |
|------------------------------|---------|----------|---------|-----------|
| SAMPLE AREA (M**2) | .018 | .018- | .000 | .000 |
| TOTAL WET WEIGHT (PER M**2) | .183 | .083- | .070 | .382 |
| TOTAL ABUNDANCE (PER M**2) | 6333.33 | 1944.44- | 3978.34 | .63 |
| SAMPLE WET WEIGHT (PER M**2) | .077 | .022- | .048 | .623 |
| SAMPLE DRY WEIGHT (PER M**2) | .000 | .000- | .000 | .000 |

| ORGANISM NAME | PARTS CODE | LH-STAGE | TOTAL | MEAN | RANGE | S.D. | TOTAL | MEAN | RANGE | S.D. | WET WEIGHT, GRAMS/M**2 | AVG. BIOMASS | PERCENTAGES |
|----------------|------------|----------|--------|-------|---------------|-------|-------|------|-------------|------|------------------------|--------------|-------------|
| | | | | | | | | | | | | | |
| TURBELLARIA | | | 166.7 | 18.5 | 55.6 - 111.1 | 39.3 | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .29 .67 |
| NEMATODA | C-J/A | NOSEX | 4055.6 | 450.6 | 55.6 - 1388.9 | 444.0 | .056 | .006 | .006 - .011 | .00 | .0000 | .0000 | 7.12 3.37 |
| POLYCHAETA | C-J/A | NOSEX | 555.6 | 61.7 | 55.6 - 166.7 | 64.8 | .033 | .004 | .006 - .006 | .00 | .0001 | .0000 | .97 2.02 |
| POLYCHAETA | 6-LARVA | | 666.7 | 74.1 | 55.6 - 444.4 | 149.6 | .022 | .002 | .006 - .011 | .00 | .0001 | .0000 | 1.17 1.35 |
| OLIGOCHAETA | C-J/A | NOSEX | 222.2 | 24.7 | 55.6 - 111.1 | 40.4 | .017 | .002 | .006 - .006 | .00 | .0001 | .0000 | .39 1.01 |
| MESOGASTROPODA | C-J/A | NOSEX | 55.6 | 6.2 | 55.6 - 55.6 | 18.5 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .10 .34 |
| | 7-JUVENILE | | | | | | | | | | | | |

EPIBENTHIC PLANKTON ANALYSIS

SUMMARY TABLE, PAGE 2

| ORGANISM NAME | PARTS CODE | LH-STAGE | * TOTAL | MEAN | RANGE | S.D. | * TOTAL | MEAN | RANGE | S.D. | * AVG. BIOMASS | * PERCENTAGES |
|----------------------------|------------|-------------|----------------|-------|----------------|-------|--------------------------|------|-----------|------|----------------|---------------|
| | | | * NUMBERS/M**2 | | | | * WET WEIGHT, GRAMS/M**2 | | | | * MEAN | * ABUN- |
| | | | | | | | | | | | * S.D. | * DANCE |
| | | | | | | | | | | | * .0001 .0000 | * MASS |
| MESOGASTROPODA | | | 55.6 | 6.2 | 55.6 - 55.6 | 18.5 | .006 | .001 | .006-.006 | .00 | .0001 .0000 | .10 .34 |
| BIVALVIA | | C-J/A NOSEX | 444.4 | 49.4 | 55.6 - 222.2 | 70.5 | .028 | .003 | .006-.006 | .00 | .0001 .0000 | .78 1.68 |
| HALACARIDAE | | 7-JUVENILE | 500.0 | 55.6 | 55.6 - 222.2 | 78.6 | .022 | .002 | .006-.006 | .00 | .0001 .0000 | .88 1.35 |
| PODON LEUCKARTI | | C-J/A NOSEX | 55.6 | 6.2 | 55.6 - 55.6 | 18.5 | .006 | .001 | .006-.006 | .00 | .0001 .0000 | .10 .34 |
| PODOCOPA | | A-JUV+ADULT | 1055.6 | 117.3 | 55.6 - 388.9 | 122.5 | .039 | .004 | .006-.006 | .00 | .0001 .0000 | 1.85 2.36 |
| CALANOIDA | | C-J/A NOSEX | 55.6 | 6.2 | 55.6 - 55.6 | 18.5 | .006 | .001 | .006-.006 | .00 | .0001 .0000 | .10 .34 |
| GENTROPAGES ABDOMINALIS | | F-COPEPODID | 55.6 | 6.2 | 55.6 - 55.6 | 18.5 | .006 | .001 | .006-.006 | .00 | .0001 .0000 | .10 .34 |
| F-COPEPODID | | F-COPEPODID | 55.6 | 6.2 | 55.6 - 55.6 | 18.5 | .006 | .001 | .006-.006 | .00 | .0001 .0000 | .10 .34 |
| EURYTEMORA AMERICANA | | 8-ADULT | 1444.4 | 160.5 | 55.6 - 388.9 | 137.3 | .039 | .004 | .006-.006 | .00 | .0000 .0000 | 2.53 2.36 |
| EURYTEMORA AMERICANA | | F-COPEPODID | 5166.7 | 574.1 | 166.7 - 1388.9 | 515.9 | .072 | .008 | .006-.022 | .01 | .0000 .0000 | 9.06 4.38 |
| ACARTIA SP. | | 8-ADULT | 2666.7 | 296.3 | 55.6 - 888.9 | 273.6 | .050 | .006 | .006-.011 | .00 | .0000 .0000 | 4.68 3.03 |
| ACARTIA SP. | | F-COPEPODID | 388.9 | 43.2 | 55.6 - 333.3 | 110.3 | .011 | .001 | .006-.006 | .00 | .0001 .0001 | .68 .67 |
| HARPACTICOIDA | | 8-ADULT | 166.7 | 18.5 | 55.6 - 55.6 | 27.8 | .017 | .002 | .006-.006 | .00 | .0001 .0000 | .29 1.01 |
| HARPACTICOIDA | | F-COPEPODID | 944.4 | 104.9 | 55.6 - 555.6 | 185.2 | .028 | .003 | .006-.011 | .00 | .0000 .0000 | 1.66 1.68 |
| LONGIPEDIA SP. | | 8-ADULT | 666.7 | 74.1 | 55.6 - 333.3 | 107.6 | .028 | .003 | .006-.006 | .00 | .0001 .0000 | 1.17 1.68 |
| LONGIPEDIA SP. | | F-COPEPODID | 166.7 | 18.5 | 55.6 - 111.1 | 39.3 | .011 | .001 | .006-.006 | .00 | .0001 .0000 | .29 .67 |
| LONGIPEDIA SP. | | L-EGG-C FEM | 944.4 | 104.9 | 55.6 - 277.8 | 109.2 | .033 | .004 | .006-.006 | .00 | .0001 .0000 | 1.66 2.02 |
| ECTINOSOMATIDAE | | A-JUV+ADULT | 166.7 | 18.5 | 55.6 - 111.1 | 39.3 | .011 | .001 | .006-.006 | .00 | .0001 .0000 | .29 .67 |
| ECTINOSOMATIDAE | | L-EGG-C FEM | 666.7 | 74.1 | 55.6 - 222.2 | 87.8 | .028 | .003 | .006-.006 | .00 | .0001 .0000 | 1.17 1.68 |
| HARPACTICUS SPINULOSUS | | 8-ADULT | 666.7 | 74.1 | 222.2 - 222.2 | 111.1 | .017 | .002 | .006-.006 | .00 | .0000 .0000 | 1.17 1.01 |
| HARPACTICUS SPINULOSUS | | U-MATING PR | 111.1 | 12.3 | 111.1 - 111.1 | 37.0 | .006 | .001 | .006-.006 | .00 | .0000 .0000 | .19 .34 |
| ZAUS SP. | | U-MATING PR | 2722.2 | 302.5 | 55.6 - 1444.4 | 449.7 | .061 | .007 | .006-.022 | .01 | .0000 .0000 | 4.78 3.70 |
| TISBE SPP. | | 8-ADULT | 1333.3 | 148.1 | 55.6 - 611.1 | 192.5 | .033 | .004 | .006-.006 | .00 | .0000 .0000 | 2.34 2.02 |
| TISBE SPP. | | F-COPEPODID | 166.7 | 18.5 | 55.6 - 55.6 | 27.8 | .017 | .002 | .006-.006 | .00 | .0001 .0000 | .29 1.01 |
| TISBE SPP. | | L-EGG-C FEM | 444.4 | 49.4 | 55.6 - 388.9 | 128.6 | .011 | .001 | .006-.006 | .00 | .0001 .0001 | .78 .67 |
| MICROARTHRIIDION LITTORALE | | 8-ADULT | | | | | | | | | | |

EPIBENTHIC PLANKTON ANALYSIS

SUMMARY TABLE, PAGE 3

| ORGANISM NAME | PARTS CODE | LH-STAGE | * TOTAL | MEAN | RANGE | S.D. | * NUMBERS/M**2 | * TOTAL | MEAN | RANGE | S.D. | * WET WEIGHT, GRAMS/M**2 | * MEAN | S.D. | * AVG. BIOMASS | * ABUN- DANCE | * PERCENTAGES BIO- MASS |
|-------------------------------|--------------|----------|---------|-------|----------------|-------|----------------|---------|------|-------------|------|--------------------------|--------|-------|----------------|---------------|-------------------------|
| TACHIDIUS TRIANGULARIS | 8-ADULT | | 222.2 | 24.7 | 111.1 - 111.1 | 49.0 | | .011 | .001 | .006 - .006 | .00 | .0000 | .0000 | .0000 | .39 | .67 | |
| TACHIDIUS TRIANGULARIS | 8-ADULT | | 500.0 | 55.6 | 55.6 - 111.1 | 48.1 | | .033 | .004 | .006 - .006 | .00 | .0001 | .0000 | .0000 | .88 | 2.02 | |
| LAOPHONTIDAE | L-EGG-C FEM | | 666.7 | 74.1 | 55.6 - 277.8 | 103.9 | | .028 | .003 | .006 - .006 | .00 | .0001 | .0000 | .0000 | 1.17 | 1.68 | |
| PARALAOPHONTE CONGENERA | F-COPEPODID | | 3277.8 | 364.2 | 55.6 - 1000.0 | 326.4 | | .056 | .006 | .006 - .011 | .00 | .0000 | .0000 | .0000 | 5.75 | 3.37 | |
| PARALAOPHONTE CONGENERA | 8-ADULT | | 4277.8 | 475.3 | 55.6 - 1666.7 | 527.9 | | .061 | .007 | .006 - .022 | .01 | .0000 | .0000 | .0000 | 7.50 | 3.70 | |
| PARALAOPHONTE CONGENERA | L-EGG-C FEM | | 4000.0 | 444.4 | 111.1 - 2000.0 | 664.3 | | .039 | .004 | .006 - .011 | .00 | .0000 | .0000 | .0000 | 7.02 | 2.36 | |
| HETEROLAOPHONTE LONGISETIGERA | U-MATTING PR | | 222.2 | 24.7 | 55.6 - 166.7 | 56.3 | | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .0000 | .39 | .67 | |
| HETEROLAOPHONTE LONGISETIGERA | 8-ADULT | | 111.1 | 12.3 | 55.6 - 55.6 | 24.5 | | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .0000 | .19 | .67 | |
| HETEROLAOPHONTE LONGISETIGERA | L-EGG-C FEM | | 333.3 | 37.0 | 111.1 - 111.1 | 55.6 | | .017 | .002 | .006 - .006 | .00 | .0000 | .0000 | .0000 | .58 | 1.01 | |
| HETEROLAOPHONTE HAMONDI | U-MATTING PR | | 55.6 | 6.2 | 111.1 - 55.6 | 18.5 | | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .0000 | .10 | .34 | |
| AMEIRIDAE | L-EGG-C FEM | | 111.1 | 12.3 | 111.1 - 111.1 | 37.0 | | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .0000 | .19 | .34 | |
| AMEIRIDAE | 8-ADULT | | 111.1 | 12.3 | 111.1 - 111.1 | 37.0 | | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .0000 | .19 | .34 | |
| AMEIRA SP. | L-EGG-C FEM | | 166.7 | 18.5 | 55.6 - 111.1 | 39.3 | | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .0000 | .29 | .67 | |
| AMEIRA SP. | 8-ADULT | | 222.2 | 24.7 | 55.6 - 111.1 | 40.4 | | .017 | .002 | .006 - .006 | .00 | .0001 | .0000 | .0000 | .39 | 1.01 | |
| AMEIRA LONGIPES | L-EGG-C FEM | | 611.1 | 67.9 | 277.8 - 333.3 | 135.5 | | .011 | .001 | .006 - .006 | .00 | .0000 | .0000 | .0000 | 1.07 | .67 | |
| AMEIRA LONGIPES | 8-ADULT | | 222.2 | 24.7 | 222.2 - 222.2 | 74.1 | | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .0000 | .39 | .34 | |
| HUNTEMANNIA JADENSIS | L-EGG-C FEM | | 388.9 | 43.2 | 55.6 - 166.7 | 60.7 | | .022 | .002 | .006 - .006 | .00 | .0001 | .0000 | .0000 | .68 | 1.35 | |
| NANNOPIUS PALUSTRIS | 8-ADULT | | 55.6 | 6.2 | 55.6 - 55.6 | 18.5 | | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .0000 | .10 | .34 | |
| AMONARDIA NORMANI | 8-ADULT | | 55.6 | 6.2 | 55.6 - 55.6 | 18.5 | | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .0000 | .10 | .34 | |
| AMPHIASCUS SP. | 8-ADULT | | 222.2 | 24.7 | 111.1 - 111.1 | 49.0 | | .011 | .001 | .006 - .006 | .00 | .0000 | .0000 | .0000 | .39 | .67 | |
| AMPHIASCUS SP. | 8-ADULT | | 388.9 | 43.2 | 55.6 - 111.1 | 54.0 | | .022 | .002 | .006 - .006 | .00 | .0001 | .0000 | .0000 | .68 | 1.35 | |
| STENHELIA SP. | L-EGG-C FEM | | 222.2 | 24.7 | 55.6 - 111.1 | 56.3 | | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .0000 | .39 | .67 | |
| STENHELIA SP. | 8-ADULT | | 166.7 | 18.5 | 166.7 - 166.7 | 55.6 | | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .0000 | .29 | .34 | |
| STENHELIA PENICULATA | L-EGG-C FEM | | 55.6 | 6.2 | 166.7 - 55.6 | 18.5 | | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .0000 | .10 | .34 | |
| TYPHLOPHIASCUS PECTINIFER | 8-ADULT | | 55.6 | 6.2 | 55.6 - 55.6 | 18.5 | | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .0000 | .10 | .34 | |

EPIBENTHIC PLANKTON ANALYSIS

| ORGANISM NAME | PARTS CODE | LH-STAGE | * TOTAL | MEAN | RANGE | S.D. | * NUMBERS/M**2 | * TOTAL | MEAN | RANGE | S.D. | * WET WEIGHT, GRAMS/M**2 | * MEAN | S.D. | * AVG. BIOMASS | * ABUN- * DANCE | * PERCENTAGES |
|---------------------------|-------------|----------|---------|-------|----------------|-------|----------------|---------|------|-------------|------|--------------------------|--------|------|----------------|-----------------|---------------|
| TYPHLOPHASCIUS PECTINIFER | A-JUV+ADULT | | 222.2 | 24.7 | 55.6 - 166.7 | 56.3 | | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .39 | .67 | | |
| AMPHIASCOIDES SP. A | 8-ADULT | | 277.8 | 30.9 | 55.6 - 111.1 | 40.4 | | .022 | .002 | .006 - .006 | .00 | .0001 | .0000 | .49 | 1.35 | | |
| AMPHIASCOIDES SP. A | L-EGG-C FEM | | 777.8 | 86.4 | 55.6 - 166.7 | 62.8 | | .039 | .004 | .006 - .006 | .00 | .0001 | .0000 | 1.36 | 2.36 | | |
| ROBERTSONIA SP. CF KNOXI | 8-ADULT | | 500.0 | 55.6 | 55.6 - 222.2 | 73.5 | | .028 | .003 | .006 - .006 | .00 | .0001 | .0000 | .88 | 1.68 | | |
| ROBERTSONIA SP. CF KNOXI | L-EGG-C FEM | | 944.4 | 104.9 | 55.6 - 444.4 | 137.3 | | .044 | .005 | .006 - .011 | .00 | .0001 | .0000 | 1.66 | 2.69 | | |
| BRYOCAMPTUS SP. | 8-ADULT | | 666.7 | 74.1 | 166.7 - 500.0 | 169.0 | | .011 | .001 | .006 - .006 | .00 | .0000 | .0000 | 1.17 | .67 | | |
| MESOCHRA SP. | 8-ADULT | | 166.7 | 18.5 | 166.7 - 166.7 | 55.6 | | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .29 | .34 | | |
| MESOCHRA SP. | L-EGG-C FEM | | 111.1 | 12.3 | 111.1 - 111.1 | 37.0 | | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .19 | .34 | | |
| DIARTHRODES SP. | A-JUV+ADULT | | 4777.8 | 530.9 | 166.7 - 1722.2 | 542.3 | | .056 | .006 | .006 - .017 | .00 | .0000 | .0000 | 8.38 | 3.37 | | |
| CYCLOPOIDA | A-JUV+ADULT | | 55.6 | 6.2 | 55.6 - 55.6 | 18.5 | | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .10 | .34 | | |
| CLAUSIIDAE | F-COPEPODID | | 777.8 | 86.4 | 55.6 - 277.8 | 92.6 | | .033 | .004 | .006 - .006 | .00 | .0001 | .0000 | 1.36 | 2.02 | | |
| BALANOMORPHA | 2-NAUPLIUS | | 611.1 | 67.9 | 111.1 - 166.7 | 66.8 | | .028 | .003 | .006 - .006 | .00 | .0000 | .0000 | 1.07 | 1.68 | | |
| BALANOMORPHA | E-CYPRIS | | 111.1 | 12.3 | 55.6 - 55.6 | 24.5 | | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .19 | .67 | | |
| LEUCON SP | A-JUV+ADULT | | 333.3 | 37.0 | 55.6 - 277.8 | 92.1 | | .022 | .002 | .006 - .017 | .01 | .0001 | .0000 | .58 | 1.35 | | |
| CUMELLA VULGARIS | 7-JUVENILE | | 388.9 | 43.2 | 388.9 - 388.9 | 129.6 | | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .68 | .34 | | |
| CUMELLA VULGARIS | A-JUV+ADULT | | 1833.3 | 203.7 | 55.6 - 833.3 | 275.0 | | .056 | .006 | .006 - .011 | .00 | .0001 | .0000 | 3.22 | 3.37 | | |
| TANAIDACEA-DIKONOPHORA | 7-JUVENILE | | 111.1 | 12.3 | 55.6 - 55.6 | 24.5 | | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .19 | .67 | | |
| LEPTOCHELLIA SAVIGNYI | 7-JUVENILE | | 55.6 | 6.2 | 55.6 - 55.6 | 18.5 | | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .10 | .34 | | |
| COROPHIUM SP. | 7-JUVENILE | | 222.2 | 24.7 | 55.6 - 55.6 | 29.3 | | .022 | .002 | .006 - .006 | .00 | .0001 | .0000 | .39 | 1.35 | | |
| PONTOGENEIA SP. | 7-JUVENILE | | 55.6 | 6.2 | 55.6 - 55.6 | 18.5 | | .011 | .001 | .011 - .011 | .00 | .0002 | .0000 | .10 | .67 | | |
| CAPRELLIDEA | 7-JUVENILE | | 166.7 | 18.5 | 55.6 - 55.6 | 27.8 | | .017 | .002 | .006 - .006 | .00 | .0001 | .0000 | .29 | 1.01 | | |
| CAPRELLA LAEVIUSCULA | L-EGG-C FEM | | 55.6 | 6.2 | 55.6 - 55.6 | 18.5 | | .033 | .004 | .033 - .033 | .01 | .0006 | .0000 | .10 | 2.02 | | |
| CRANGONIDAE | 6-LARVA | | 55.6 | 6.2 | 55.6 - 55.6 | 18.5 | | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .10 | .34 | | |
| UNIDENTIFIED EGG | M-EGG CASE | | 166.7 | 18.5 | 166.7 - 166.7 | 55.6 | | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .29 | .34 | | |

EPIBENTHIC PLANKTON ANALYSIS

SUMMARY TABLE, PAGE 5

| | | |
|--|---------|------|
| TOTAL NUMBER OF PLANKTON CATEGORIES | 80 | |
| SHANNON-WEINER DIVERSITY INDEX | NUMBERS | 5.15 |
| BRILLOUIN-S DIVERSITY INDEX BASED ON NUMBERS | BIOMASS | 5.91 |
| | | 5.14 |

EPIBENTHIC PLANKTON ANALYSIS

SUMMARY TABLE, PAGE 2

| ORGANISM NAME | PARTS CODE | LH-STAGE | NUMBERS/M**2 | | | WET WEIGHT, GRAMS/M**2 | | | * AVG. BIOMASS | | | * PERCENTAGES | | | |
|----------------------------|------------|-------------|--------------|--------|---------------|------------------------|---------|--------|----------------|--------|--------|---------------|---------|---------|--------|
| | | | * TOTAL | * MEAN | * RANGE | * S.D. | * TOTAL | * MEAN | * RANGE | * S.D. | * MEAN | * S.D. | * ABUN- | * DANCE | * BIO- |
| | | | | | | | | | | | | | | | |
| EUPHILOMEDES SP. | | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 | |
| PODOCOPA | | 7-JUVENILE | 1222.2 | 122.2 | 55.6 - 277.8 | 90.0 | .044 | .004 | .006 - .006 | .00 | .0000 | .0000 | 1.34 | 2.28 | |
| COPEPODA | | C-J/A NOSEX | 1222.2 | 122.2 | 55.6 - 611.1 | 205.9 | .022 | .002 | .006 - .006 | .00 | .0000 | .0000 | 1.34 | 1.14 | |
| CALANOIDA | | 2-NAUPLIUS | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 | |
| PARACALANUS SP. | | F-COPEPODID | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 | |
| EURYTEMORA AMERICANA | | F-COPEPODID | 111.1 | 11.1 | 55.6 - 55.6 | 23.4 | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .12 | .57 | |
| EURYTEMORA AMERICANA | | 8-ADULT | 1111.1 | 111.1 | 55.6 - 277.8 | 78.6 | .050 | .005 | .006 - .006 | .00 | .0001 | .0000 | 1.22 | 2.56 | |
| ACARTIA SP. | | F-COPEPODID | 2055.6 | 205.6 | 55.6 - 444.4 | 161.5 | .044 | .004 | .006 - .006 | .00 | .0000 | .0000 | 2.26 | 2.28 | |
| ACARTIA SP. | | 8-ADULT | 12777.8 | 1277.8 | 55.6 - 3500.0 | 1253.5 | .094 | .009 | .006 - .022 | .01 | .0000 | .0000 | 14.05 | 4.84 | |
| HARPACTICOIDA | | F-COPEPODID | 611.1 | 61.1 | 55.6 - 166.7 | 66.5 | .033 | .003 | .006 - .006 | .00 | .0001 | .0000 | .67 | 1.71 | |
| HARPACTICOIDA | | 8-ADULT | 1777.8 | 177.8 | 55.6 - 888.9 | 269.4 | .039 | .004 | .006 - .006 | .00 | .0000 | .0000 | 1.95 | 1.99 | |
| HARPACTICOIDA | | F-COPEPODID | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 | |
| TEGASTIDAE | | L-EGG-C FEM | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 | |
| LONGIPEDIA SP. | | 8-ADULT | 1333.3 | 133.3 | 55.6 - 944.4 | 287.1 | .044 | .004 | .006 - .011 | .00 | .0001 | .0000 | 1.47 | 2.28 | |
| LONGIPEDIA SP. | | 8-ADULT | 2555.6 | 255.6 | 55.6 - 777.8 | 241.7 | .044 | .004 | .006 - .006 | .00 | .0000 | .0000 | 2.81 | 2.28 | |
| LONGIPEDIA SP. | | F-COPEPODID | 222.2 | 22.2 | 55.6 - 111.1 | 38.8 | .017 | .002 | .006 - .006 | .00 | .0001 | .0000 | .24 | .85 | |
| SCOTTOLANA CANADENSIS | | L-EGG-C FEM | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 | |
| ECTINOSOMATIDAE | | F-COPEPODID | 5833.3 | 583.3 | 55.6 - 1500.0 | 524.6 | .056 | .006 | .006 - .011 | .00 | .0000 | .0000 | 6.41 | 2.85 | |
| HARPACTICUS SPINULOSUS | | A-JUV+ADULT | 111.1 | 11.1 | 55.6 - 55.6 | 23.4 | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .12 | .57 | |
| TISBE SPP. | | 8-ADULT | 1000.0 | 100.0 | 111.1 - 388.9 | 145.3 | .022 | .002 | .006 - .006 | .00 | .0000 | .0000 | 1.10 | 1.14 | |
| TISBE SPP. | | 8-ADULT | 1222.2 | 122.2 | 55.6 - 333.3 | 100.8 | .044 | .004 | .006 - .006 | .00 | .0000 | .0000 | 1.34 | 2.28 | |
| MICROARTHRIIDION LITTORALE | | F-COPEPODID | 5333.3 | 533.3 | 55.6 - 2666.7 | 778.3 | .056 | .006 | .006 - .011 | .00 | .0000 | .0000 | 5.86 | 2.85 | |
| MICROARTHRIIDION LITTORALE | | 8-ADULT | 277.8 | 27.8 | 55.6 - 111.1 | 39.3 | .022 | .002 | .006 - .006 | .00 | .0001 | .0000 | .31 | 1.14 | |
| TACHIDIUS TRIANGULARIS | | L-EGG-C FEM | 5666.7 | 566.7 | 55.6 - 1611.1 | 567.6 | .072 | .007 | .006 - .022 | .01 | .0000 | .0000 | 6.23 | 3.70 | |
| TACHIDIUS TRIANGULARIS | | 8-ADULT | 1222.2 | 122.2 | 55.6 - 555.6 | 173.3 | .039 | .004 | .006 - .006 | .00 | .0001 | .0000 | 1.34 | 1.99 | |

EPIBENTHIC PLANKTON ANALYSIS

SUMMARY TABLE, PAGE 3

| ORGANISM NAME | * PARTS CODE | * LH-STAGE | * * TOTAL | * MEAN | * RANGE | * S.D. | * * NUMBERS/M**2 | * * TOTAL | * MEAN | * RANGE | * S.D. | * * WET WEIGHT, GRAMS/M**2 | * * MEAN | * S.D. | * * AVG. BIOMASS | * * PERCENTAGES | * * ABUN- | * * BIO- | * * DANCE | * * MASS |
|-----------------------------|--------------|------------|-----------|--------|----------------|--------|------------------|-----------|-------------|---------|--------|----------------------------|----------|--------|------------------|-----------------|-----------|----------|-----------|----------|
| TACHIDIIDAE | 8-ADULT | | 444.4 | 44.4 | 55.6 - 277.8 | 86.1 | .022 | .002 | .006 - .006 | .00 | .0001 | .0000 | .49 | 1.14 | | | | | | |
| LAOPHONTIDAE | F-COPEPODID | | 1888.9 | 188.9 | 166.7 - 500.0 | 174.1 | .039 | .004 | .006 - .006 | .00 | .0000 | .0000 | 2.08 | 1.99 | | | | | | |
| PARALAOPHONTE CONGENERA | 8-ADULT | | 2222.2 | 222.2 | 55.6 - 444.4 | 122.8 | .056 | .006 | .006 - .006 | .00 | .0000 | .0000 | 2.44 | 2.85 | | | | | | |
| PARALAOPHONTE CONGENERA | L-EGG-C FEM | | 500.0 | 50.0 | 55.6 - 166.7 | 61.1 | .028 | .003 | .006 - .006 | .00 | .0001 | .0000 | .55 | 1.42 | | | | | | |
| PARALAOPHONTE CONGENERA | U-MATING PR | | 2444.4 | 244.4 | 111.1 - 1000.0 | 342.7 | .033 | .003 | .006 - .006 | .00 | .0000 | .0000 | 2.69 | 1.71 | | | | | | |
| HETEROLAOPHONTE SP. | 8-ADULT | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 | | | | | | |
| CLETODIDAE | 8-ADULT | | 166.7 | 16.7 | 55.6 - 111.1 | 37.5 | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .18 | .57 | | | | | | |
| CLETODIDAE | L-EGG-C FEM | | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .12 | .28 | | | | | | |
| HUNTEMANNIA JADENSIS | 8-ADULT | | 166.7 | 16.7 | 55.6 - 111.1 | 37.5 | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .18 | .57 | | | | | | |
| ACRENHYDROSOMA KARLINGI | 8-ADULT | | 333.3 | 33.3 | 55.6 - 111.1 | 38.8 | .028 | .003 | .006 - .006 | .00 | .0001 | .0000 | .37 | 1.42 | | | | | | |
| AMONARDIA NORMANI | 8-ADULT | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 | | | | | | |
| AMONARDIA NORMANI | F-COPEPODID | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 | | | | | | |
| STENHELIA SP. | 8-ADULT | | 444.4 | 44.4 | 55.6 - 222.2 | 73.1 | .022 | .002 | .006 - .006 | .00 | .0001 | .0000 | .49 | 1.14 | | | | | | |
| STENHELIA PENICULATA | 8-ADULT | | 555.6 | 55.6 | 55.6 - 277.8 | 86.9 | .028 | .003 | .006 - .006 | .00 | .0001 | .0000 | .61 | 1.42 | | | | | | |
| STENEHLIA SP. A | L-EGG-C FEM | | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .12 | .28 | | | | | | |
| TYPHILAMPHIASCUS PECTINIFER | 8-ADULT | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 | | | | | | |
| TYPHILAMPHIASCUS PECTINIFER | A-JUV+ADULT | | 444.4 | 44.4 | 55.6 - 222.2 | 82.0 | .017 | .002 | .006 - .006 | .00 | .0001 | .0000 | .49 | .85 | | | | | | |
| AMPHIASCOIDES SP. A | 8-ADULT | | 611.1 | 61.1 | 55.6 - 222.2 | 80.5 | .028 | .003 | .006 - .006 | .00 | .0001 | .0000 | .67 | 1.42 | | | | | | |
| AMPHIASCOIDES SP. A | L-EGG-C FEM | | 222.2 | 22.2 | 55.6 - 111.1 | 38.8 | .017 | .002 | .006 - .006 | .00 | .0001 | .0000 | .24 | .85 | | | | | | |
| ROBERTSONIA SP. CF KNOXI | 8-ADULT | | 388.9 | 38.9 | 55.6 - 277.8 | 87.1 | .017 | .002 | .006 - .006 | .00 | .0001 | .0000 | .43 | .85 | | | | | | |
| BRYOCAMPTUS SP. | 8-ADULT | | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .12 | .28 | | | | | | |
| BRYOCAMPTUS SP. | F-COPEPODID | | 277.8 | 27.8 | 277.8 - 277.8 | 87.8 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .31 | .28 | | | | | | |
| MESOCYCLA SP. | 8-ADULT | | 277.8 | 27.8 | 111.1 - 166.7 | 60.0 | .011 | .001 | .006 - .006 | .00 | .0000 | .0000 | .31 | .57 | | | | | | |
| DACTYLOPODIA VULGARIS | 8-ADULT | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 | | | | | | |
| DACTYLOPODIA VULGARIS | L-EGG-C FEM | | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 | | | | | | |

EPIBENTHIC PLANKTON ANALYSIS

SUMMARY TABLE, PAGE 4

| ORGANISM NAME | PARTS CODE | LH-STAGE | * TOTAL | MEAN | RANGE | S.D. | * S.D. | TOTAL | MEAN | RANGE | S.D. | * S.D. | AVG. BIOMASS | * ABUN-DANCE | PERCENTAGES BIO-MASS |
|----------------------|------------|-------------|---------|--------------|---------------|------------------------|--------|-------|------|-------------|------|--------|--------------|--------------|----------------------|
| | | | * TOTAL | NUMBERS/M**2 | NUMBERS/M**2 | WET WEIGHT, GRAMS/M**2 | | | | | | | | | |
| DIARTHRODES SP. | | 8-ADULT | 444.4 | 44.4 | 55.6 - 166.7 | 51.1 | 51.1 | .033 | .003 | .006 - .006 | .00 | .0001 | .0000 | .49 | 1.71 |
| CYCLOPOIDA | | C-J/A NOSEX | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 |
| CYCLOPOIDA | | F-COPEPODID | 111.1 | 11.1 | 55.6 - 55.6 | 23.4 | 23.4 | .011 | .001 | .006 - .006 | .00 | .0001 | .0000 | .12 | .57 |
| CLAUSIIDAE | | F-COPEPODID | 2388.9 | 238.9 | 166.7 - 555.6 | 173.8 | 173.8 | .044 | .004 | .006 - .006 | .00 | .0000 | .0000 | 2.63 | 2.28 |
| OITHONA HELGOLANDICA | | 8-ADULT | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 |
| BALANOMORPHA | | 2-NAUPLIUS | 277.8 | 27.8 | 55.6 - 111.1 | 39.3 | 39.3 | .022 | .002 | .006 - .006 | .00 | .0001 | .0000 | .31 | 1.14 |
| BALANOMORPHA | | E-CYPRIS | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 |
| LEUCON SP | | A-JUV+ADULT | 1666.7 | 166.7 | 55.6 - 555.6 | 196.0 | 196.0 | .083 | .008 | .006 - .022 | .01 | .0001 | .0000 | 1.83 | 4.27 |
| CUMELLA VULGARIS | | A-JUV+ADULT | 3333.3 | 333.3 | 166.7 - 833.3 | 238.6 | 238.6 | .122 | .012 | .006 - .033 | .01 | .0000 | .0000 | 3.67 | 6.27 |
| LEPTOCHELIA SAVIGNYI | | 8-ADULT | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 |
| LEPTOCHELIA SAVIGNYI | | A-JUV+ADULT | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | 35.1 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .12 | .28 |
| EPICARIDEA | | C-J/A NOSEX | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 |
| COROPHIUM SP. | | 7-JUVENILE | 111.1 | 11.1 | 111.1 - 111.1 | 35.1 | 35.1 | .006 | .001 | .006 - .006 | .00 | .0000 | .0000 | .12 | .28 |
| DIPTERA-CHIRONOMIDAE | | 6-LARVA | 55.6 | 5.6 | 55.6 - 55.6 | 17.6 | 17.6 | .006 | .001 | .006 - .006 | .00 | .0001 | .0000 | .06 | .28 |

TOTAL NUMBER OF PLANKTON CATEGORIES 70

SHANNON-WEINER DIVERSITY INDEX NUMBERS 4.66
 BIOMASS 5.52
 BRILLOUIN-S DIVERSITY INDEX BASED ON NUMBERS 4.66