

**PUGET SOUND BENTHIC COMMUNITY ASSESSMENT-JUNE
1999**

SUBMITTED TO

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INTRODUCTION

The Puget Sound Estuary was sampled during June and July 1997, June of 1998 and June 1999. This report is an assessment of the June 1999 collection. One aspect of this study was benthic community characterization, which was accomplished via sample collection by National Oceanic and Atmospheric Administration (NOAA) personnel and laboratory and data analysis by Barry A. Vittor & Associates, Inc. (BVA).

METHODS

Sample Collection And Handling

A Young dredge (area = 0.04 m²) was used to collect bottom samples at each of 33 strata locations (three stations sampled per stratum except stratum 26 where four stations were sampled) throughout southern Puget Sound. Samples were pre-screened through 1.0 and 0.5 mm mesh sieves, re-screened to remove formalin and preserved in 70% ethanol by the Washington State Department of Ecology's Marine Sediment Monitoring Unit. The preserved, 0.5 mm sample fractions were transported to Vittor & Associate's laboratory in Mobile, Alabama.

Macroinfaunal Sample Analysis

In the laboratory of BVA, benthic samples were inventoried, rinsed gently through a 0.5 mm mesh sieve to remove preservatives and sediment, stained with Rose Bengal, and stored in 70% isopropanol solution until processing. Sample material (sediment, detritus, organisms) was placed in white enamel trays for sorting under Wild M-5A dissecting microscopes. All macroinvertebrates were carefully removed with forceps and placed in labelled glass vials containing 70% isopropanol. Each vial represented a major taxonomic group (e.g. Polychaeta, Mollusca, Arthropoda). All sorted macroinvertebrates were identified to the lowest practical identification level (LPIL), which in most cases was to species level unless the specimen was a juvenile, damaged, or otherwise unidentifiable. The number of individuals of each taxon, excluding fragments, was recorded. A voucher collection was prepared, composed of representative individuals

of each species not previously encountered in samples from the region.

DATA ANALYSIS

All data generated as a result of laboratory analysis of macroinfauna samples were first coded on data sheets. Enumeration data were entered for each species according to station and replicate. These data were reduced to a data summary report for each station, which included a taxonomic species list and benthic community parameters information. Archive data files of species identification and enumeration were prepared.

The QA/QC reports for the Puget Sound samples are given in Appendices A1 and A2. Quality control comments on dominant LPIL taxa are given in Appendix A3.

Assemblage Structure

Several numerical indices were chosen for analysis and interpretation of the macroinfaunal data. Selection was based primarily on the ability of the index to provide a meaningful summary of data, as well as the applicability of the index to the characterization of the benthic community. Infaunal abundance is reported as the total number of individuals per station and the total number of individuals per square meter (= density). Taxa richness is reported as the total number of taxa represented in a given station collection.

Taxa diversity, which is often related to the ecological stability and environmental "quality" of the benthos, was estimated by the Shannon-Weaver Index (Pielou, 1966), according to the following formula:

$$H' = - \sum_{i=1}^S p_i (\ln p_i)$$

where, S = is the number of taxa in the sample,

i = is the i 'th taxon in the sample, and

p_i = is the number of individuals of the i 'th taxon divided by the total number of individuals in the sample.

Taxa diversity within a given community is dependent upon the number of taxa present (taxa richness) and the distribution of all individuals among those taxa (equitability or evenness). In order to quantify and compare faunal equitability to taxa diversity for a given area, Pielou's Index J' (Pielou, 1966) was calculated as $J' = H'/\ln S$, where $\ln S = H'_{\max}$, or the maximum possible diversity, when all taxa are represented by the same number of individuals; thus, $J' = H' / H'_{\max}$.

HABITAT CHARACTERISTICS

Station location and identification for the June 1999 Puget Sound strata are provided in Table 1 and Figure 1. A station location map for the 1997, 1998 and 1999 Puget Sound strata is provided in Figure 2. Sediment composition data were not provided to BVA at the time of the report, therefore sediment characteristics will not be presented.

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Table 2 provides a complete phylogenetic listing for all strata as well as data on taxa abundance and strata occurrence. Microsoft TMExcel spreadsheets are being provided separately to NOAA which include: raw data on taxa abundance and density by station, a complete taxonomic listing with strata abundance and occurrence and QA/QC comments, a major taxa table with overall taxa abundance, and an assemblage parameter table including data on mean number of taxa, mean density, taxa diversity and taxa evenness by station and stratum.

A total of 54,988 organisms, representing 386 taxa, were identified from the 33 strata (Table 3). Polychaetes were the most numerous organisms present representing 54% of the total assemblage, followed in abundance by malacostracans (19%) and bivalves (16%). Polychaetes represented 53% of the total number of taxa followed by malacostracans (28%) and bivalves (8%) (Table 3). The percentage abundance of the major taxa at the 33 strata is given in Table 4 and Figure 3.

The dominant taxa collected from the strata was the polychaete, family

Cirratulidae (LPIL), the malacostracan, *Eudorella pacifica*, and the polychaetes, *Nephtys cornuta*, *Cossura* (LPIL) and *Levinsenia gracilis* representing 11.0%, 6.9%, 6.4%, 5.8% and 5.5% of the total number of individuals, respectively (Table 2). The polychaete, *Nephtys cornuta* were the most widely distributed taxon being found at 100% of the strata. The distribution of taxa representing > 10% of the total assemblage at each stratum is given in Table 5.

Station abundance and taxa data are summarized for the 33 strata in Table 6 and Figures 4 through 7. Mean density per stratum ranged from 2,775 organisms/m² (SD = 4,330.4) at Stratum 13 to 39,450 organisms/m² (SD = 23,959.4) at Stratum 3 (Table 6; Figures 4 and 5). The mean number of taxa per stratum ranged from 6.7 taxa/rep (SD = 2.9) at Stratum 13 to 63.7 taxa/rep (SD = 15.6) at Stratum 14 (Table 6; Figures 6 and 7).

Taxa diversity and evenness for the Puget Sound strata are given in Table 6 and Figures 8 through 11. Taxa diversity (H') varied considerably and ranged from 0.79 at Stratum 13 to 3.89 at Stratum 23 (Table 6; Figures 8 and 9). Taxa evenness (J') also exhibited considerable variation and ranged from 0.28 at Stratum 13 to 0.85 at Stratum 23 (Table 6; Figures 10 and 11).

LITERATURE CITED

Pielou, E.C. 1966. The measurement of diversity in different types of biological collections *Journal of Theoretical Biology* 13:131-144.

Table 1. Location data for the Puget Sound strata, June 1999.

Stratum No.	Sample No.	Location	Station Target NAD 1983 Decimal Minutes	
			Latitude	Longitude
1	206	Port Ludlow	47 55.3063	122 40.6079
1	207	Port Ludlow	47 55.4684	122 40.7705
1	208	Port Ludlow, south shore	47 55.0000	122 40.8296
2	209	Hood Canal	47 50.4616	122 38.7563
2	210	Hood Canal	47 50.6702	122 39.6710
2	211	Hood Canal, north	47 56.6335	122 38.5530
3	212	Port Gamble Bay	47 50.6340	122 34.3770
3	213	Port Gamble Bay, south	47 49.3381	122 34.5365
3	214	Port Gamble Bay	47 50.1776	122 34.7104
4	215	Quilcene Bay	47 47.9482	122 51.4191
4	216	Quilcene Bay	47 47.8276	122 51.5183
4	217	Quilcene Bay	47 47.4055	122 51.3201
5	218	Dabob Bay, north end	47 49.2351	122 49.1038
5	219	Dabob Bay, Pulali Point	47 43.8027	122 50.9510
5	220	Dabob Bay, Pulali Point	47 44.0792	122 50.6447
6	221	Hood Canal, Red Bluff	47 25.2380	123 06.6194
6	222	Hood Canal, Oak Head	47 40.6926	122 48.8794
6	223	Hood Canal	47 38.0941	122 53.4517
7	224	Hood Canal, Lynch Cove	47 23.4445	122 56.3855
7	225	Hood Canal, Lynch Cove	47 23.7924	122 57.3607
7	226	Hood Canal, Ayres Pt.	47 22.6791	123 07.7475
8	227	Shelton	47 12.7526	123 05.0440
8	228	Shelton	47 12.5834	123 04.9680
8	229	Shelton	47 12.7415	123 05.0350
9	230	Shelton	47 12.5267	123 04.7564
9	231	Oakland Bay	47 13.1674	123 03.7783
9	232	Oakland Bay	47 13.2406	123 03.6894
18	257	Drayton Passage	47 10.1358	122 44.1506
18	258	Drayton Passage, north	47 11.4227	122 44.2201
10	233	Totten Inlet	47 09.3178	123 00.2629
10	234	Totten Inlet	47 06.9598	123 02.3086
10	235	Totten Inlet	47 09.1915	122 58.6520
11	238	Eld Inlet	47 06.7964	122 57.4226
11	239	Eld Inlet	47 07.3304	122 57.6253
11	240	Eld Inlet	47 05.9624	122 58.8208
12	236	Budd Inlet	47 06.8542	122 53.8171
12	237	Budd Inlet	47 07.7563	122 54.8269
12	241	Budd Inlet	47 08.1278	122 54.8698
13	242	Olympia, East Bay	47 03.1717	122 53.8417
13	243	Olympia, East Bay	47 03.0983	122 53.7533
13	244	Olympia, West Bay	47 03.4500	122 54.5500
14	245	Pickering Passage	47 15.4997	122 55.1501

Table 1. Continued:

Stratum No.	Sample No.	Location	Station Target NAD 1983 Decimal Minutes	
			Latitude	Longitude
14	246	Pickering Passage, north	47 18.2273	122 50.9954
14	247	South Squaxin Island	47 10.0216	122 54.3079
15	248	Henderson Inlet	47 08.5717	122 50.1324
15	249	Henderson Inlet	47 08.1040	122 50.1473
15	250	Henderson Inlet	47 08.6698	122 50.4779
16	251	Case Inlet, south	47 12.0105	122 48.9859
16	252	Case Inlet, Herron Island	47 16.1741	122 51.0604
16	253	Case Inlet	47 13.2916	122 50.1095
17	254	N.W. of Nisqually Reach	47 08.4188	122 45.0653
17	255	N.W. of Nisqually Reach	47 10.7949	122 47.2433
17	256	N.W. of Nisqually Reach	47 08.8895	122 46.4537
18	259	Drayton Passage	47 09.7354	122 43.9769
19	260	East of Anderson Island	47 08.9022	122 39.5300
19	261	East of Anderson Island	47 09.1917	122 40.1395
19	262	N. Cormorant Passage	47 10.1569	122 37.2560
20	263	Carr Inlet	47 13.5978	122 39.5067
20	264	Carr Inlet	47 18.5593	122 43.6549
20	265	Carr Inlet	47 15.1438	122 39.9434
21	266	Hale Passage	47 16.1512	122 38.7442
21	267	Wollochet Bay entrance	47 16.1956	122 36.0662
21	268	Hale Passage	47 15.2780	122 35.8865
22	269	Gig Harbor	47 20.2735	122 35.0692
22	270	Gig Harbor	47 20.1284	122 34.7574
22	271	Gig Harbor	47 20.1244	122 34.9836
23	272	Colvos Passage	47 28.4295	122 30.1306
23	273	Colvos Passage, north	47 30.6412	122 29.1539
23	274	Colvos Passage	47 28.3289	122 30.4155
24	275	Quartermaster Harbor	47 21.4626	122 28.6702
24	276	Quartermaster Harbor	47 23.0028	122 28.1154
24	277	Quartermaster Harbor	47 22.3633	122 28.9080
25	278	South of Maury Island	47 19.6160	122 26.9519
25	279	North of Dash Point	47 20.3608	122 24.7121
25	280	Piner Point	47 20.3785	122 27.2318
26	281	S.E. Commencement Bay	47 17.5372	122 26.5156
26	282	S.E. Commencement Bay	47 17.1003	122 27.8927
26	283	S.E. Commencement Bay	47 18.3070	122 27.4126
26	284	S.E. Commencement Bay	47 18.4631	122 28.9287
27	285	S.E. Commencement Bay	47 16.7425	122 28.1936
27	286	S.E. Commencement Bay	47 17.0923	122 28.3244
27	287	S.E. Commencement Bay	47 16.1733	122 26.8208
28	288	S.E. Commencement Bay	47 16.7600	122 26.3977
28	289	S.E. Commencement Bay	47 16.6480	122 27.0584
28	290	S.E. Commencement Bay	47 16.8400	122 26.8446

Table 1. Continued:

Stratum Sample		Location	Station Target NAD 1983 Decimal Minutes	
No.	No.		Latitude	Longitude
29	291	N.E. Commencement Bay	47 17.2721	122 25.8344
29	292	N.E. Commencement Bay	47 17.5280	122 25.1932
29	293	N.E. Commencement Bay	47 17.8160	122 25.7567
30	294	Thea Foss Waterway	47 14.9497	122 25.8998
30	295	Thea Foss Waterway	47 15.4829	122 26.0665
30	296	Thea Foss Waterway	47 15.5314	122 26.1058
31	297	Middle Waterway	47 15.9167	122 26.0000
31	298	Middle Waterway	47 15.8750	122 26.0083
31	299	Middle Waterway	47 15.8583	122 25.9667
32	300	Blair Waterway	47 15.7304	122 23.2828
32	301	Blair Waterway	47 15.7179	122 23.2372
32	302	Blair Waterway	47 15.5052	122 22.8726
33	303	Hylebos Waterway	47 16.5437	122 23.1614
33	304	Hylebos Waterway	47 16.7189	122 23.9059
33	305	Hylebos Waterway	47 16.8190	122 24.0883

Table 2. Abundance and distribution of benthic macroinfaunal taxa for the Puget Sound strata, June 1999.

Taxon Name	Phylum	Class	No. of Individuals	% of Total	Cumulative %	Stratum Occurrence	% Stratum Occurrence
Cirratulidae (LPIL)	Ann	Poly	6045	10.99	10.99	28	85
<i>Eudorella pacifica</i>	Art	Mala	3788	6.89	17.88	29	88
<i>Nephtys cornuta</i>	Ann	Poly	3525	6.41	24.29	33	100
<i>Cossura</i> (LPIL)	Ann	Poly	3161	5.75	30.04	24	73
<i>Levinsenia gracilis</i>	Ann	Poly	3022	5.50	35.54	28	85
<i>Rochefortia tumida</i>	Mol	Biva	2861	5.20	40.74	32	97
<i>Aphelochaeta monilaris</i>	Ann	Poly	2739	4.98	45.72	20	61
<i>Axinopsida serricata</i>	Mol	Biva	2564	4.66	50.38	27	82
Tubificidae (LPIL)	Ann	Olig	1726	3.14	53.52	26	79
<i>Pholoe glabra</i>	Ann	Poly	1670	3.04	56.56	31	94
<i>Eudorellopsis</i> sp. A	Art	Mala	1661	3.02	59.58	6	18
<i>Semele rubropicta</i>	Mol	Biva	1580	2.87	62.45	27	82
<i>Alvania compacta</i>	Mol	Gast	1430	2.60	65.05	17	52
<i>Aoroides intermedius</i>	Art	Mala	927	1.69	66.74	8	24
Bivalvia (LPIL)	Mol	Biva	837	1.52	68.26	29	88
Ophiuroidea (LPIL)	Ech	Ophi	824	1.50	69.76	24	73
<i>Actinaria</i> (LPIL)	Cni	Anth	688	1.25	71.01	18	55
<i>Euchone incolor</i>	Ann	Poly	647	1.18	72.19	10	30
<i>Trochochaeta multisetosa</i>	Ann	Poly	586	1.07	73.25	18	55
<i>Aphelochaeta</i> (LPIL)	Ann	Poly	562	1.02	74.28	17	52
<i>Aricidea ramosa</i>	Ann	Poly	494	0.90	75.17	8	24
<i>Prionospio lighti</i>	Ann	Poly	458	0.83	76.01	32	97
<i>Sigambra setosa</i>	Ann	Poly	415	0.75	76.76	18	55
Lumbrineridae (LPIL)	Ann	Poly	395	0.72	77.48	21	64
<i>Metaphoxus frequens</i>	Art	Mala	387	0.70	78.18	12	36
<i>Armandia brevis</i>	Ann	Poly	360	0.65	78.84	16	48
<i>Leucon nasica</i>	Art	Mala	337	0.61	79.45	21	64
Holothuroidea (LPIL)	Ech	Holo	308	0.56	80.01	10	30
<i>Mediomastus</i> (LPIL)	Ann	Poly	305	0.55	80.57	25	76
Amphiuridae (LPIL)	Ech	Ophi	300	0.55	81.11	4	12
Lucinidae (LPIL)	Mol	Biva	292	0.53	81.64	26	79
<i>Americhelidium rectipalmum</i>	Art	Mala	265	0.48	82.13	19	58
Gastropoda (LPIL)	Mol	Gast	264	0.48	82.61	18	55
<i>Micropodarke dubia</i>	Ann	Poly	264	0.48	83.09	15	45
Yoldiidae (LPIL)	Mol	Biva	256	0.47	83.55	11	33
<i>Prionospio</i> (LPIL)	Ann	Poly	224	0.41	83.96	24	73
<i>Guernea reduncans</i>	Art	Mala	198	0.36	84.32	9	27
<i>Prionospio steenstrupi</i>	Ann	Poly	191	0.35	84.67	13	39
<i>Ampharete acutifrons</i>	Ann	Poly	187	0.34	85.01	10	30
Rhynchocoela (LPIL)	Rhy	-	177	0.32	85.33	29	88
<i>Glycinde armigera</i>	Ann	Poly	175	0.32	85.65	22	67
<i>Cheirimeдея zotea</i>	Art	Mala	171	0.31	85.96	8	24
<i>Rhynchospio glutaea</i>	Ann	Poly	165	0.30	86.26	2	6
<i>Sphaerosyllis ranunculus</i>	Ann	Poly	161	0.29	86.55	16	48
<i>Ehlersia hyperioni</i>	Ann	Poly	158	0.29	86.84	14	42
<i>Turbonilla</i> (LPIL)	Mol	Gast	157	0.29	87.12	18	55
<i>Harpiniopsis fulgens</i>	Art	Mala	156	0.28	87.41	18	55
<i>Ophelina acuminata</i>	Ann	Poly	155	0.28	87.69	13	39
<i>Leptochelia</i> (LPIL)	Art	Mala	153	0.28	87.97	5	15
<i>Cossura pygodactylata</i>	Ann	Poly	148	0.27	88.24	9	27
<i>Odostomia</i> (LPIL)	Mol	Gast	148	0.27	88.50	16	48
<i>Leitoscoloplos pugettensis</i>	Ann	Poly	145	0.26	88.77	24	73
<i>Exogone molesta</i>	Ann	Poly	141	0.26	89.02	17	52
<i>Rhepoxynius daboius</i>	Art	Mala	127	0.23	89.26	6	18
<i>Paraphoxus</i> sp. A	Art	Mala	120	0.22	89.47	6	18
<i>Metopa cistella</i>	Art	Mala	119	0.22	89.69	14	42
<i>Sphaerodoropsis sexantennella</i>	Ann	Poly	117	0.21	89.90	17	52

Table 2. Continued:

Taxon Name	Phylum	Class	No. of Individuals	% of Total	Cumulative %	Station Occurrence	% Station Occurrence
<i>Westwoodilla caecula</i>	Art	Mala	111	0.20	90.11	17	52
<i>Photis (LPIL)</i>	Art	Mala	108	0.20	90.30	10	30
<i>Protomeдея articulata</i>	Art	Mala	107	0.19	90.50	12	36
<i>Pleurogonium rubicundum</i>	Art	Mala	104	0.19	90.69	20	61
<i>Scoletoma tetraura</i>	Ann	Poly	103	0.19	90.87	15	45
<i>Diastylis pellucida</i>	Art	Mala	102	0.19	91.06	16	48
<i>Prionospio jubata</i>	Ann	Poly	99	0.18	91.24	11	33
<i>Capitella tripartita</i>	Ann	Poly	95	0.17	91.41	11	33
<i>Aricidea catherinae</i>	Ann	Poly	91	0.17	91.58	14	42
<i>Ennucula tenuis</i>	Mol	Biva	90	0.16	91.74	15	45
Lysianassidae Genus G	Art	Mala	89	0.16	91.90	9	27
<i>Heteromastus filiformis</i>	Ann	Poly	85	0.15	92.06	11	33
<i>Cumella morion</i>	Art	Mala	82	0.15	92.21	7	21
<i>Dipolydora caulleryi</i>	Ann	Poly	79	0.14	92.35	11	33
<i>Harmothoe imbricata</i>	Ann	Poly	77	0.14	92.49	13	39
<i>Chaetozone setosa</i>	Ann	Poly	76	0.14	92.63	11	33
<i>Lumbrineris (LPIL)</i>	Ann	Poly	76	0.14	92.77	13	39
Columbellidae (LPIL)	Mol	Gast	73	0.13	92.90	15	45
<i>Glycinde picta</i>	Ann	Poly	72	0.13	93.03	16	48
<i>Leptodepcreum sp. A</i>	Art	Mala	68	0.12	93.15	8	24
<i>Nephtys caecoides</i>	Ann	Poly	68	0.12	93.28	18	55
<i>Paraprionospio pinnata</i>	Ann	Poly	68	0.12	93.40	11	33
<i>Tritella laevis</i>	Art	Mala	68	0.12	93.52	7	21
<i>Cossura rostrata</i>	Ann	Poly	67	0.12	93.65	8	24
<i>Dipolydora socialis</i>	Ann	Poly	64	0.12	93.76	17	52
<i>Nutricola tantilla</i>	Mol	Biva	64	0.12	93.88	11	33
<i>Podarkeopsis perkinsi</i>	Ann	Poly	64	0.12	94.00	15	45
<i>Spiophanes bombyx</i>	Ann	Poly	64	0.12	94.11	4	12
<i>Eteone californica</i>	Ann	Poly	57	0.10	94.22	11	33
<i>Glycera (LPIL)</i>	Ann	Poly	57	0.10	94.32	9	27
Maldanidae (LPIL)	Ann	Poly	57	0.10	94.42	11	33
<i>Pleusymptes subglaber</i>	Art	Mala	57	0.10	94.53	12	36
<i>Microjassa sp. A</i>	Art	Mala	55	0.10	94.63	5	15
<i>Nephtys ferruginea</i>	Ann	Poly	55	0.10	94.73	15	45
Terebellidae (LPIL)	Ann	Poly	55	0.10	94.83	14	42
Semelidae (LPIL)	Mol	Biva	51	0.09	94.92	2	6
<i>Bathymedon pumilus</i>	Art	Mala	49	0.09	95.01	7	21
<i>Phyllodoce groenlandica</i>	Ann	Poly	48	0.09	95.10	14	42
<i>Euclymene zonalis</i>	Ann	Poly	46	0.08	95.18	9	27
<i>Aoroides (LPIL)</i>	Art	Mala	45	0.08	95.26	12	36
<i>Melita dentata</i>	Art	Mala	43	0.08	95.34	9	27
<i>Eteone leptotes</i>	Ann	Poly	42	0.08	95.42	14	42
Aoridae (LPIL)	Art	Mala	41	0.07	95.49	2	6
<i>Dyopedos sp. A</i>	Art	Mala	41	0.07	95.56	5	15
<i>Scoloura phillipsi</i>	Art	Mala	41	0.07	95.64	12	36
<i>Lumbrineris cruzensis</i>	Ann	Poly	40	0.07	95.71	9	27
<i>Tiron biocellata</i>	Art	Mala	40	0.07	95.78	1	3
<i>Corophium brevis</i>	Art	Mala	39	0.07	95.86	4	12
<i>Nereis procera</i>	Ann	Poly	38	0.07	95.92	10	30
<i>Carazziella hobsonae</i>	Ann	Poly	37	0.07	95.99	7	21
<i>Gattyana treadwelli</i>	Ann	Poly	37	0.07	96.06	9	27
<i>Tubutanus (LPIL)</i>	Rhy	Anop	37	0.07	96.13	9	27
<i>Eudorellopsis longirostris</i>	Art	Mala	36	0.07	96.19	6	18
<i>Podarkeopsis glabra</i>	Ann	Poly	35	0.06	96.26	11	33
<i>Protodorvillea gracilis</i>	Ann	Poly	35	0.06	96.32	7	21
<i>Mediomastus californiensis</i>	Ann	Poly	34	0.06	96.38	14	42
Oedicerotidae (LPIL)	Art	Mala	34	0.06	96.44	10	30
<i>Parougia sp. A</i>	Ann	Poly	33	0.06	96.50	8	24

Table 2. Continued:

Taxon Name	Phylum	Class	No. of Individuals	% of Total	Cumulative %	Station Occurrence	% Station Occurrence
<i>Ampharete labrops</i>	Ann	Poly	32	0.06	96.56	7	21
<i>Dyopedos monacanthus</i>	Art	Mala	32	0.06	96.62	9	27
<i>Spiophanes berkeleyorum</i>	Ann	Poly	32	0.06	96.68	13	39
<i>Munnogonium tillerae</i>	Art	Mala	30	0.05	96.73	7	21
Oligochaeta (LPIL)	Ann	Olig	30	0.05	96.79	6	18
<i>Pectinaria californiensis</i>	Ann	Poly	30	0.05	96.84	3	9
<i>Brada villosa</i>	Ann	Poly	29	0.05	96.89	5	15
<i>Munna ubiquita</i>	Art	Mala	29	0.05	96.95	4	12
Naticidae (LPIL)	Mol	Gast	29	0.05	97.00	4	12
<i>Magelona berkleyi</i>	Ann	Poly	28	0.05	97.05	4	12
<i>Parapleustes pugettensis</i>	Art	Mala	28	0.05	97.10	6	18
<i>Eteone pacifica</i>	Ann	Poly	27	0.05	97.15	2	6
<i>Glycera nana</i>	Ann	Poly	27	0.05	97.20	14	42
<i>Podarke pugettensis</i>	Ann	Poly	27	0.05	97.25	12	36
<i>Yoldia</i> (LPIL)	Mol	Biva	27	0.05	97.30	6	18
Lineidae (LPIL)	Rhy	Anop	26	0.05	97.34	13	39
Sipuncula (LPIL)	Sip	-	26	0.05	97.39	9	27
Hesionidae (LPIL)	Ann	Poly	25	0.05	97.44	12	36
Nephtyidae (LPIL)	Ann	Poly	25	0.05	97.48	9	27
<i>Pilargis maculata</i>	Ann	Poly	25	0.05	97.53	12	36
<i>Batanoglossus</i> (LPIL)	Hem	Ente	24	0.04	97.57	5	15
<i>Polycirrus medusa</i>	Ann	Poly	24	0.04	97.62	5	15
<i>Sternaspis cf. fossor</i>	Ann	Poly	24	0.04	97.66	5	15
<i>Tenonia priops</i>	Ann	Poly	24	0.04	97.70	8	24
Turbellaria (LPIL)	Pla	Turb	24	0.04	97.75	8	24
<i>Turbonilla pesa</i>	Mol	Gast	24	0.04	97.79	2	6
<i>Magelona longicornis</i>	Ann	Poly	23	0.04	97.83	3	9
<i>Terebellides ehlersi</i>	Ann	Poly	23	0.04	97.87	6	18
<i>Caulleriella pacifica</i>	Ann	Poly	22	0.04	97.91	3	9
Pinnotheridae (LPIL)	Art	Mala	22	0.04	97.95	5	15
<i>Terebellides californica</i>	Ann	Poly	22	0.04	97.99	7	21
Lysianassidae Genus H	Art	Mala	21	0.04	98.03	4	12
Ampharetidae (LPIL)	Ann	Poly	20	0.04	98.07	7	21
<i>Opisa eschrichtii</i>	Art	Mala	20	0.04	98.11	7	21
<i>Phyllococe hartmanae</i>	Ann	Poly	20	0.04	98.14	9	27
<i>Pseudotanais californiensis</i>	Art	Mala	20	0.04	98.18	3	9
<i>Argissa hamatipes</i>	Art	Mala	19	0.03	98.21	8	24
Capitellidae (LPIL)	Ann	Poly	19	0.03	98.25	10	30
<i>Ehlersia heterochaeta</i>	Ann	Poly	19	0.03	98.28	7	21
<i>Euspira pallida</i>	Mol	Gast	19	0.03	98.32	3	9
<i>Mayerella banksia</i>	Art	Mala	18	0.03	98.35	4	12
<i>Photis californica</i>	Art	Mala	18	0.03	98.38	8	24
<i>Hippomedon denticulatus</i>	Art	Mala	17	0.03	98.41	4	12
<i>Lucina</i> (LPIL)	Mol	Biva	16	0.03	98.44	3	9
<i>Sphaerosyllis</i> (LPIL)	Ann	Poly	16	0.03	98.47	5	15
<i>Onuphis</i> sp. K	Ann	Poly	15	0.03	98.50	5	15
<i>Pholoides aspera</i>	Ann	Poly	15	0.03	98.53	5	15
<i>Heterophoxus oculatus</i>	Art	Mala	13	0.02	98.55	1	3
Lysianassidae (LPIL)	Art	Mala	13	0.02	98.57	6	18
<i>Praxillella praetermissa</i>	Ann	Poly	13	0.02	98.60	5	15
<i>Decamastus gracilis</i>	Ann	Poly	11	0.02	98.62	4	12
Dorvilleidae (LPIL)	Ann	Poly	11	0.02	98.64	2	6
<i>Goniada maculata</i>	Ann	Poly	11	0.02	98.66	5	15
<i>Ischyrocerus anguipes</i>	Art	Mala	11	0.02	98.68	3	9
<i>Paleanotus bellis</i>	Ann	Poly	11	0.02	98.70	6	18
Phoxocephalidae (LPIL)	Art	Mala	11	0.02	98.72	5	15
<i>Terebellides horikoshii</i>	Ann	Poly	11	0.02	98.74	3	9
<i>Exogone lourei</i>	Ann	Poly	10	0.02	98.75	4	12
<i>Gasteropteron pacificum</i>	Mol	Gast	10	0.02	98.77	6	18

Table 2. Continued:

Taxon Name	Phylum	Class	No. of Individuals	% of Total	Cumulative %	Station Occurrence	% Station Occurrence
<i>Mytilus edulis</i>	Mol	Biva	10	0.02	98.79	6	18
<i>Aplacophora</i> (LPIL)	Mol	Apla	9	0.02	98.81	2	6
<i>Chone duneri</i>	Ann	Poly	9	0.02	98.82	6	18
<i>Cumella</i> sp. T	Art	Mala	9	0.02	98.84	3	9
Polynoidae (LPIL)	Ann	Poly	9	0.02	98.86	6	18
Pristiglomidae (LPIL)	Mol	Biva	9	0.02	98.87	2	6
Sabellidae (LPIL)	Ann	Poly	9	0.02	98.89	6	18
<i>Apistobranchnus ornatus</i>	Ann	Poly	8	0.01	98.90	1	3
<i>Chaetozone lunula</i>	Ann	Poly	8	0.01	98.92	4	12
<i>Dipolydora cardalia</i>	Ann	Poly	8	0.01	98.93	6	18
<i>Laonice pugettensis</i>	Ann	Poly	8	0.01	98.95	2	6
<i>Leucon</i> sp. J	Art	Mala	8	0.01	98.96	2	6
<i>Microspio pigmentata</i>	Ann	Poly	8	0.01	98.98	2	6
<i>Photis bifurcatus</i>	Art	Mala	8	0.01	98.99	5	15
Rissoidae (LPIL)	Mol	Gast	8	0.01	99.01	3	9
<i>Scalibregma californicum</i>	Ann	Poly	8	0.01	99.02	3	9
Spionidae (LPIL)	Ann	Poly	8	0.01	99.03	6	18
Syllidae (LPIL)	Ann	Poly	8	0.01	99.05	7	21
<i>Aoroides inermis</i>	Art	Mala	7	0.01	99.06	2	6
<i>Asabellides lineata</i>	Ann	Poly	7	0.01	99.07	3	9
<i>Barantolla americana</i>	Ann	Poly	7	0.01	99.09	6	18
<i>Caecum occidentale</i>	Mol	Gast	7	0.01	99.10	1	3
<i>Campylaspis rubromaculata</i>	Art	Mala	7	0.01	99.11	2	6
Cumacea (LPIL)	Art	Mala	7	0.01	99.13	2	6
<i>Desmosoma</i> sp. B	Art	Mala	7	0.01	99.14	2	6
<i>Diastylis</i> sp. I	Art	Mala	7	0.01	99.15	2	6
<i>Eteone pigmentata</i>	Ann	Poly	7	0.01	99.16	2	6
<i>Laonice cirrata</i>	Ann	Poly	7	0.01	99.18	4	12
<i>Lumbrineris japonica</i>	Ann	Poly	7	0.01	99.19	4	12
<i>Phyllodoce longipes</i>	Ann	Poly	7	0.01	99.20	6	18
Polynoidae Genus L	Ann	Poly	7	0.01	99.21	2	6
<i>Terebellides</i> (LPIL)	Ann	Poly	7	0.01	99.23	7	21
<i>Boccardiella hamata</i>	Ann	Poly	6	0.01	99.24	3	9
Cardiidae (LPIL)	Mol	Biva	6	0.01	99.25	6	18
<i>Chaetozone</i> (LPIL)	Ann	Poly	6	0.01	99.26	3	9
<i>Cirrophorus branchiatus</i>	Ann	Poly	6	0.01	99.27	1	3
<i>Cumella californica</i>	Art	Mala	6	0.01	99.28	1	3
<i>Exogone gemmifera</i>	Ann	Poly	6	0.01	99.29	1	3
<i>Heteromastus</i> (LPIL)	Ann	Poly	6	0.01	99.30	1	3
<i>Leitoscoloplos</i> (LPIL)	Ann	Poly	6	0.01	99.31	5	15
<i>Musculus niger</i>	Mol	Biva	6	0.01	99.33	1	3
<i>Okenia vancouverensis</i>	Mol	Gast	6	0.01	99.34	1	3
<i>Proceraea cornuta</i>	Ann	Poly	6	0.01	99.35	6	18
<i>Acteocina</i> (LPIL)	Mol	Gast	5	0.01	99.36	3	9
<i>Americhelidium</i> (LPIL)	Art	Mala	5	0.01	99.37	4	12
Enchytraeidae (LPIL)	Ann	Olig	5	0.01	99.37	4	12
<i>Euchone analis</i>	Ann	Poly	5	0.01	99.38	3	9
<i>Galathowenia oculata</i>	Ann	Poly	5	0.01	99.39	2	6
Isaeidae (LPIL)	Art	Mala	5	0.01	99.40	3	9
<i>Malmgreniella macginitiei</i>	Ann	Poly	5	0.01	99.41	4	12
<i>Myriochele olgae</i>	Ann	Poly	5	0.01	99.42	1	3
Nudibranchia (LPIL)	Mol	Gast	5	0.01	99.43	2	6
Pandoridae (LPIL)	Mol	Biva	5	0.01	99.44	3	9
Phyllodocidae (LPIL)	Ann	Poly	5	0.01	99.45	5	15
<i>Polycirrus californicus</i>	Ann	Poly	5	0.01	99.46	3	9
<i>Ampelisca agassizi</i>	Art	Mala	4	0.01	99.46	2	6
<i>Ampharete</i> (LPIL)	Ann	Poly	4	0.01	99.47	3	9
<i>Aricidea</i> (LPIL)	Ann	Poly	4	0.01	99.48	2	6
<i>Chaetozone</i> sp. N	Ann	Poly	4	0.01	99.49	2	6

Table 2. Continued:

Taxon Name	Phylum	Class	No. of Individuals	% of Total	Cumulative %	Station Occurrence	% Station Occurrence
Cnidaria (LPIL)	Cni	—	4	0.01	99.49	3	9
Corbulidae (LPIL)	Mol	Biva	4	0.01	99.50	1	3
Cossuridae (LPIL)	Ann	Poly	4	0.01	99.51	1	3
<i>Eumida longicornuta</i>	Ann	Poly	4	0.01	99.51	3	9
<i>Exogone</i> (LPIL)	Ann	Poly	4	0.01	99.52	2	6
<i>Gammaropsis thompsoni</i>	Art	Mala	4	0.01	99.53	2	6
Hydrozoa (LPIL)	Cni	Hydr	4	0.01	99.54	3	9
<i>Leptochelia savignyi</i>	Art	Mala	4	0.01	99.54	2	6
<i>Odontosyllis phosphorea</i>	Ann	Poly	4	0.01	99.55	2	6
<i>Rhepoxynius bicuspidatus</i>	Art	Mala	4	0.01	99.56	2	6
Scaphandridae (LPIL)	Mol	Gast	4	0.01	99.57	2	6
<i>Sigambra</i> (LPIL)	Ann	Poly	4	0.01	99.57	2	6
<i>Tellina</i> (LPIL)	Mol	Biva	4	0.01	99.58	3	9
<i>Aricidea wassi</i>	Ann	Poly	3	0.01	99.59	2	6
Asciacea (LPIL)	Cho	Asci	3	0.01	99.59	1	3
<i>Capitella</i> (LPIL)	Ann	Poly	3	0.01	99.60	3	9
<i>Cirrophorus</i> (LPIL)	Ann	Poly	3	0.01	99.60	1	3
<i>Clinocardium ciliatum</i>	Mol	Biva	3	0.01	99.61	2	6
Decapoda (LPIL)	Art	Mala	3	0.01	99.61	2	6
<i>Dipolydora</i> (LPIL)	Ann	Poly	3	0.01	99.62	3	9
<i>Dorvillea annulata</i>	Ann	Poly	3	0.01	99.62	2	6
<i>Eusirus longipes</i>	Art	Mala	3	0.01	99.63	2	6
<i>Haliophasma geminata</i>	Art	Mala	3	0.01	99.63	3	9
<i>Harmothoe fragilis</i>	Ann	Poly	3	0.01	99.64	3	9
Hirudinea (LPIL)	Ann	Hiru	3	0.01	99.65	2	6
<i>Lumbrineris latreilli</i>	Ann	Poly	3	0.01	99.65	2	6
<i>Lyonsia</i> (LPIL)	Mol	Biva	3	0.01	99.66	2	6
<i>Lyonsia californica</i>	Mol	Biva	3	0.01	99.66	2	6
<i>Micronereis nanaimoensis</i>	Ann	Poly	3	0.01	99.67	1	3
Nephtyidae Genus A	Ann	Poly	3	0.01	99.67	2	6
Onuphidae (LPIL)	Ann	Poly	3	0.01	99.68	2	6
<i>Onuphis</i> (LPIL)	Ann	Poly	3	0.01	99.68	2	6
Pectinariidae (LPIL)	Ann	Poly	3	0.01	99.69	2	6
<i>Phoronis</i> (LPIL)	Pho	—	3	0.01	99.69	1	3
Solenidae (LPIL)	Mol	Biva	3	0.01	99.70	3	9
<i>Sphaerodorium papillifer</i>	Ann	Poly	3	0.01	99.71	1	3
<i>Sphaerosyllis californiensis</i>	Ann	Poly	3	0.01	99.71	2	6
<i>Spio cirrifera</i>	Ann	Poly	3	0.01	99.72	1	3
<i>Synudotea</i> sp. C	Art	Mala	3	0.01	99.72	1	3
<i>Acrocirrus heterochaetus</i>	Ann	Poly	2	0.00	99.73	1	3
Asteroidea (LPIL)	Ech	Aste	2	0.00	99.73	1	3
<i>Byblis</i> (LPIL)	Art	Mala	2	0.00	99.73	2	6
<i>Byblis veleronis</i>	Art	Mala	2	0.00	99.74	1	3
<i>Campylaspis hartae</i>	Art	Mala	2	0.00	99.74	2	6
<i>Caprella</i> (LPIL)	Art	Mala	2	0.00	99.74	2	6
<i>Chaetozone commonalis</i>	Ann	Poly	2	0.00	99.75	1	3
<i>Corophium</i> (LPIL)	Art	Mala	2	0.00	99.75	2	6
Cuspidariidae (LPIL)	Mol	Biva	2	0.00	99.75	1	3
<i>Eteone</i> (LPIL)	Ann	Poly	2	0.00	99.76	2	6
<i>Eteone spilotus</i>	Ann	Poly	2	0.00	99.76	2	6
Eulimidae (LPIL)	Mol	Gast	2	0.00	99.77	2	6
<i>Gammaropsis</i> (LPIL)	Art	Mala	2	0.00	99.77	1	3
<i>Gammaropsis shoemakeri</i>	Art	Mala	2	0.00	99.77	1	3
<i>Harmothoe</i> (LPIL)	Ann	Poly	2	0.00	99.78	2	6
<i>Hemilamprops californicus</i>	Art	Mala	2	0.00	99.78	2	6
<i>Hesperone laevis</i>	Ann	Poly	2	0.00	99.78	2	6
<i>Hiatella arctica</i>	Mol	Biva	2	0.00	99.79	2	6
<i>Leucon</i> (LPIL)	Art	Mala	2	0.00	99.79	2	6
<i>Lirobittium</i> (LPIL)	Mol	Gast	2	0.00	99.79	1	3

Table 2. Continued:

Taxon Name	Phylum	Class	No. of Individuals	% of Total	Cumulative %	Station Occurrence	% Station Occurrence
<i>Magelona</i> (LPIL)	Ann	Poly	2	0.00	99.80	2	6
Magelonidae (LPIL)	Ann	Poly	2	0.00	99.80	2	6
<i>Mediomastus ambiseta</i>	Ann	Poly	2	0.00	99.81	2	6
Myidae (LPIL)	Mol	Biva	2	0.00	99.81	1	3
Mysidacea (LPIL)	Art	Mala	2	0.00	99.81	1	3
Mytilidae (LPIL)	Mol	Biva	2	0.00	99.82	2	6
<i>Nebalia pugettensis</i>	Art	Mala	2	0.00	99.82	1	3
<i>Nephtys</i> (LPIL)	Ann	Poly	2	0.00	99.82	1	3
Nereididae (LPIL)	Ann	Poly	2	0.00	99.83	2	6
Opheliidae (LPIL)	Ann	Poly	2	0.00	99.83	2	6
<i>Pectinaria</i> (LPIL)	Ann	Poly	2	0.00	99.83	1	3
<i>Pherusa inflata</i>	Ann	Poly	2	0.00	99.84	1	3
<i>Pista agassizi</i>	Ann	Poly	2	0.00	99.84	1	3
<i>Polycirrus</i> (LPIL)	Ann	Poly	2	0.00	99.85	1	3
<i>Pseudomma berkleyi</i>	Art	Mala	2	0.00	99.85	2	6
<i>Scoloplos acmeceps</i>	Ann	Poly	2	0.00	99.85	1	3
<i>Spiophanes kroeyeri</i>	Ann	Poly	2	0.00	99.86	2	6
Trochochaetidae (LPIL)	Ann	Poly	2	0.00	99.86	1	3
<i>Tryphosella</i> sp. A	Art	Mala	2	0.00	99.86	1	3
Aeginellidae (LPIL)	Art	Mala	1	0.00	99.87	1	3
<i>Ampelisca</i> (LPIL)	Art	Mala	1	0.00	99.87	1	3
<i>Ampelisca cristata</i>	Art	Mala	1	0.00	99.87	1	3
<i>Ampelisca eoa</i>	Art	Mala	1	0.00	99.87	1	3
<i>Ampelisca hancocki</i>	Art	Mala	1	0.00	99.87	1	3
Ampeliscidae (LPIL)	Art	Mala	1	0.00	99.87	1	3
Amphipoda (LPIL)	Art	Mala	1	0.00	99.88	1	3
Anarthruridae (LPIL)	Art	Mala	1	0.00	99.88	1	3
<i>Anonyx liljeborgii</i>	Art	Mala	1	0.00	99.88	1	3
Arenicolidae (LPIL)	Ann	Poly	1	0.00	99.88	1	3
<i>Aricidea lopezi</i>	Ann	Poly	1	0.00	99.88	1	3
<i>Autolytus</i> (LPIL)	Ann	Poly	1	0.00	99.89	1	3
<i>Boccardia</i> (LPIL)	Ann	Poly	1	0.00	99.89	1	3
<i>Campylaspis biplicata</i>	Art	Mala	1	0.00	99.89	1	3
<i>Campylaspis canaliculata</i>	Art	Mala	1	0.00	99.89	1	3
<i>Capitella oculata</i>	Ann	Poly	1	0.00	99.89	1	3
Capitellidae Genus MM	Ann	Poly	1	0.00	99.89	1	3
Caprellidae (LPIL)	Art	Mala	1	0.00	99.90	1	3
<i>Cardiomya pectinata</i>	Mol	Biva	1	0.00	99.90	1	3
<i>Chaetozone hartmanae</i>	Ann	Poly	1	0.00	99.90	1	3
<i>Chone</i> (LPIL)	Ann	Poly	1	0.00	99.90	1	3
Corophiidae (LPIL)	Art	Mala	1	0.00	99.90	1	3
<i>Corophium crassicorne</i>	Art	Mala	1	0.00	99.91	1	3
<i>Crenella decussata</i>	Mol	Biva	1	0.00	99.91	1	3
<i>Cumella</i> sp. S	Art	Mala	1	0.00	99.91	1	3
<i>Cylichna</i> (LPIL)	Mol	Gast	1	0.00	99.91	1	3
<i>Doto columbiana</i>	Mol	Gast	1	0.00	99.91	1	3
<i>Eteone balboensis</i>	Ann	Poly	1	0.00	99.91	1	3
<i>Eteone brigitteae</i>	Ann	Poly	1	0.00	99.92	1	3
<i>Eteone tuberculata</i>	Ann	Poly	1	0.00	99.92	1	3
<i>Glycera americana</i>	Ann	Poly	1	0.00	99.92	1	3
Glyceridae (LPIL)	Ann	Poly	1	0.00	99.92	1	3
<i>Harpiniopsis</i> (LPIL)	Art	Mala	1	0.00	99.92	1	3
<i>Heteropodarke heteromorpha</i>	Ann	Poly	1	0.00	99.93	1	3
<i>Lamprops</i> sp. A	Art	Mala	1	0.00	99.93	1	3
<i>Lamprops</i> sp. B	Art	Mala	1	0.00	99.93	1	3
<i>Lepidasthenia berkeleyae</i>	Ann	Poly	1	0.00	99.93	1	3
<i>Megalomma splendida</i>	Ann	Poly	1	0.00	99.93	1	3
<i>Mesochaetopterus</i> (LPIL)	Ann	Poly	1	0.00	99.93	1	3
<i>Micronephtys minuta</i>	Ann	Poly	1	0.00	99.94	1	3

Table 2. Continued:

Taxon Name	Phylum	Class	No. of Individuals	% of Total	Cumulative %	Station Occurrence	% Station Occurrence
<i>Monoculodes</i> (LPIL)	Art	Mala	1	0.00	99.94	1	3
<i>Munna</i> sp. A	Art	Mala	1	0.00	99.94	1	3
<i>Myriochele gracilis</i>	Ann	Poly	1	0.00	99.94	1	3
<i>Naineris grubei</i>	Ann	Poly	1	0.00	99.94	1	3
<i>Notomastus</i> (LPIL)	Ann	Poly	1	0.00	99.95	1	3
<i>Notomastus lineatus</i>	Ann	Poly	1	0.00	99.95	1	3
<i>Onuphis elegans</i>	Ann	Poly	1	0.00	99.95	1	3
<i>Ophelia brevata</i>	Ann	Poly	1	0.00	99.95	1	3
<i>Pacifoculodes spinipes</i>	Art	Mala	1	0.00	99.95	1	3
<i>Pandora glacialis</i>	Mol	Biva	1	0.00	99.95	1	3
<i>Paranaitis polynoides</i>	Ann	Poly	1	0.00	99.96	1	3
<i>Paraonella spinifera</i>	Ann	Poly	1	0.00	99.96	1	3
<i>Pardalisca cuspidata</i>	Art	Mala	1	0.00	99.96	1	3
<i>Parougia</i> (LPIL)	Ann	Poly	1	0.00	99.96	1	3
<i>Pectinaria granulata</i>	Ann	Poly	1	0.00	99.96	1	3
<i>Pettiboneia sanmatiensis</i>	Ann	Poly	1	0.00	99.97	1	3
<i>Phitine</i> (LPIL)	Mol	Gast	1	0.00	99.97	1	3
<i>Pionosyllis</i> (LPIL)	Ann	Poly	1	0.00	99.97	1	3
<i>Pista</i> (LPIL)	Ann	Poly	1	0.00	99.97	1	3
Pleurobranchiidae (LPIL)	Mol	Gast	1	0.00	99.97	1	3
Pleustidae (LPIL)	Art	Mala	1	0.00	99.97	1	3
<i>Proclea</i> (LPIL)	Ann	Poly	1	0.00	99.98	1	3
<i>Proclea graffii</i>	Ann	Poly	1	0.00	99.98	1	3
<i>Rhepoxynius</i> (LPIL)	Art	Mala	1	0.00	99.98	1	3
<i>Rhepoxynius abronius</i>	Art	Mala	1	0.00	99.98	1	3
<i>Rictaxis punctocaelatus</i>	Mol	Gast	1	0.00	99.98	1	3
Sabellidae Genus F	Ann	Poly	1	0.00	99.99	1	3
Scaphopoda (LPIL)	Mol	Scap	1	0.00	99.99	1	3
<i>Sigambra bassi</i>	Ann	Poly	1	0.00	99.99	1	3
<i>Sphaerosyllis brandhorsti</i>	Ann	Poly	1	0.00	99.99	1	3
Stenothoidae (LPIL)	Art	Mala	1	0.00	99.99	1	3
Tellinidae (LPIL)	Mol	Biva	1	0.00	99.99	1	3
Thraciidae (LPIL)	Mol	Biva	1	0.00	100.00	1	3
<i>Travisia brevis</i>	Ann	Poly	1	0.00	100.00	1	3
Trochidae (LPIL)	Mol	Gast	1	0.00	100.00	1	3

Taxa Key

Ann=Annelida

Hiru=Hirudinea

Olig=Oligochaeta

Poly=Polychaeta

Art=Arthropoda

Mala=Malacostraca

Cho=Chordata

Asci=Asciacea

Cni=Cnidaria

Anth=Anthozoa

Hydr=Hydrozoa

Ech=Echinodermata

Aste=Asteroidea

Holo=Holothuroidea

Ophi=Ophiuroidea

Hem=Hemichordata

Ente=Enteropneusta

Mol=Mollusca

Apla=Aplacophora

Biva=Bivalvia

Gast=Gastropoda

Scap=Scaphopoda

Pho=Phoronida

Pla=Platyhelminthes

Turb=Turbellaria

Rhy=Rhynchocoela

Anop=Anopla

Sip=Sipuncula

Table 3. Summary of overall abundance of major benthic macroinfaunal taxonomic groups for the Puget Sound strata, June 1999.

Taxa	Total No. Taxa	% of Total	Total No. Individuals	% of Total
Annelida				
Hirudinea	1	0.3	3	0.0
Oligochaeta	3	0.8	1,761	3.2
Polychaeta	203	52.6	29,611	53.8
Mollusca				
Aplacophora	1	0.3	9	0.0
Bivalvia	31	8.0	8,707	15.8
Gastropoda	23	6.0	2,199	4.0
Scaphopoda	1	0.3	1	0.0
Arthropoda				
Malacostraca	108	28.0	10,247	18.6
Echinodermata				
Asteroidea	1	0.3	2	0.0
Holothuroidea	1	0.3	308	0.6
Ophiuroidea	2	0.5	1,124	2.0
Other Taxa	11	2.8	1,016	1.8
Total	386		54,988	

Table 4. Summary of abundance of major benthic macroinfaunal taxonomic groups by stratum for the Puget Sound strata, June 1999.

Stratum	Phylum	Total No.		Total No.	
		Taxa	% of Total	Individuals	% of Total
1	Annelida	55	68.8	2,137	57.7
	Mollusca	8	10.0	527	14.2
	Arthropoda	17	21.3	1,042	28.1
	Echinodermata	0	0.0	0	0.0
	Other Taxa	0	0.0	0	0.0
	Total	80		3,706	
2	Annelida	50	48.1	279	25.3
	Mollusca	18	17.3	425	38.5
	Arthropoda	32	30.8	389	35.2
	Echinodermata	2	1.9	9	0.8
	Other Taxa	2	1.9	2	0.2
	Total	104		1,104	
3	Annelida	57	54.3	4,139	87.4
	Mollusca	14	13.3	332	7.0
	Arthropoda	29	27.6	243	5.1
	Echinodermata	2	1.9	2	0.0
	Other Taxa	3	2.9	18	0.4
	Total	105		4,734	
4	Annelida	59	62.8	805	41.6
	Mollusca	13	13.8	849	43.9
	Arthropoda	14	14.9	248	12.8
	Echinodermata	1	1.1	1	0.1
	Other Taxa	7	7.4	31	1.6
	Total	94		1,934	
5	Annelida	28	59.6	297	57.6
	Mollusca	10	21.3	202	39.1
	Arthropoda	7	14.9	14	2.7
	Echinodermata	0	0.0	0	0.0
	Other Taxa	2	4.3	3	0.6
	Total	47		516	
6	Annelida	26	54.2	281	53.3
	Mollusca	8	16.7	29	5.5
	Arthropoda	12	25.0	207	39.3
	Echinodermata	0	0.0	0	0.0
	Other Taxa	2	4.2	10	1.9
	Total	48		527	

Table 4. Continued:

Stratum	Phylum	Total No.		Total No.	
		Taxa	% of Total	Individuals	% of Total
7	Annelida	19	70.4	413	85.9
	Mollusca	3	11.1	44	9.1
	Arthropoda	2	7.4	14	2.9
	Echinodermata	1	3.7	2	0.4
	Other Taxa	2	7.4	8	1.7
	Total	27		481	
8	Annelida	27	65.9	356	84.8
	Mollusca	6	14.6	27	6.4
	Arthropoda	6	14.6	35	8.3
	Echinodermata	1	2.4	1	0.2
	Other Taxa	1	2.4	1	0.2
	Total	41		420	
9	Annelida	14	66.7	279	69.1
	Mollusca	4	19.0	12	3.0
	Arthropoda	1	4.8	108	26.7
	Echinodermata	1	4.8	2	0.5
	Other Taxa	1	4.8	3	0.7
	Total	21		404	
10	Annelida	18	56.3	789	92.4
	Mollusca	9	28.1	35	4.1
	Arthropoda	3	9.4	13	1.5
	Echinodermata	1	3.1	16	1.9
	Other Taxa	1	3.1	1	0.1
	Total	32		854	
11	Annelida	17	56.7	548	40.7
	Mollusca	6	20.0	68	5.0
	Arthropoda	3	10.0	690	51.2
	Echinodermata	2	6.7	22	1.6
	Other Taxa	2	6.7	20	1.5
	Total	30		1,348	
12	Annelida	24	49.0	891	49.8
	Mollusca	13	26.5	188	10.5
	Arthropoda	5	10.2	387	21.6
	Echinodermata	2	4.1	306	17.1
	Other Taxa	5	10.2	17	1.0
	Total	49		1,789	

Table 4. Continued:

Stratum	Phylum	Total No.		Total No.	
		Taxa	% of Total	Individuals	% of Total
13	Annelida	13	76.5	329	98.8
	Mollusca	2	11.8	2	0.6
	Arthropoda	1	5.9	1	0.3
	Echinodermata	1	5.9	1	0.3
	Other Taxa	0	0.0	0	0.0
	Total	17		333	
14	Annelida	63	48.8	735	20.3
	Mollusca	22	17.1	1,859	51.5
	Arthropoda	34	26.4	249	6.9
	Echinodermata	4	3.1	108	3.0
	Other Taxa	6	4.7	661	18.3
	Total	129		3,612	
15	Annelida	15	53.6	306	17.9
	Mollusca	5	17.9	105	6.1
	Arthropoda	5	17.9	1,277	74.5
	Echinodermata	1	3.6	21	1.2
	Other Taxa	2	7.1	4	0.2
	Total	28		1,713	
16	Annelida	32	68.1	741	74.5
	Mollusca	9	19.1	110	11.1
	Arthropoda	2	4.3	110	11.1
	Echinodermata	1	2.1	26	2.6
	Other Taxa	3	6.4	8	0.8
	Total	47		995	
17	Annelida	57	54.8	622	57.4
	Mollusca	15	14.4	209	19.3
	Arthropoda	26	25.0	88	8.1
	Echinodermata	1	1.0	130	12.0
	Other Taxa	5	4.8	34	3.1
	Total	104		1,083	
18	Annelida	51	53.1	591	34.8
	Mollusca	17	17.7	530	31.2
	Arthropoda	18	18.8	132	7.8
	Echinodermata	2	2.1	416	24.5
	Other Taxa	8	8.3	29	1.7
	Total	96		1,698	

Table 4. Continued:

Stratum	Phylum	Total No.		Total No.	
		Taxa	% of Total	Individuals	% of Total
19	Annelida	43	50.0	428	45.5
	Mollusca	16	18.6	302	32.1
	Arthropoda	21	24.4	147	15.6
	Echinodermata	1	1.2	51	5.4
	Other Taxa	5	5.8	13	1.4
	Total	86		941	
20	Annelida	40	69.0	440	51.1
	Mollusca	11	19.0	396	46.0
	Arthropoda	3	5.2	7	0.8
	Echinodermata	1	1.7	11	1.3
	Other Taxa	3	5.2	7	0.8
	Total	58		861	
21	Annelida	51	58.6	160	39.6
	Mollusca	14	16.1	125	30.9
	Arthropoda	17	19.5	101	25.0
	Echinodermata	1	1.1	1	0.2
	Other Taxa	4	4.6	17	4.2
	Total	87		404	
22	Annelida	44	53.0	1,092	54.4
	Mollusca	12	14.5	81	4.0
	Arthropoda	21	25.3	824	41.0
	Echinodermata	2	2.4	3	0.1
	Other Taxa	4	4.8	9	0.4
	Total	83		2,009	
23	Annelida	55	57.3	233	40.5
	Mollusca	12	12.5	84	14.6
	Arthropoda	25	26.0	225	39.1
	Echinodermata	1	1.0	1	0.2
	Other Taxa	3	3.1	33	5.7
	Total	96		576	
24	Annelida	56	61.5	749	75.2
	Mollusca	10	11.0	72	7.2
	Arthropoda	21	23.1	164	16.5
	Echinodermata	0	0.0	0	0.0
	Other Taxa	4	4.4	11	1.1
	Total	91		996	

Table 4. Continued:

Stratum	Phylum	Total No.		Total No.	
		Taxa	% of Total	Individuals	% of Total
25	Annelida	53	53.0	508	21.2
	Mollusca	7	7.0	246	10.3
	Arthropoda	35	35.0	1,366	57.1
	Echinodermata	2	2.0	259	10.8
	Other Taxa	3	3.0	12	0.5
	Total	100		2,391	
26	Annelida	58	51.3	1,588	43.2
	Mollusca	9	8.0	901	24.5
	Arthropoda	40	35.4	1,133	30.8
	Echinodermata	2	1.8	34	0.9
	Other Taxa	4	3.5	19	0.5
	Total	113		3,675	
27	Annelida	50	56.8	426	49.5
	Mollusca	8	9.1	236	27.4
	Arthropoda	29	33.0	194	22.6
	Echinodermata	0	0.0	0	0.0
	Other Taxa	1	1.1	4	0.5
	Total	88		860	
28	Annelida	35	50.7	2,492	83.8
	Mollusca	9	13.0	261	8.8
	Arthropoda	21	30.4	215	7.2
	Echinodermata	1	1.4	1	0.0
	Other Taxa	3	4.3	5	0.2
	Total	69		2,974	
29	Annelida	63	60.0	2,611	68.8
	Mollusca	14	13.3	864	22.8
	Arthropoda	24	22.9	305	8.0
	Echinodermata	1	1.0	2	0.1
	Other Taxa	3	2.9	14	0.4
	Total	105		3,796	
30	Annelida	47	58.8	1,441	72.2
	Mollusca	17	21.3	510	25.6
	Arthropoda	13	16.3	40	2.0
	Echinodermata	1	1.3	1	0.1
	Other Taxa	2	2.5	4	0.2
	Total	80		1,996	

Table 4. Continued:

Stratum	Phylum	Total No. Taxa	% of Total	Total No. Individuals	% of Total
31	Annelida	54	60.0	1,177	71.5
	Mollusca	12	13.3	373	22.7
	Arthropoda	21	23.3	90	5.5
	Echinodermata	1	1.1	3	0.2
	Other Taxa	2	2.2	3	0.2
	Total	90		1,646	
32	Annelida	50	73.5	1,889	71.2
	Mollusca	12	17.6	694	26.2
	Arthropoda	2	2.9	58	2.2
	Echinodermata	1	1.5	3	0.1
	Other Taxa	3	4.4	8	0.3
	Total	68		2,652	
33	Annelida	50	63.3	1,603	81.8
	Mollusca	9	11.4	218	11.1
	Arthropoda	16	20.3	131	6.7
	Echinodermata	1	1.3	1	0.1
	Other Taxa	3	3.8	7	0.4
	Total	79		1,960	

Table 5. Percentage abundance of dominant taxa (> 10% of the total) for the Puget Sound strata, June 1999.

Taxa	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Annelida																	
Oligochaeta																	
Tubificidae (LPIL)	33.8							21.2									
Polychaeta																	
<i>Aphelochaeta monilaris</i>			41.8														
<i>Aricidea ramosa</i>																31.8	
<i>Armandia brevis</i>								10.2									
Cirratulidae (LPIL)	10.5		30.0														
<i>Cossura</i> (LPIL)							10.0										
<i>Euchone incolor</i>																	
<i>Levinsenia gracilis</i>					14.1											18.2	23.5
<i>Nephtys cornuta</i>						25.0	12.9	36.4	57.2	65.6	11.3	11.6	84.4				
<i>Paraprionospio pinnata</i>							11.0										
<i>Pholoe glabra</i>										17.1	21.9	31.3					
<i>Prionospio lighti</i>																	
<i>Sigambra setosa</i>							38.9										
Arthropoda																	
Malacostraca																	
<i>Aoroides intermedius</i>	21.6																
<i>Diastylis pellucida</i>						10.2											
<i>Eudorella pacifica</i>						21.8					50.9	21.0			72.9	10.5	
<i>Eudorellopsis</i> sp. A																	
<i>Leucon nasica</i>									26.7								
Cnidaria																	
Anthozoa																	
<i>Actiniaria</i> (LPIL)														17.2			
Echinodermata																	
Holothuroidea																	
Holothuroidea (LPIL)																	
Ophiuroidea																	
Ophiuroidea (LPIL)																	12.0
Mollusca																	
Bivalvia																	
<i>Axinopsida serricata</i>				16.4	23.3												
Bivalvia (LPIL)																	
<i>Rochefortia tumida</i>	11.4			15.5										10.7			
<i>Semele rubropicta</i>																	
Yoldiidae (LPIL)		19.3															
Gastropoda																	
<i>Alvania compacta</i>														33.4			

Table 6. Summary of the benthic macroinvertebrate data for the Puget Sound strata, June 1999.

Stratum	Station	No. of Taxa	No. of Indvs.	Density (nos/m ²)	Mean No. Taxa	Taxa (SD)	Mean Density	Density (SD)	Total No. Taxa	Total No. Individuals	H' Diversity	J' Evenness
1	206	21	374	9350	36.0	13.1	30883.3	36369.8	80	3706	2.28	0.52
	207	45	417	10425								
	208	42	2915	72875								
2	209	47	294	7350	50.3	8.5	9200.0	2299.9	104	1104	3.50	0.75
	210	60	471	11775								
	211	44	339	8475								
3	212	53	1276	31900	52.0	20.5	39450.0	23959.4	105	4734	2.08	0.45
	213	72	2651	66275								
	214	31	807	20175								
4	215	40	489	12225	57.7	15.5	16116.7	3635.3	94	1934	3.23	0.71
	216	64	668	16700								
	217	69	777	19425								
5	218	43	447	11175	20.3	19.7	4300.0	5956.9	47	516	2.84	0.74
	219	10	42	1050								
	220	8	27	675								
6	221	19	81	2025	24.3	7.6	4391.7	3213.5	48	527	2.71	0.70
	222	33	322	8050								
	223	21	124	3100								
7	224	10	135	3375	13.0	6.1	4008.3	678.8	27	481	2.11	0.64
	225	9	157	3925								
	226	20	189	4725								
8	227	23	177	4425	21.0	2.6	3500.0	901.0	41	420	2.33	0.63
	228	22	138	3450								
	229	18	105	2625								
9	230	9	113	2825	10.7	2.1	3366.7	1323.4	21	404	1.36	0.45
	231	10	96	2400								
	232	13	195	4875								
10	233	23	233	5825	19.0	7.8	7116.7	2659.2	32	854	1.40	0.40
	234	10	407	10175								
	235	24	214	5350								
11	238	16	487	12175	17.3	7.1	11233.3	8103.6	30	1348	1.64	0.48
	239	25	753	18825								
	240	11	108	2700								
12	236	13	152	3800	24.0	9.6	14908.3	10413.8	49	1789	2.16	0.55
	237	28	659	16475								
	241	31	978	24450								
13	242	5	9	225	6.7	2.9	2775.0	4330.4	17	333	0.79	0.28
	243	5	13	325								
	244	10	311	7775								
14	245	66	1663	41575	63.7	15.6	30100.0	10059.7	129	3612	2.82	0.58
	246	78	912	22800								
	247	47	1037	25925								
15	248	16	299	7475	15.7	2.5	14275.0	6025.4	28	1713	1.14	0.34
	249	13	758	18950								
	250	18	656	16400								
16	251	31	329	8225	29.0	5.3	8291.7	1026.6	47	995	2.45	0.64
	252	23	374	9350								
	253	33	292	7300								
17	254	40	135	3375	52.0	11.5	9025.0	5075.9	104	1083	3.33	0.72
	255	53	420	10500								
	256	63	528	13200								
18	257	28	386	9650	45.7	15.9	14150.0	4011.2	96	1698	2.98	0.65
	258	50	618	15450								
	259	59	694	17350								
19	260	31	265	6625	42.7	10.7	7841.7	1752.2	86	941	3.33	0.75
	261	45	282	7050								
	262	52	394	9850								

Table 6. Continued:

Stratum	Station	No. of Taxa	No. of Indvs.	Density (nos/m ²)	Mean No. Taxa	Taxa (SD)	Mean Density	Density (SD)	Total No. Taxa	Total No. Individuals	H' Diversity	J' Evenness
20	263	48	427	10675	30.0	15.6	7175.0	3032.7	58	861	2.82	0.69
	264	21	213	5325								
	265	21	221	5525								
21	266	35	138	3450	40.3	10.1	3366.7	1152.3	87	404	3.57	0.80
	267	52	179	4475								
	268	34	87	2175								
22	269	48	531	13275	44.7	10.4	16741.7	7939.5	83	2009	2.55	0.58
	270	53	445	11125								
	271	33	1033	25825								
23	272	61	248	6200	48.3	11.4	4800.0	1284.8	96	576	3.89	0.85
	273	45	181	4525								
	274	39	147	3675								
24	275	59	219	5475	42.7	16.0	8300.0	2455.7	91	996	3.12	0.69
	276	27	397	9925								
	277	42	380	9500								
25	278	59	1110	27750	46.0	13.0	19925.0	12718.3	100	2391	2.68	0.58
	279	46	1071	26775								
	280	33	210	5250								
26	281	50	993	24825	58.8	6.5	22968.8	8229.6	113	3675	2.94	0.62
	282	62	941	23525								
	283	58	1267	31675								
	284	65	474	11850								
27	285	54	228	5700	46.0	9.8	7166.7	3536.0	88	860	3.38	0.75
	286	49	448	11200								
	287	35	184	4600								
28	288	42	1136	28400	45.7	3.2	24783.3	10694.0	69	2974	1.87	0.44
	289	47	510	12750								
	290	48	1328	33200								
29	291	62	1357	33925	53.7	8.5	31633.3	4883.9	105	3796	2.72	0.58
	292	54	1398	34950								
	293	45	1041	26025								
30	294	25	86	2150	38.7	11.9	16633.3	12804.5	80	1996	2.57	0.59
	295	44	1058	26450								
	296	47	852	21300								
31	297	59	709	17725	54.7	3.8	13716.7	3534.0	90	1646	3.34	0.74
	298	53	495	12375								
	299	52	442	11050								
32	300	55	1232	30800	45.7	9.0	22100.0	12085.9	68	2652	2.69	0.64
	301	45	1088	27200								
	302	37	332	8300								
33	303	51	770	19250	45.3	6.0	16333.3	6166.1	79	1960	2.35	0.54
	304	39	370	9250								
	305	46	820	20500								

Figure 1. Project location and stratum locations for the Puget Sound strata, June 1999.

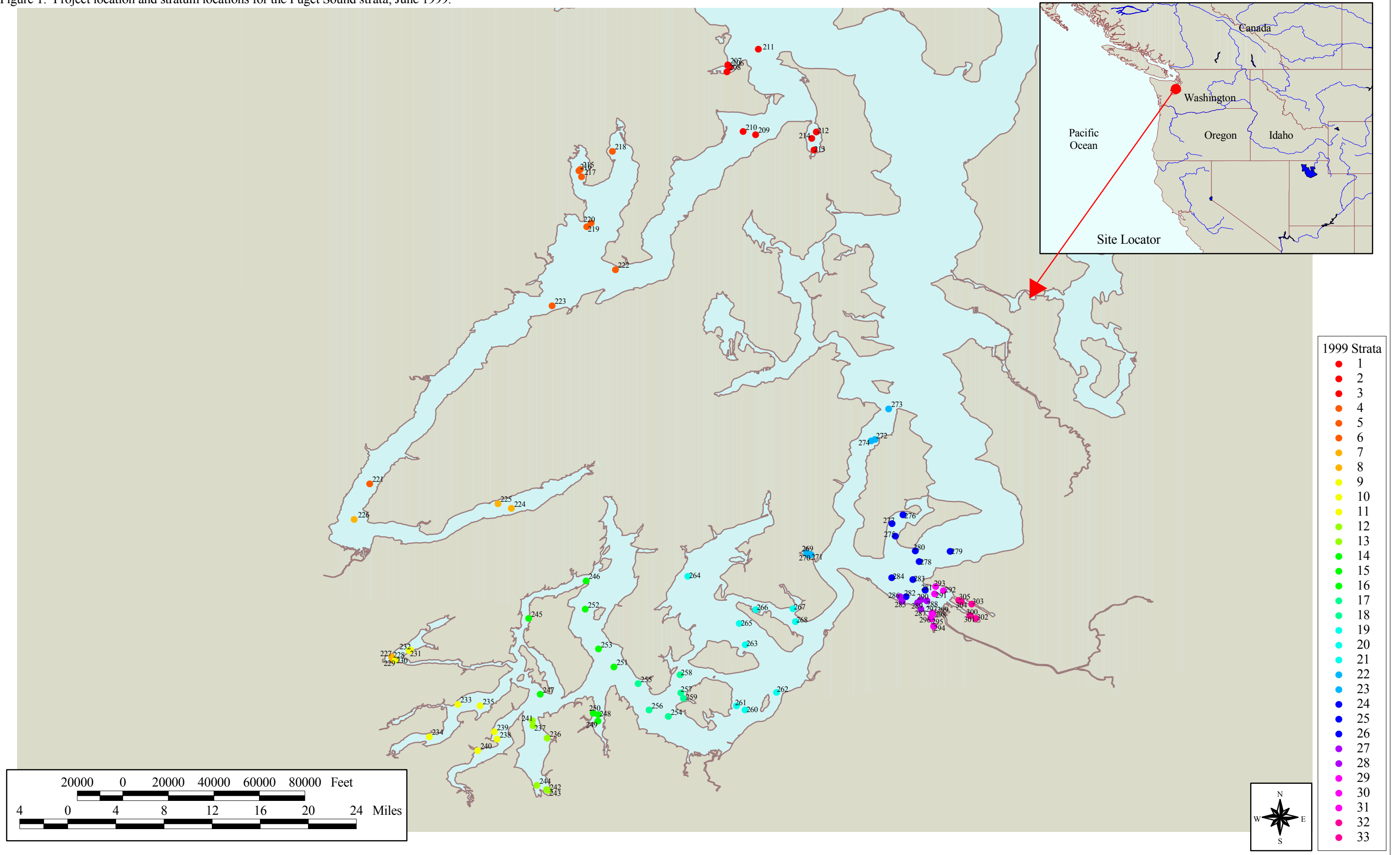


Figure 2. Station locations for the Puget Sound strata, 1997, 1998 and 1999.

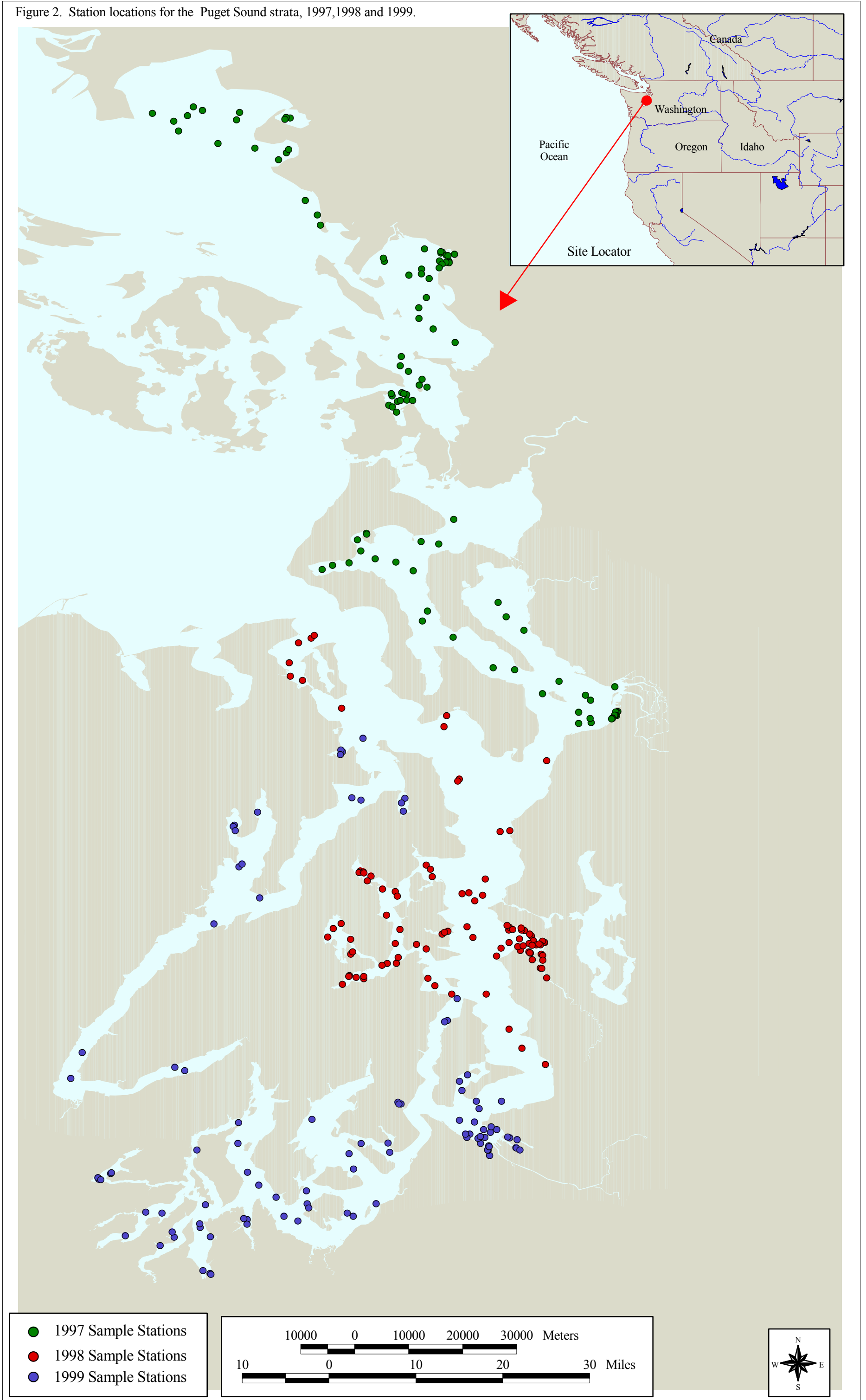


Figure 3. Percent abundance of major taxonomic groups for the Puget Sound strata, June 1999.

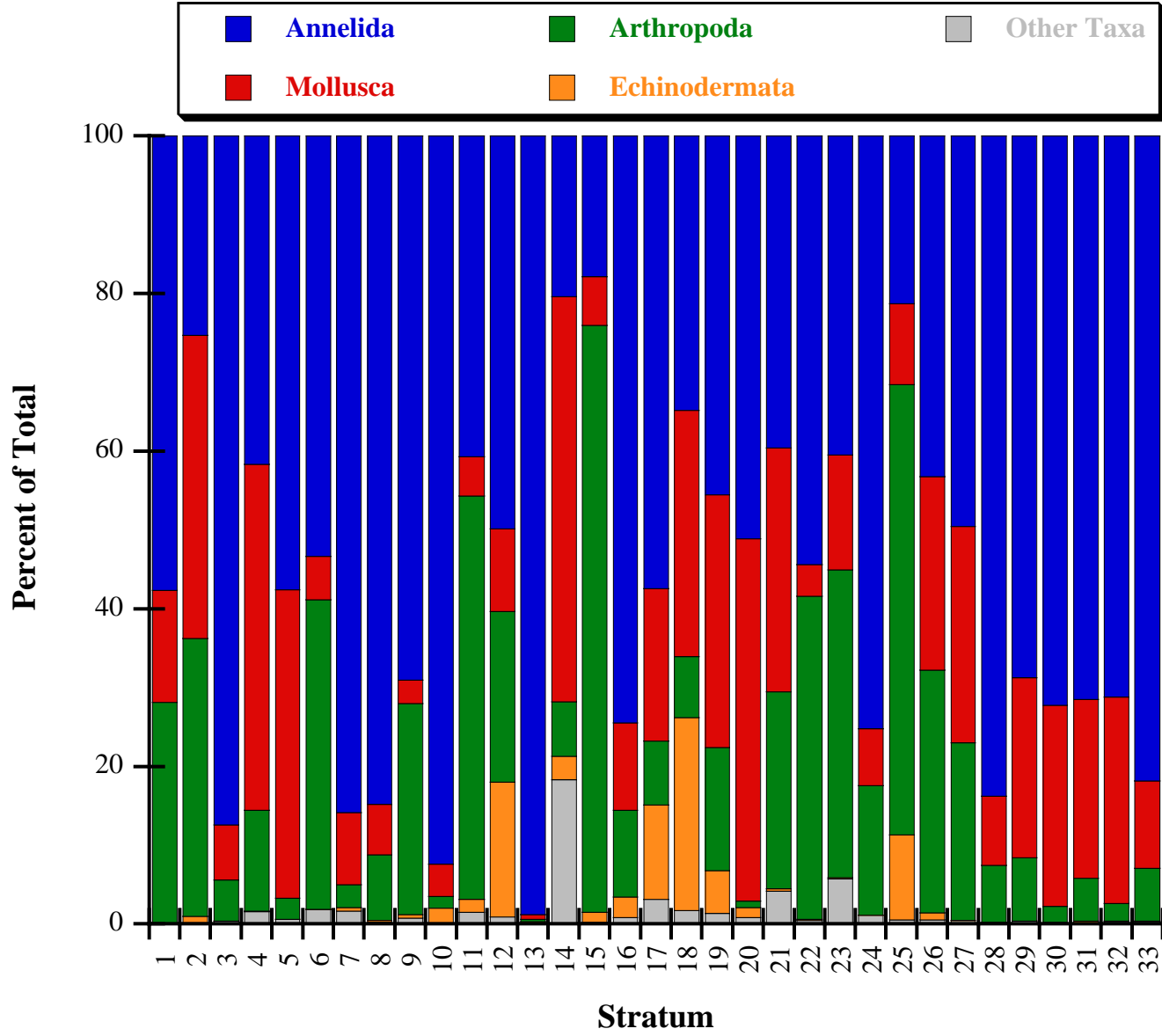


Figure 4. Mean macroinvertebrate densities for the Puget Sound strata, June 1999.

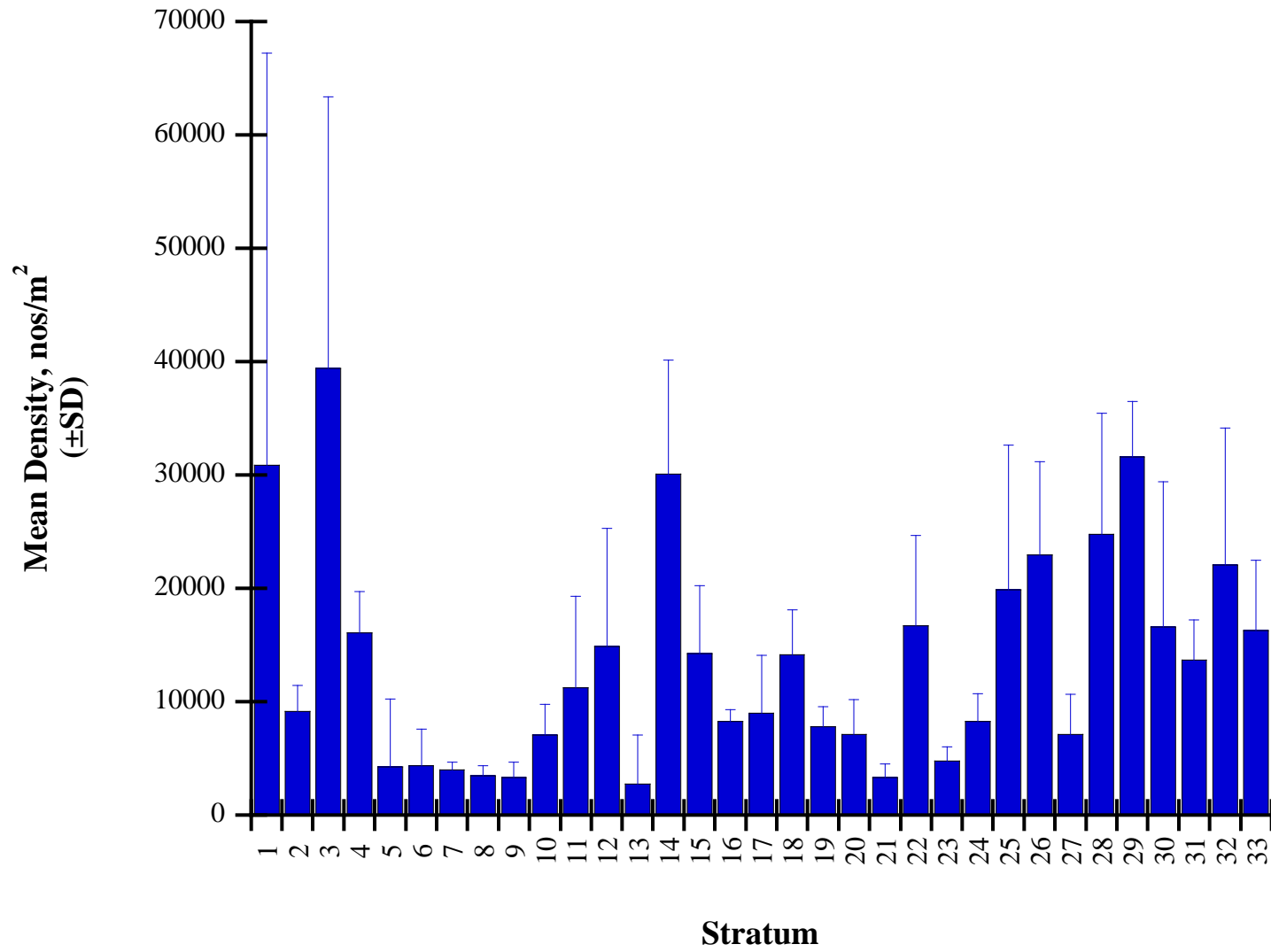


Figure 5. Spatial distribution of mean macroinvertebrate density for the Puget Sound strata, June 1999.

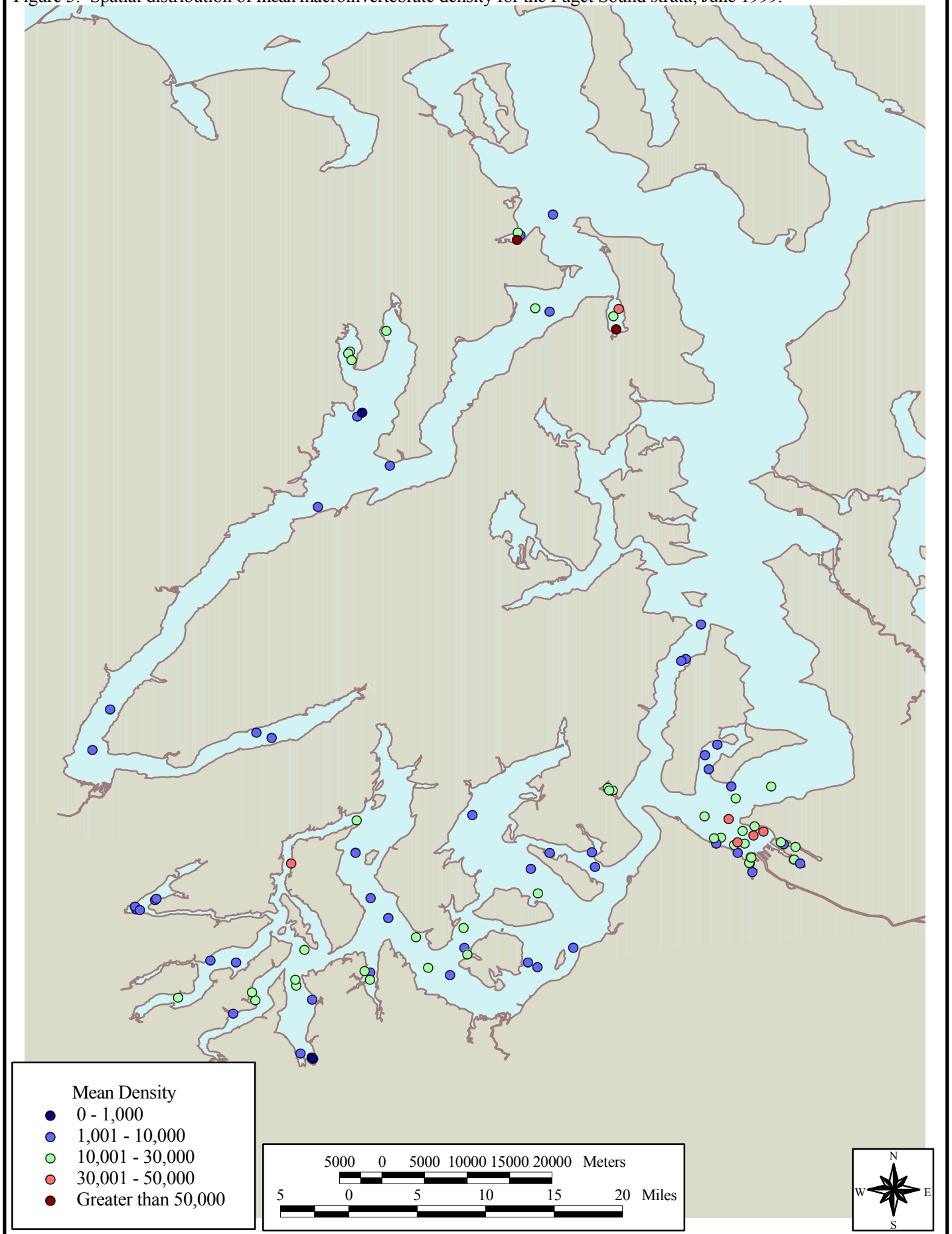


Figure 6. Mean number of taxa for the Puget Sound strata, June 1999.

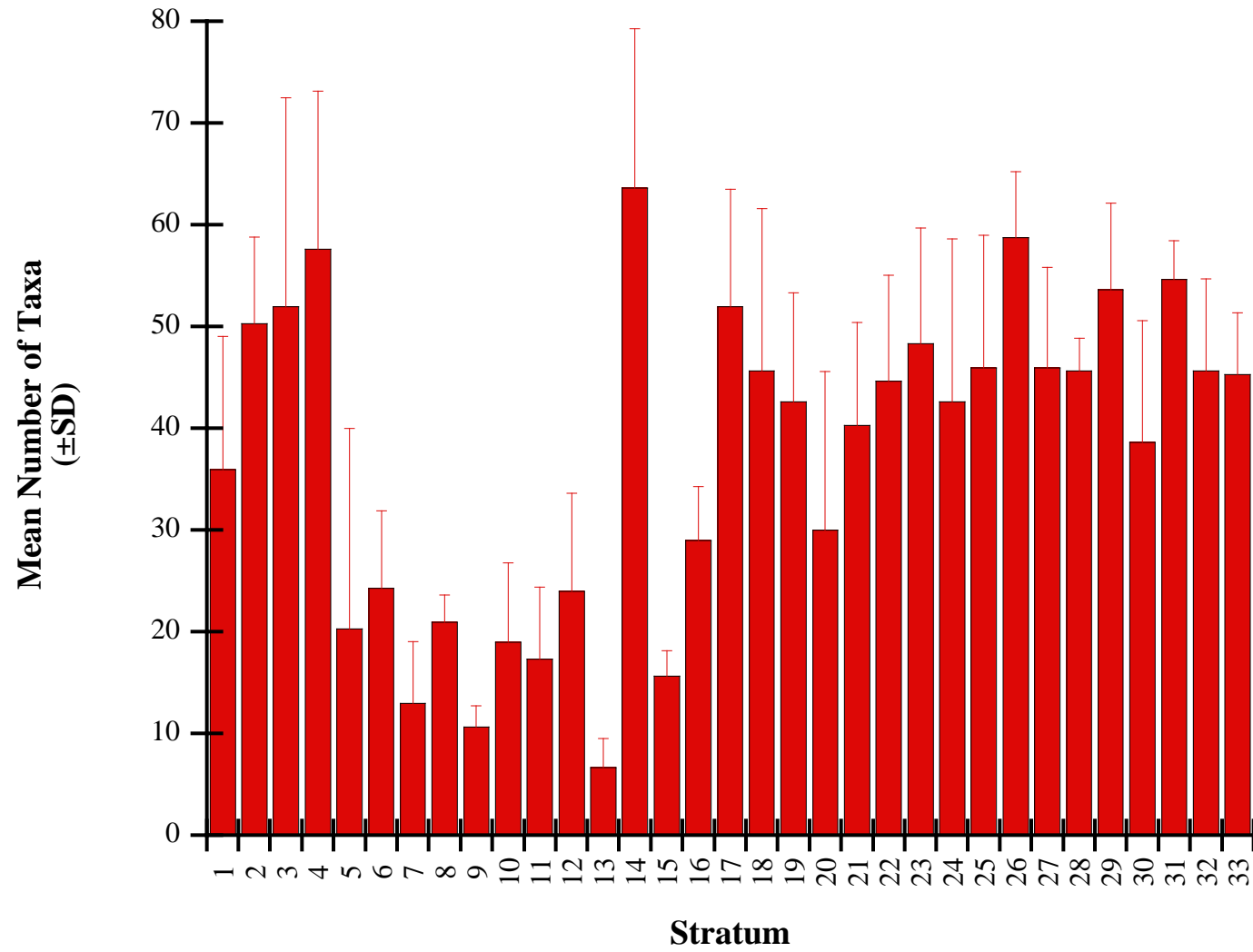


Figure 7. Spatial distribution of mean number of taxa for the Puget Sound strata, June 1999.

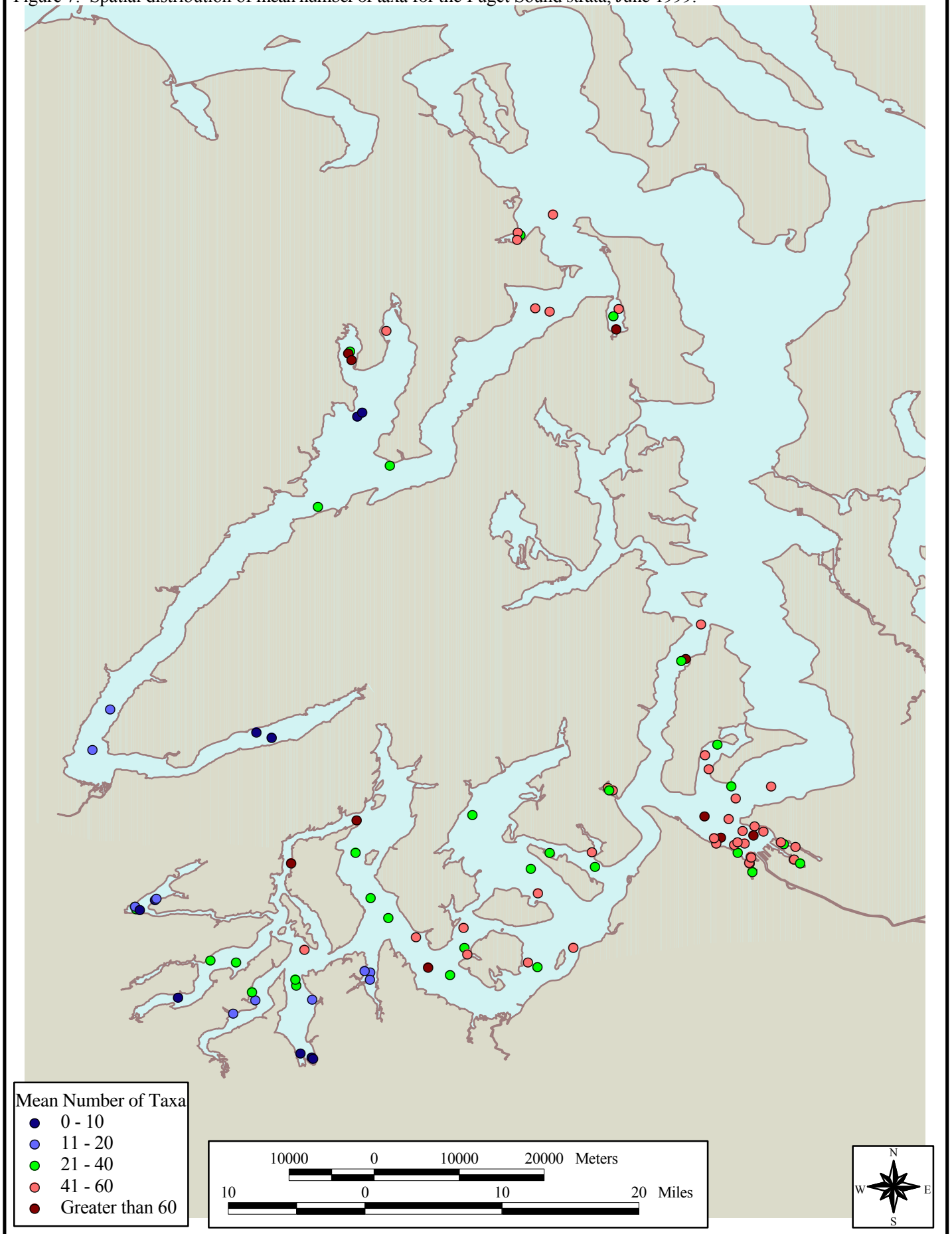


Figure 8. Taxa diversity (H') for the Puget Sound strata, June 1999.

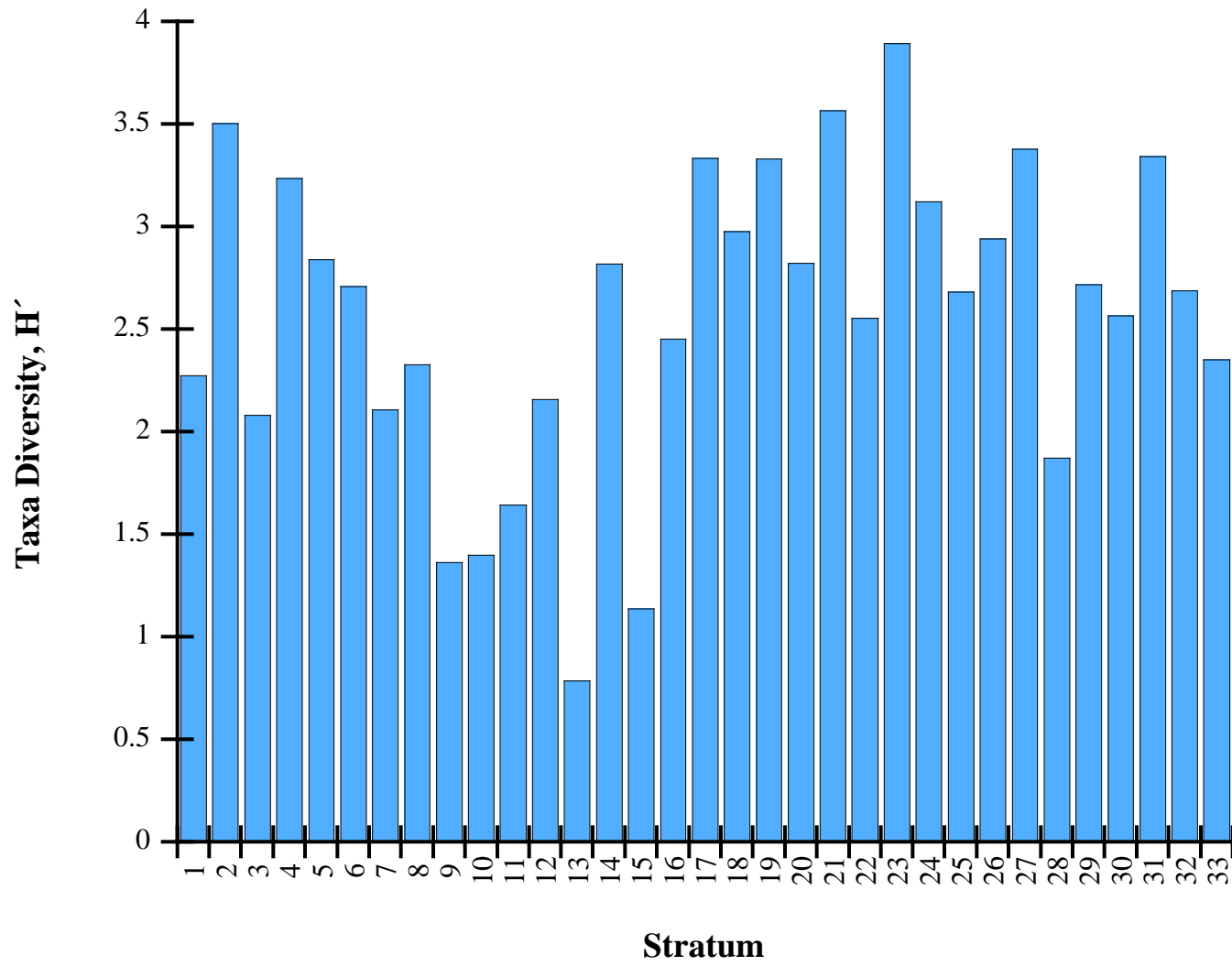


Figure 9. Spatial distribution of taxa diversity (H') for the Puget Sound strata, June 1999.

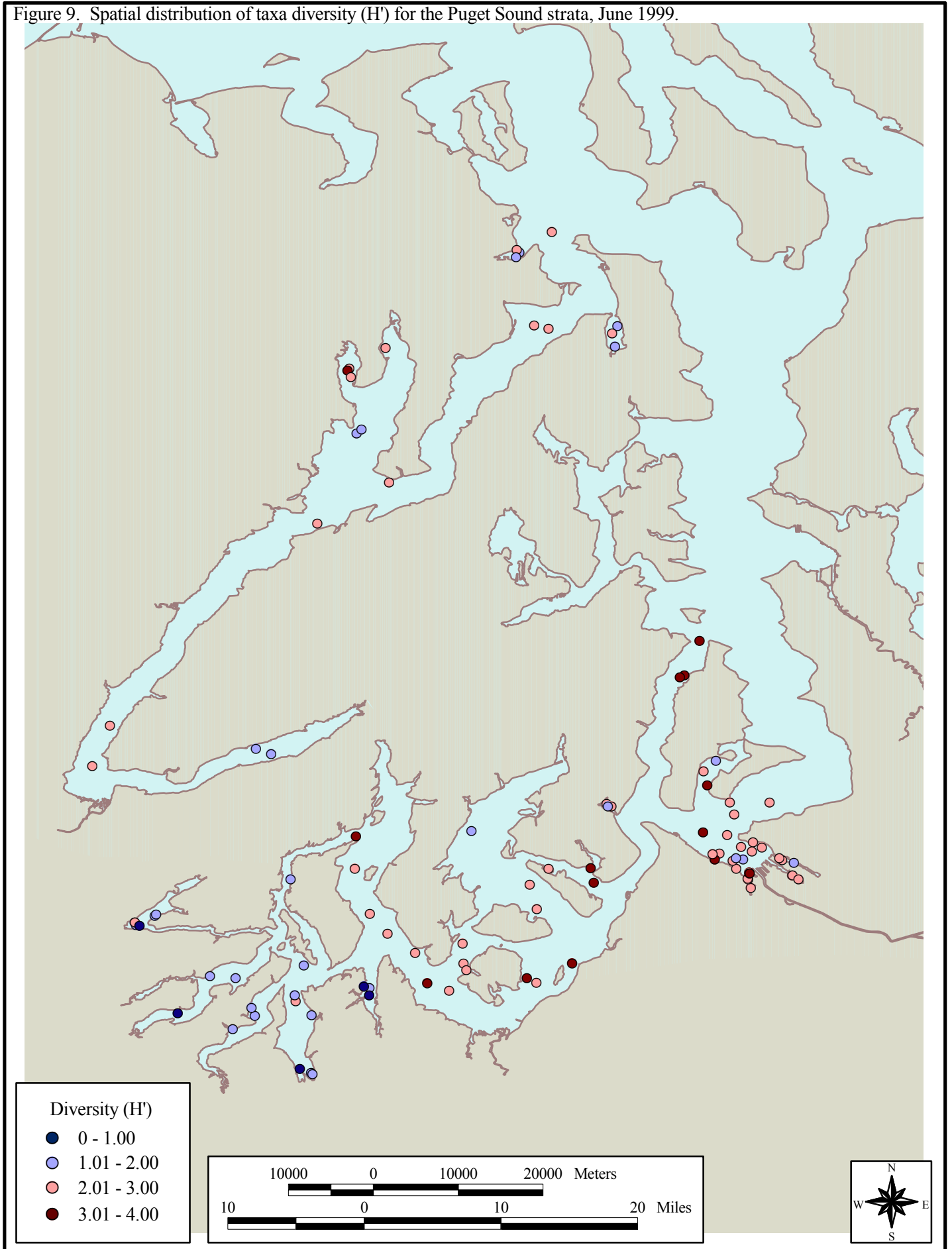


Figure 10. Taxa evenness (J') for the Puget Sound strata, June 1999.

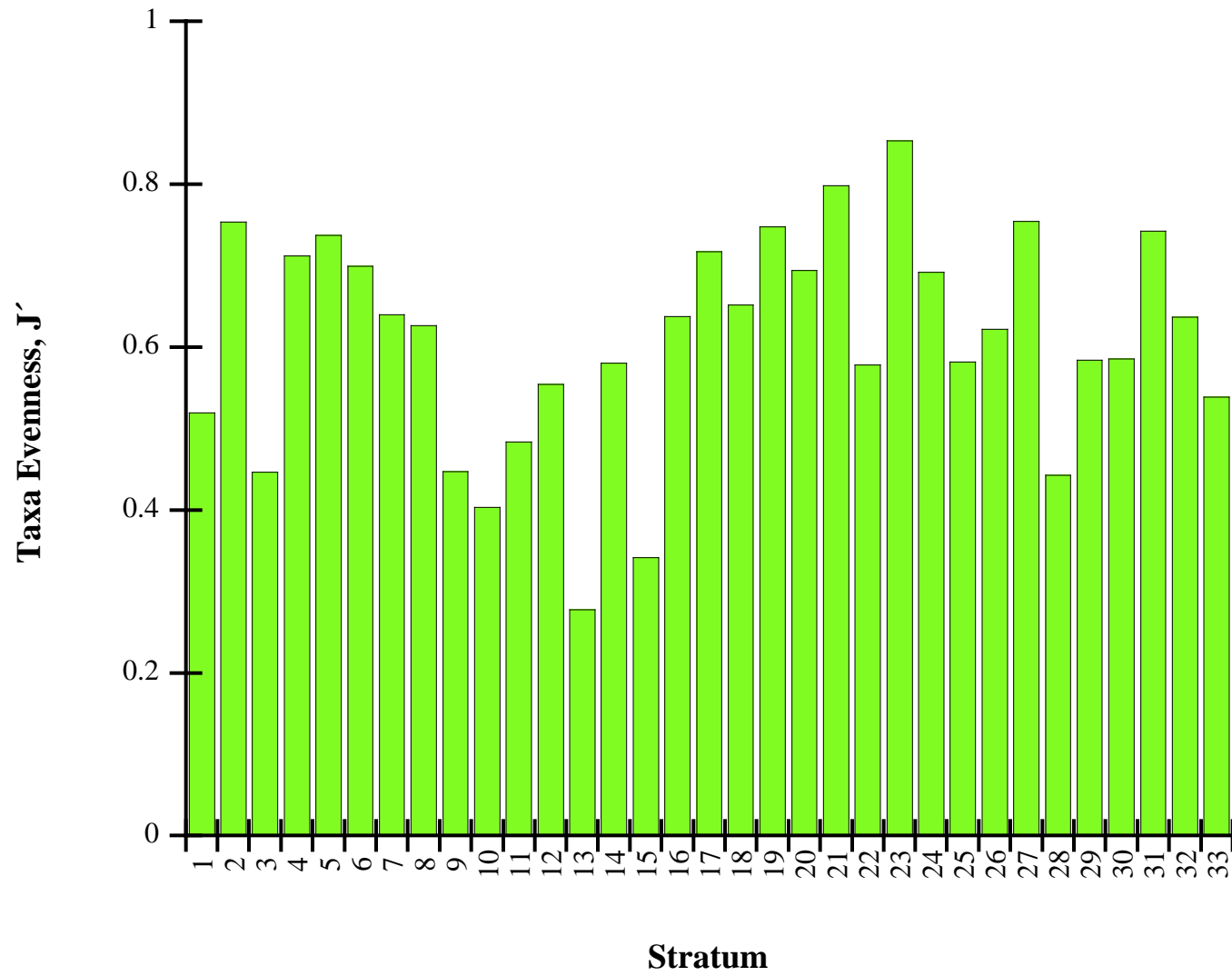
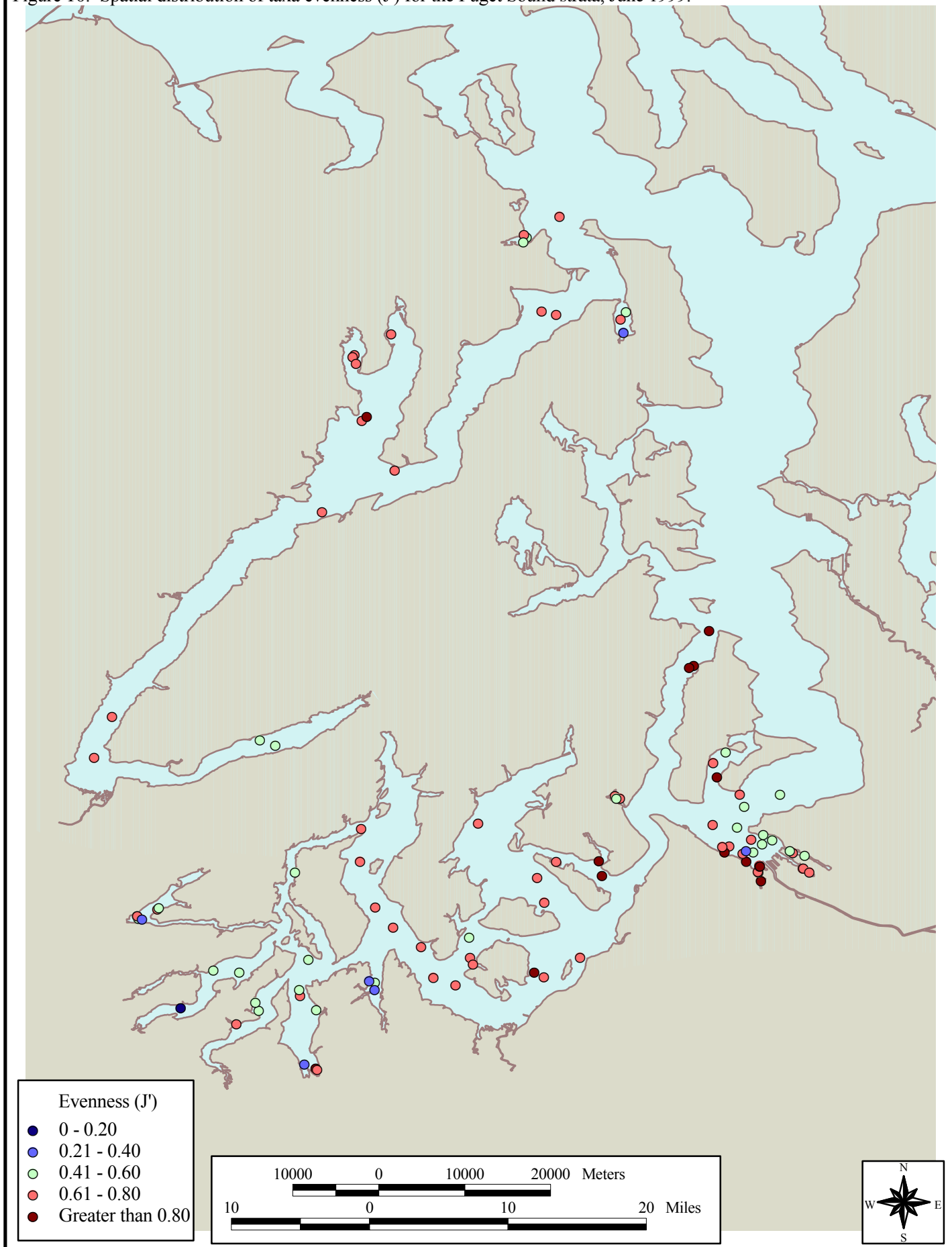


Figure 10. Spatial distribution of taxa evenness (J') for the Puget Sound strata, June 1999.



APPENDIX

QUALITY ASSURANCE STATEMENT

Client/Project NOAA
Work Assignment Title 1999 Puget Sound
Work Assignment Number **Task Number DO 6**

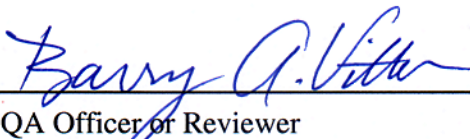
Description of

Data Set or Deliverable: 99 Benthic macroinvertebrate samples collected
June 1999; Young Dredge grabs.

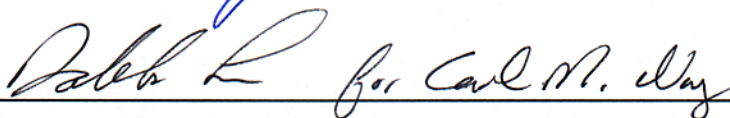
Description of audit and review activities:

Judged accuracy rates were well above standard levels for sorting and taxonomy. Laboratory QC reports were completed. Copies of QC results follow (see attachment.) All taxonomic data were entered into computer and printed. This list was checked for accuracy against original taxonomic data sheets.

Description of outstanding issues or deficiencies which may affect data quality: None



Signature of QA Officer or Reviewer March 7, 2001
Date



Signature of Project Manager March 7, 2001
Date

QUALITY CONTROL REWORKS

Client/Project NOAA-Puget Sound 1999
Work Assignment Title

Task Number DO 6

Sorting Results:	Sample #	% Accuracy
	223	100%
	243	100%
	248	100%
	250	99%
	264	100%
	220	100%
	224	100%
	238	100%
	254	99%
	265	100%
	232	100%
	226	100%
	242	100%

Taxonomy Results:	Sample #	Taxa	% Accuracy
	250	Crust./Moll.	100%
	283	Crust./Moll.	98%
	237	Crust./Moll.	99%
	218	Crust./Moll.	99%
	289	Crust./Moll.	100%
	254	Crust./Moll.	98%
	214	Crust./Moll.	97%
	217	Crust./Moll.	99%
	255	Crust./Moll.	100%
	258	Crust./Moll.	99%
	244	Poly./Misc.	99%
	286	Poly./Misc.	98%
	209	Poly./Misc.	97%
	272	Poly./Misc.	98%
	224	Poly./Misc.	99%
	304	Poly./Misc.	98%
	216	Poly./Misc.	99%
	211	Poly./Misc.	98%
	231	Poly./Misc.	97%
	254	Poly./Misc.	96%
	266	Poly./Misc.	96%

Description of outstanding issues or deficiencies which may affect data quality: None

Barry A. Vitter March 7, 2001
Signature of QA Officer or Reviewer Date

Appendix A3. Comments on dominant LPIL taxa for the Puget Sound strata, June 1999.

Taxon Name	Phylum	Class	No. of Individuals	% of Total	Comments
<i>Cirratulidae</i> (LPIL)	Ann	Poly	6045	10.99	anterior fragment, posterior needed for specis ID.
<i>Eudorella pacifica</i>	Art	Mala	3788	6.89	
<i>Nephtys cornuta</i>	Ann	Poly	3525	6.41	
<i>Cossura</i> (LPIL)	Ann	Poly	3161	5.75	specimen fragmented, must have pygidium for species ID.
<i>Levinsenia gracilis</i>	Ann	Poly	3022	5.5	
<i>Rocheffortia tumida</i>	Mol	Biva	2861	5.2	
<i>Aphelochaeta monilaris</i>	Ann	Poly	2739	4.98	
<i>Axinopsida serricata</i>	Mol	Biva	2564	4.66	
<i>Tubificidae</i> (LPIL)	Ann	Olig	1726	3.14	sexually immature
<i>Pholoe glabra</i>	Ann	Poly	1670	3.04	
<i>Eudorellopsis</i> sp. A	Art	Mala	1661	3.02	
<i>Semele rubropicta</i>	Mol	Biva	1580	2.87	
<i>Alvania compacta</i>	Mol	Gast	1430	2.6	
<i>Aoroides intermedius</i>	Art	Mala	927	1.69	
<i>Bivalvia</i> (LPIL)	Mol	Biva	837	1.52	crushed and/or juvenile specimen.
<i>Ophiuroidea</i> (LPIL)	Ech	Ophi	824	1.5	central disk missing characters.
<i>Actiniaria</i> (LPIL)	Cni	Anth	688	1.25	order is lowest identification level.
<i>Euchone incolor</i>	Ann	Poly	647	1.18	
<i>Trochochaeta multisetos</i>	Ann	Poly	586	1.07	
<i>Aphelochaeta</i> (LPIL)	Ann	Poly	562	1.02	specimen damaged, specific staining patterns determine species ID