ST. JOHN'S RIVER MACROINVERTEBRATE COMMUNITY ASSESSMENT, JULY 2000



SUBMITTED TO: U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL OCEAN SERVICE NATION CENTERS FOR COASTAL OCEAN SCIENCE CENTER FOR COASTAL MONITORING AND ASSESSMENT 219 FORT JOHNSON ROAD CHARLESTON, SOUTH CAROLINA 29412

PREPARED BY: BARRY A. VITTOR & ASSOCIATES, INC. 8060 COTTAGE HILL ROAD MOBILE, ALABAMA 36695 (334) 633-6100 WWW.BVAENVIRO.COM



SEPTEMBER 2001

ST JOHN'S RIVER BENTHIC MACROINVERTEBRATE COMMUNITY ASSESSMENT, JULY 2000

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INTRODUCTION

The St. John's River was sampled during July 2001 (Figure 1). 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 m^2) was used to collect bottom samples at each of 7 station locations (three replicate samples were taken at each station) throughout the St. John's River. Samples were prescreened through 0.5 mm mesh seives, by NOAA in the field and fixed in 10% formalin. The preserved sample fractions were transported to BVA'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 Quality Assurance/Quality Control (QA/QC) reports for the St. John's River 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:

$$H' = - \begin{array}{c} s \\ p_i(\ln p_i) \end{array}$$

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

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

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

Taxa diversity was calculated using ln, however taxa diversity may also be

calculated using log. Both methods for calculating taxa diversity are common in scientific literature. The taxa diversity calculated in this report using ln, can be converted to log by multiplying the taxa diversity by 1.44270.

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.

Macroinfaunal data were graphically and statistically analyzed to identify any differences in density and number of taxa per replicate between stations. Data for density and taxa richness (mean number of taxa per replicate) were Square-root transformed to meet normal assumptions. The transformed data was analyzed using one-way ANOVAs and Tukey-Kramer post-hoc tests (SAS Institute, 2000, Zar, 1999).

Cluster analysis of both habitat collections (normal analysis) and taxa (inverse analysis) was performed by calculating the Bray-Curtis dissimilarity for all pairs (Bray and Cutis 1957). Clusters were formed using the average linkage method between dissimilarities (Rohlf, 1998). In this method, the distance between two clusters is the average distance between pairs of observations, one in each cluster. Taxa used in these analyses were selected according to their percent abundance in the assemblage.

HABITAT CHARACTERISTICS

Water quality data for the 7 stations are presented in Table 1 and Figures 2 and 3. Depth ranged from 1.7 m at Station 7 to 8.5 m at Station 5 (Figure 2). Salinity ranged from 10.7 at Station 1 to 34.4 at Station 7 (Figure 3). Dissolved oxygen ranged from 4.7 mg/l at Station 7 to 8.0 mg/l at Station 1 (Figure 3).

Sediment data for the 7 stations are given in Table 1 and Figures 4 through 8.

Sediment composition at the 7 stations varied throughout St. John's River (Figure 4). Sand was the dominant sediment type at each station except Station 4 (Gravel was the dominant sediment type)(Figure 5). Mean particle size ranged from 0.78 at Station 4 to 5.9 at Station 2 (Figure 6). Sorting coefficient ranged from 0.49 at Station 1 to 6.0 at Station 5 (Figure 7). The percent total organic carbon (TOC) fraction of the sediment was generally low with all values less than 6% (Table 1, Figure 8).

BENTHIC COMMUNITY CHARACTERIZATION

Faunal Composition, Abundance, and Community Structure

Table 2 provides a complete phylogenetic listing for all strata as well as data on taxa abundance and strata occurrence. Microsoft [™] Excel 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 2,794 organisms, representing 143 taxa, were identified from the 7 stations (Table 3). Polychaetes were the most numerous organisms present representing 42% of the total assemblage, followed in abundance by bivalves (26%) and malacostracans (16%). Polychaetes represented 41% of the total number of taxa followed by malacostracans (22%), and bivalves (16%)(Table 3). The percentage abundance of the major taxa at the 7 stations is given in Table 4 and Figures 9 and 10.

The dominant taxa collected from the 7 stations were the polychete, *Streblospio benedicti*, the bivalve, *Gemma gemma*, the bivalve, *Mytilopsis leucophaeata*, and the polychete *Sabellaria vulgaris*, representing 17.9%, 10.5%, 9.9%, and 7.5% of the total number of individuals, respectively (Table 2). *Streblospio benedicti* was the most widely distributed taxa being found at 100% of the stations. The distribution of taxa representing > 10% of the total assemblage at each station is given in Table 5.

Station abundance and taxa data are summarized for the 7 stations in Table 6. Mean density per station ranged from 416.7 organisms·m² (SD = 260.2) at Station 6 to 6816.7 organisms·m² (SD = 1881.2) at Station 1 (Table 6; Figures 11 and 12). There were significant differences in density between stations, with Stations 1 and 5 being significantly greater than Stations 2, 4 and 6 (Tables 7 and 8). Station 7 was significantly greater then Stations 2 and 6 (Table 8). The mean number of taxa per station ranged from 7.0 taxa per replicate (SD = 1.0) at Station 6 to 42.0 taxa per replicate (SD = 2.6) at Station 5 (Table 6; Figures 13 and 14). There were significantly higher than Stations 1, 2, 3, 4 and 6 (Tables 7 and 8). Station 7, 2, 3, 4 and 6 (Tables 7 and 8). Station 7 number of taxa was significantly higher than Stations 2 and 6 (Table 8).

Taxa diversity and evenness for the St. John's River stations are given in Table 6 and Figures 15, 16, 17 and 18. Taxa diversity (H^{\prime}) varied and ranged from 1.75 at Station 6 to 2.83 at Station 5 (Table 6; Figures 15 and 16). Taxa evenness (J^{\prime}) ranged from 0.53 at Station 7 to 0.87 at Station 2 (Table 6; Figures 17 and 18).

Cluster Analysis

Normal (station) and inverse (taxa) cluster analyses were performed on the St. John's River data set and displayed as dendrograms (Figures 19 and 20). Count data for the 18 taxa selected were included in a matrix of station and taxa groups (Table 9). These taxa accounted for 80.5% of the total macroinfaunal assemblage.

Clustering of the 7 stations can be interpreted at a three-group level (» 3-5 % level of dissimilarity, Table 9; Figure 19). Group 1 contained Stations 1-4 (lower salinity). Group 2 contained stations 5 and 7 (higher salinity). Group 3 contained only Station 6, which had the highest abundance of *Paraonis fulgens*.

Clustering of the 18 taxa in the 7 stations could be interpreted at a five–group level (» 1-7% dissimilarity; Table 9; Figure 20). Groups A and B were represented by 8 and 7 taxa, respectively. The remaining three groups were represented by one taxa each.

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Table 1. Summary of station location, water quality and sediment data for the St. Jonh's River stations, July 2000.

															Median	
			Depth	Temp.	Salinity	D.O.		%	%	%	%	%	%	USACE	Particle	Sorting
Station	Latitude	Longitude	(m)	(C)	(ppt)	(mg/l)	pН	T.O.C.	Gravel	Sand	Silt	Clay	Silt + Clay	Description	Size (phi)	Coefficient
1	30° 08' 56.741"	81° 41' 56.637"	3.9	30.9	10.7	8.0	8.2	1.1	1.88	96.75	-	-	1.37	Sand	2.461	0.490
2	30° 16' 36.986"	81° 42' 41.066"	2.3	30.7	17.8	6.5	7.9	5.1	0.38	36.70	31.49	31.43	_	Sandy Clay	5.928	3.960
3	30° 21' 34.256"	81° 37' 10.608"	3.3	30.1	23.5	6.1	8.0	3.0	0.19	52.02	20.29	27.51	_	Clayey Sand	3.886	3.905
4	30° 23' 28.704"	81° 39' 18.708"	2.1	30.1	28.1	6.2	8.0	4.0	41.73	16.77	11.98	29.53	_	N/A	0.788	5.958
5	30° 23' 00.690"	81° 33' 42.144"	8.5	29.7	30.0	6.9	8.1	0.4	5.55	59.84	8.78	25.83	_	N/A	2.817	6.042
6	30° 22' 44.347"	81° 32' 19.742"	3.5	28.9	32.4	6.4	8.1	0.2	0.00	99.73	-	-	0.27	Sand	2.459	0.546
7	30° 26' 03.956"	81° 30' 27.171"	1.7	29.0	34.4	4.1	7.6	0.3	0.00	99.58	_	_	0.42	Sand	2.313	0.619

Table 2. Abundance and distribution of benthic macroinfaunal taxa for the St. John's River stations, July 2000.

T.			No. of		Cumulative	Station	% Station
Taxa	Phylum	Class	Individuals	% of Total	%	Occurrence	Occurrence
Streblospio benedicti	Ann	Polv	499	17.86	17.86	7	100
Gemma gemma	Mol	Biva	292	10.45	28.31	1	14
Mytilonsis leuconhaeata	Mol	Biva	272	9.91	38.22	1	14
Sabellaria vulgaris	Ann	Poly	209	7.48	45.71	2	29
Paracaprella pusilla	Art	Mala	127	4 55	50.25	3	43
Actiniaria (LPIL)	Cni	Anth	120	4 29	54.55	3	43
Odostomia impressa	Mol	Gast	88	3.15	57.70	1	14
Batea catharinensis	Art	Mala	72	2.58	60.27	3	43
Nereis succinea	Ann	Poly	72	2.58	62.85	4	57
Melitidae (LPIL)	Art	Mala	60	2.15	65.00	5	71
Porifera (LPIL)	Por	_	56	2.00	67.00	1	14
Dipolydora socialis	Ann	Polv	54	1.93	68.93	3	43
Rhynchocoela (LPIL)	Rhy		49	1.75	70.69	5	71
Mediomastus (LPIL)	Ann	Polv	47	1.68	72.37	4	57
Tubulanus (LPIL)	Rhv	Anop	47	1.68	74.05	3	43
Mediomastus ambiseta	Ann	Polv	38	1.36	75.41	2	29
Ampelisca (LPIL)	Art	Mala	29	1.04	76.45	3	43
Macoma mitchelli	Mol	Biva	29	1.04	77.49	3	43
Paraonis fulgens	Ann	Polv	29	1.04	78.53	1	14
Eusarsiella zostericola	Art	Ostr	28	1.00	79.53	3	43
Ischadium recurvum	Mol	Biva	27	0.97	80.49	2	29
Rangia cuneata	Mol	Biva	26	0.93	81.42	4	57
Cyclaspis varians	Art	Mala	21	0.75	82.18	2	29
Diopatra cuprea	Ann	Poly	21	0.75	82.93	$\frac{1}{2}$	29
Melita (LPIL)	Art	Mala	19	0.68	83.61	3	43
Xanthidae (LPIL)	Art	Mala	19	0.68	84.29	3	43
Tellinidae (LPIL)	Mol	Biva	18	0.64	84.93	5	71
Grandidierella bonnieroides	Art	Mala	15	0.54	85.47	2	29
Leucon americanus	Art	Mala	13	0.47	85.93	$\overline{2}$	29
Pista avadrilobata	Ann	Poly	13	0.47	86.40	1	14
Ascidiacea (LPIL)	Cho	Asci	12	0.43	86.83	3	43
Hypereteone (LPIL)	Ann	Polv	12	0.43	87.26	3	43
Lucina multilineata	Mol	Biva	12	0.43	87.69	1	14
Marenzellaria viridis	Ann	Poly	12	0.43	88.12	1	14
Assiminea succinea	Mol	Gast	11	0.39	88.51	2	29
Polydora cornuta	Ann	Poly	11	0.39	88.90	$\overline{2}$	29
Sigambra tentaculata	Ann	Poly	11	0.39	89.30	3	43
Aeginellidae (LPIL)	Art	Mala	10	0.36	89.66	1	14
Nereis lamellosa	Ann	Polv	10	0.36	90.01	2	29
Sphenia antillensis	Mol	Biva	9	0.32	90.34	1	14
Corophium (LPIL)	Art	Mala	8	0.29	90.62	1	14
Mactridae (LPIL)	Mol	Biva	7	0.25	90.87	5	71
Nucula proxima	Mol	Biva	7	0.25	91.12	3	43
Anadara transversa	Mol	Biva	6	0.21	91.34	1	14
Exogone (LPIL)	Ann	Polv	6	0.21	91.55	1	14
Hydroides dianthus	Ann	Polv	6	0.21	91.77	1	14
Leitoscoloplos robustus	Ann	Polv	6	0.21	91.98	1	14
Nereis micromma	Ann	Polv	6	0.21	92.20	1	14
Paraprionospio pinnata	Ann	Poly	6	0.21	92.41	2	29
Podarkeopsis levifuscina	Ann	Poly	6	0.21	92.63	3	43
Ampelisca abdita	Art	Mala	5	0.18	92.81	1	14
Amphilochidae (LPIL)	Art	Mala	5	0.18	92.98	2	29
Cyathura polita	Art	Mala	5	0.18	93.16	2	29
Heteromastus filiformis	Ann	Poly	5	0.18	93.34	1	14
Aoridae (LPIL)	Art	Mala	4	0.14	93.49	2	29
Bivalvia (LPIL)	Mol	Biva	4	0.14	93.63	3	43

Table 2. Continued:

Taxa Phy Class Individuals % of Total % of Cocurrence Occurrence Occurrence (Crarphorex (LPL)) Ann Poly 4 0.14 93.92 2 29 Lemonax (LPL) Ann Poly 4 0.14 94.06 2 29 Magetona sp. H Ann Poly 4 0.14 94.35 2 29 Ophiuroidea (LPL) Ech Ophi 4 0.14 94.45 1 14 Polarke obscura Ann Poly 4 0.14 94.45 2 29 Prionopia (LPL) Ann Poly 4 0.14 94.92 1 14 Agleophanus vervilli Ann Poly 3 0.11 95.03 1 14 Agleophanus vervilli Ann Poly 3 0.11 95.55 2 29 Capiella capitate Ann Poly 3 0.11 95.56 2 29 Capiella capitate Ann Poly 3 <th></th> <th></th> <th></th> <th>No. of</th> <th></th> <th>Cumulative</th> <th>Station</th> <th>% Station</th>				No. of		Cumulative	Station	% Station
$\begin{array}{c} \mbox{Crropborus} (LPL) & \mbox{Ann} & \mbox{Poly} & 4 & 0.14 & 93.77 & 1 & 14 \\ \mbox{Demonax} (LPL) & \mbox{Ann} & \mbox{Poly} & 4 & 0.14 & 94.05 & 2 & 29 \\ \mbox{Edvis} rinloha & \mbox{Art} & \mbox{Mala} & 4 & 0.14 & 94.06 & 2 & 29 \\ \mbox{Reston} & \mbox{Art} & \mbox{Mala} & 4 & 0.14 & 94.06 & 2 & 29 \\ \mbox{Reston} & \mbox{Ann} & \mbox{Poly} & 4 & 0.14 & 94.420 & 1 & 14 \\ \mbox{Poliuroidea} (LPL) & \mbox{Ann} & \mbox{Poly} & 4 & 0.14 & 94.49 & 1 & 14 \\ \mbox{Poliuroidea} (LPL) & \mbox{Ech} & \mbox{Opliuroidea} (LPL) & \mbox{Ann} & \mbox{Poly} & 4 & 0.14 & 94.49 & 1 & 14 \\ \mbox{Poliuroidea} (LPL) & \mbox{Ann} & \mbox{Poly} & 4 & 0.14 & 94.63 & 2 & 29 \\ \mbox{Turonospin} (LPL) & \mbox{Ann} & \mbox{Poly} & 4 & 0.14 & 94.92 & 1 & 14 \\ \mbox{Poliuroidea} (LPL) & \mbox{Ann} & \mbox{Poly} & 3 & 0.11 & 95.03 & 1 & 14 \\ \mbox{Aglaphamus werrilli} & \mbox{Ann} & \mbox{Poly} & 3 & 0.11 & 95.53 & 1 & 14 \\ \mbox{Arestondia macricanian} & \mbox{Art} & \mbox{Mala} & 3 & 0.11 & 95.56 & 2 & 29 \\ \mbox{Curoidpina} mericanian & \mbox{Ann} & \mbox{Poly} & 3 & 0.11 & 95.78 & 1 & 14 \\ \mbox{Crophium} acustre & \mbox{Art} & \mbox{Mala} & 3 & 0.11 & 95.78 & 1 & 14 \\ \mbox{Crophium} acustre & \mbox{Art} & \mbox{Mala} & 3 & 0.11 & 95.78 & 1 & 14 \\ \mbox{Crophium} acustre & \mbox{Art} & \mbox{Mala} & 3 & 0.11 & 95.78 & 1 & 14 \\ \mbox{Crophium} acustre & \mbox{Art} & \mbox{Mala} & 3 & 0.11 & 95.78 & 1 & 14 \\ \mbox{Crophium} acustre & \mbox{Art} & \mbox{Mala} & 3 & 0.11 & 96.61 & 2 & 29 \\ \mbox{Letrosolpoid} (LPL) & \mbox{Art} & \mbox{Mala} & 3 & 0.11 & 96.62 & 2 & 29 \\ \mbox{Letrosolpoid} (LPL) & \mbox{Art} & \mbox{Mala} & 3 & 0.11 & 96.64 & 2 & 29 \\ \mbox{Letrosolpoid} (LPL) & \mbox{Art} & \mbox{Mala} & 3 & 0.11 & 96.64 & 2 & 29 \\ \mbox{Letrosolpoid} (LPL) & \mbox{Art} & \mbox{Mala} & 3 & 0.11 & 96.64 & 2 & 29 \\ \mbox{Letrosolpoid} (LPL) & \mbox{Art} & \mbox{Mala} & 3 & 0.11 & 96.64 & 2 & 29 \\ \mbox{Letrosolpoid} (LPL) & \mbox{Art} & \mbox{Mala} & 2 & 0.07 & 97.35 & 1 & 14 \\ \mbox{Letrosolpoid} (LPL) & \mbox{Art} & \mbox{Ma}$	Таха	Phylum	Class	Individuals	% of Total	%	Occurrence	Occurrence
$ \begin{array}{l c c c c c c c c c c c c c c c c c c c$	Cirrophorus (LPIL)	Ånn	Polv	4	0.14	93.77	1	14
Edota irribónArtMala4 0.14 94.06229Magetona Sp. HAnnPoly4 0.14 94.35229Ophimvidea (LPL)AnnPoly4 0.14 94.45229Tabificiolas heterochenusAnnPoly4 0.14 94.63229Tabificioles heterochenusAnnPoly4 0.14 94.63229Tabificioles heterochenusAnnPoly4 0.14 94.77229Tabificioles heterochenusAnnPoly3 0.11 95.13229Armandia macricanumAnnPoly3 0.11 95.85229Capitella capitatiAnnPoly3 0.11 95.85229Capitella capitatiAnnPoly3 0.11 95.85229Capitella capitatiAnnPoly3 0.11 95.86114CarabitatiaAnnPoly3 0.11 95.67114CarabitatiaAnnPoly3 0.11 95.78114CarabitatiaAnnPoly3 0.11 95.78114CarabitatiaAnnPoly3 0.11 95.67229Linbaropolic (LPL)MolBiva3 0.11 96.61229Linbaropolic (LPL)AnnPoly3 0.11 96.61229	Demonax (LPIL)	Ann	Poly	4	0.14	93.92	2	29
$\begin{aligned} & \text{Aragelemiz sp. H} & \text{Am} & \text{Poly} & \text{A} & 0.14 & 94.20 & 1 & 14 \\ & \text{Perzs (LPL)} & \text{Am} & \text{Poly} & 4 & 0.14 & 94.25 & 2 & 29 \\ & \text{Ophiaroides (LPL)} & \text{Ech} & \text{Ophi} & 4 & 0.14 & 94.43 & 1 & 14 \\ & \text{Podarice obscura} & \text{Am} & \text{Poly} & 4 & 0.14 & 94.43 & 1 & 14 \\ & \text{Podarice obscura} & \text{Am} & \text{Poly} & 4 & 0.14 & 94.63 & 2 & 29 \\ & \text{Thermospie Culluctual Amn} & \text{Poly} & 4 & 0.14 & 94.67 & 2 & 29 \\ & \text{Thermospie Culluctual Amn} & \text{Poly} & 4 & 0.14 & 94.67 & 2 & 29 \\ & \text{Thermospie Culluctual Amn} & \text{Poly} & 3 & 0.11 & 95.13 & 1 & 14 \\ & \text{Aglaophanus vertili} & \text{Ann} & \text{Poly} & 3 & 0.11 & 95.13 & 2 & 29 \\ & \text{Americheliation americanum} & \text{Art} & \text{Mala} & 3 & 0.11 & 95.53 & 1 & 14 \\ & \text{Carpielia contata} & \text{Ann} & \text{Poly} & 3 & 0.11 & 95.56 & 1 & 14 \\ & \text{Carpielia contata} & \text{Ann} & \text{Poly} & 3 & 0.11 & 95.56 & 1 & 14 \\ & \text{Corputiade CPL} & \text{Art} & \text{Mala} & 3 & 0.11 & 95.56 & 1 & 14 \\ & \text{Corputiade CLPL} & \text{Mol} & \text{Biva} & 3 & 0.11 & 95.78 & 1 & 14 \\ & \text{Corputiade CLPL} & \text{Mol} & \text{Biva} & 3 & 0.11 & 95.78 & 1 & 14 \\ & \text{Carsostrea virginica} & \text{Mol} & \text{Biva} & 3 & 0.11 & 95.61 & 1 & 14 \\ & \text{Carsostrea virginica} & \text{Ann} & \text{Poly} & 3 & 0.11 & 96.10 & 1 & 14 \\ & \text{Latreates parvalus} & \text{Art} & \text{Mala} & 3 & 0.11 & 96.61 & 1 & 14 \\ & \text{Latreates parvalus} & \text{Art} & \text{Mala} & 3 & 0.11 & 96.63 & 2 & 29 \\ & \text{Leitoscolopis (LPL)} & \text{Ann} & \text{Poly} & 3 & 0.11 & 96.63 & 2 & 29 \\ & \text{Leitoscolopis (LPL)} & \text{Ann} & \text{Poly} & 3 & 0.11 & 96.64 & 1 & 14 \\ & \text{Panopeus herbstii} & \text{Art} & \text{Mala} & 3 & 0.11 & 96.64 & 1 & 14 \\ & \text{Panopeus herbstii} & \text{Art} & \text{Mala} & 2 & 0.07 & 97.74 & 1 & 14 \\ & \text{Panopeus herbstii} & \text{Ann} & \text{Poly} & 2 & 0.07 & 97.52 & 2 & 29 \\ & \text{Leitoscolopis (LPL)} & \text{Ann} & \text{Poly} & 2 & 0.07 & 97.54 & 1 & 14 \\ & \text{Panopeus herbstii} & \text{Ann} & \text{Poly} & 2 & 0.07 & 97.54 & 1 & 14 \\ & \text{Panopeus herbstii} & \text{Ann} & \text{Poly} & 2 & 0.07 & 97.54 & 1 & 14 \\ & \text{Latreate parvalus} & \text{Art} & \text{Mala} & 2 & 0.07 & 97.55 & 1 & 14 \\ & Leptonouts valoru$	Edotia triloba	Δrt	Mala	4	0.14	94.06	2	29
$ \begin{array}{c} \label{eq:constraints} \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Magelona sp H	Ann	Poly	4	0.14	94.20	1	14
$ \begin{array}{c} \mbox{rescale} \mbox{rescale} \end{tabular} t$	Narais (I PIL)	Ann	Poly	4	0.14	94.20	1	20
$ \begin{array}{c} \text{Opnumodes} (LPL) & \text{Ech} & \text{Opnt} & 4 & 0.14 & 94.43 & 2 & 14 \\ \text{Pronospio} & (LPL) & \text{Ann} & \text{Poly} & 4 & 0.14 & 94.43 & 2 & 29 \\ \text{Pronospio} & (LPL) & \text{Ann} & \text{Poly} & 4 & 0.14 & 94.63 & 2 & 29 \\ \text{Pronospio} & (LPL) & \text{Ann} & \text{Poly} & 4 & 0.14 & 94.22 & 1 & 14 \\ \text{Abra acqualis} & \text{Mol} & \text{Biva} & 3 & 0.11 & 95.03 & 1 & 14 \\ \text{Abra acqualis} & \text{scrill} & \text{Ann} & \text{Poly} & 3 & 0.11 & 95.13 & 2 & 29 \\ \text{Americhelidium americanum} & \text{Art} & \text{Mala} & 3 & 0.11 & 95.55 & 2 & 29 \\ \text{Carpus benchnphilus} & \text{Art} & \text{Mala} & 3 & 0.11 & 95.55 & 2 & 29 \\ \text{Carpus benchphilus} & \text{Art} & \text{Mala} & 3 & 0.11 & 95.56 & 2 & 29 \\ \text{Carpus benchphilus} & \text{Art} & \text{Mala} & 3 & 0.11 & 95.57 & 1 & 14 \\ \text{Corbulidae} (LPL) & \text{Art} & \text{Insee} & 3 & 0.11 & 95.78 & 1 & 14 \\ \text{Corbulidae} (LPL) & \text{Art} & \text{Insee} & 3 & 0.11 & 95.78 & 1 & 14 \\ \text{Corpolim acustre} & \text{Art} & \text{Mala} & 3 & 0.11 & 95.78 & 1 & 14 \\ \text{Corspis plariseta} & \text{Ann} & \text{Poly} & 3 & 0.11 & 95.13 & 2 & 29 \\ \text{Laticoscolopios} (LPL) & \text{Art} & \text{Insee} & 3 & 0.11 & 95.13 & 2 & 29 \\ \text{Laticoscolopios} (LPL) & \text{Arn} & \text{Mala} & 3 & 0.11 & 96.10 & 1 & 14 \\ \text{Latreutes parvulus} & \text{Art} & \text{Mala} & 3 & 0.11 & 96.31 & 2 & 29 \\ \text{Leptoscoptions} (LPL) & \text{Ann} & \text{Poly} & 3 & 0.11 & 96.63 & 2 & 29 \\ \text{Myridiage} (LPL) & \text{Ann} & \text{Poly} & 3 & 0.11 & 96.63 & 2 & 29 \\ \text{Nereiphylla fragilis} & \text{Ann} & \text{Poly} & 3 & 0.11 & 96.64 & 2 & 29 \\ \text{Myridiage} (LPL) & \text{Ann} & \text{Poly} & 3 & 0.11 & 96.65 & 1 & 14 \\ \text{Panopeus herbstii} & \text{Art} & \text{Mala} & 3 & 0.11 & 96.65 & 1 & 14 \\ \text{Panopeus herbstii} & \text{Art} & \text{Mala} & 3 & 0.11 & 96.64 & 2 & 29 \\ \text{Myridiage} (LPL) & \text{Ann} & \text{Poly} & 3 & 0.11 & 96.65 & 1 & 14 \\ \text{Appelicaev subrevis} & \text{Art} & \text{Mala} & 2 & 0.07 & 97.14 & 1 & 14 \\ \text{Ampelicaevalorum} & \text{Art} & \text{Mala} & 2 & 0.07 & 97.35 & 1 & 14 \\ \text{Ceratomers invisions} & \text{Ann} & \text{Poly} & 2 & 0.07 & 97.57 & 2 & 29 \\ \text{Mirrelia hunata} & \text{Mol} & \text{Gast} & 2 & 0.07 & 97.58 & 1 & 14 \\ \text{Lepidonous variabilis} & \text{Ann} & \text{Poly} & 2 & 0.0$		AIIII	Poly	4	0.14	94.55	2 1	29
Podarke obscura Ann Poly 4 0.14 94.63 2 29 Trionospo CIPUL) Ann Olig 4 0.14 94.77 2 29 Tubificioles heterochetus Ann Olig 4 0.14 95.03 1 14 Aglaophanus verrilli Ann Poly 3 0.11 95.13 2 29 Americhelikum americanum Art Mala 3 0.11 95.54 1 14 Capitella capitata Ann Poly 3 0.11 95.567 1 14 Corputind curstre Art Mala 3 0.11 95.567 1 14 Corputind curstre Art Mala 3 0.11 95.88 1 14 Corsoutidae (LPL) Mol Biva 3 0.11 95.21 2 29 Leptosynate tensis Art Mala 3 0.11 96.61 1 4 M	Opniuroidea (LPIL)	Ecn	Opni	4	0.14	94.49	1	14
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Podarke obscura	Ann	Poly	4	0.14	94.63	2	29
Tabificoides heterocheatusAnnOlig40.1494.92114Aglaophamus verrilliAnnPoly30.1195.03114Aglaophamus verrilliAnnPoly30.1195.24114Armandia maculataAnnPoly30.1195.35229Carpitella capitataAnnPoly30.1195.45114Carpate benthophilusArtMala30.1195.56229Cimotionypus(LPIL)ArtImse30.1195.78114Corobulida (LPIL)MolBiva30.1195.78114Corobulian locustreArtMala30.1195.78114Corosoties vignicaMolBiva30.1196.61229Leitoscoloplos (LPIL)AnnPoly30.1196.62229Vereiphylla fragilisAnnPoly30.1196.64229Vereiphylla fragilisAnnPoly30.1196.64229Vereiphylla fragilisAnnPoly30.1196.64229Vereiphylla fragilisAnnPoly30.1196.64229Vereiphylla fragilisAnnPoly30.1196.64114Panopeus herbstiArtMala20.0797.141<	Prionospio (LPIL)	Ann	Poly	4	0.14	94.77	2	29
Abra acqualis Mol Biva 3 0.11 95.13 2 29 Americhelidium americanum Art Mala 3 0.11 95.13 2 29 Americhelidium americanum Art Mala 3 0.11 95.35 2 29 Capitella capitata Ann Poly 3 0.11 95.45 1 14 Cargotiul capitata Ann Poly 3 0.11 95.45 1 14 Corbuildae (LPIL) Art Mala 3 0.11 95.67 1 14 Corophiun lacustre Art Mala 3 0.11 95.88 1 14 Latreutes parvulus Art Mala 3 0.11 96.31 2 29 Leitoscoloplos (LPIL) Ann Poly 3 0.11 96.42 1 14 Mytilidae (LPIL) Ann Poly 3 0.11 96.64 2 29 Ogy	Tubificoides heterochaetus	Ann	Olig	4	0.14	94.92	1	14
Aglaophamus verrilliAnnPoly30.1195.12229Amarichelitan americanumAnnPoly30.1195.24114Armandia maculataAnnPoly30.1195.35229Capitella capitataAnnPoly30.1195.45114Cerapus benthophilusArtMala30.1195.56229Clinotionypus (LPL)ArtInse30.1195.78114Corobuika (LPL)MolBiva30.1195.78114Corobuika (LPL)MolBiva30.1195.78114Crassostrea virginicaMolBiva30.1196.61229Leitoscoloplos (LPL)AnnPoly30.1196.62114Mytildae (LPL)MolBiva30.1196.64229Nereiphylla fragilisAnnPoly30.1196.64229Nereiphylla fragilisAnnPoly30.1196.64114Panopeus herbstiiArtMala30.1196.64229Serpuikae (LPL)AnnOlig30.1196.64229Serpuikae (LPL)AnnOlig30.1196.64114Panopeus herbstiiArtMala20.0797.14114Bacid	Abra aequalis	Mol	Biva	3	0.11	95.03	1	14
Americhelidium americanumArtMaía30.1195.24114Armandia maculataAnnPoly30.1195.35229Capitella capitataAnnPoly30.1195.45114Cerapus benthophilusArtMala30.1195.67114Corbulidae (LPIL)ArtImse30.1195.78114Corobulina lacustreArtMala30.1195.78114Crassostrea virginicaMolBiva30.1195.10114Latreutes parvulusArtMala30.1196.10114Latreutes parvulusArtMala30.1196.21229Leitoscoloplos (LPIL)AnnPoly30.1196.31229Leitoscoloplos (LPIL)MolBiva30.1196.64229Ogyrides alphaerostrisArtMala30.1196.64229Ogyrides alphaerostrisArtMala30.1196.85229Serpulidae (LPIL)AnnPoly30.1196.85229Serpulidae (LPIL)AnnPoly30.1196.85229Serpulidae (LPIL)AnnPoly20.0797.21114Amerikas vadorumArtMala20.0797.21114 <td>Aglaophamus verrilli</td> <td>Ann</td> <td>Poly</td> <td>3</td> <td>0.11</td> <td>95.13</td> <td>2</td> <td>29</td>	Aglaophamus verrilli	Ann	Poly	3	0.11	95.13	2	29
Armandia maculataAnnPoly30.1195.35229Capitella capitataAnnPoly30.1195.45114Carapus benhophilusArtMala30.1195.56229Cimotanypus (LPIL)ArtImse30.1195.78114Coroblika (LPIL)MolBiva30.1195.78114Coroblium lacustreArtMala30.1195.99114Crassostre avirginicaMolBiva30.1196.10114Latreutes parvulusArtMala30.1196.21229Leitoscoloplos (LPIL)AnnPoly30.1196.64229Leitoscoloplos (LPIL)MolBiva30.1196.64229Caprides dphaterostrisArtMala30.1196.53229Serpulida (LPIL)MonPoly30.1196.54114Panopeus herbstiiArtMala30.1196.54229Serpulidae (LPIL)AnnPoly30.1196.54229Serpulidae (LPIL)AnnPoly30.1196.56114Panopeus herbstiiArtMala30.1196.56114Amelisca valorumArtMala20.0797.28114Amp	Americhelidium americanum	Art	Mala	3	0.11	95.24	1	14
Capitella capitataAnnPoly3 0.11 95.45 114Cerapus benthophilusArtMala3 0.11 95.45 114Corbulida (LPIL)ArtImage3 0.11 95.76 114Corbulida IncustreArtMala3 0.11 95.78 114Crassorrea virginicaMolBiva3 0.11 95.88 114Crassorrea virginicaMolBiva3 0.11 96.10 114Crassocolopios (LPIL)AnnPoly3 0.11 96.21 229Leitoscolopios (LPIL)AnnPoly3 0.11 96.42 114Mytildae (LPIL)MolBiva3 0.11 96.64 229Ogyrides alphaerostrisArtMala3 0.11 96.64 229Serpulida (LPIL)AnnPoly3 0.11 96.64 114Panopeus herbstiiArtMala3 0.11 96.64 114Panopeus herbstiiArtMala2 0.07 97.14 114Bateidae (LPIL)AnnPoly3 0.11 96.64 229Ogyrides alphaerostrisArtMala2 0.07 97.14 114Bateidae (LPIL)AnnPoly 2 0.07 97.14 114Crastorea virabilisAnnPoly	Armandia maculata	Ann	Poly	3	0.11	95.35	2	29
	Capitella capitata	Ann	Poly	3	0.11	95.45	1	14
$ \begin{array}{c} Crigation String primary Letter, String String primary (LPIL) Art Imse 3 0.11 95.67 1 14 \\ Corophium Lacustre Art Mala 3 0.11 95.78 1 14 \\ Corophium Lacustre Art Mala 3 0.11 95.78 1 14 \\ Crassource a virginica Mol Biva 3 0.11 95.78 1 14 \\ Crassource a virginica Ann Poly 3 0.11 96.10 1 14 \\ Latrentes parvalus Art Mala 3 0.11 96.21 2 29 \\ Leitoscoloplos (LPIL) Ann Poly 3 0.11 96.31 2 29 \\ Leitoscoloplos (LPIL) Ann Poly 3 0.11 96.63 2 29 \\ Leitoscoloplos (LPIL) Mol Biva 3 0.11 96.64 2 1 14 \\ Mytildae (LPIL) Mol Biva 3 0.11 96.64 2 29 \\ Ogrid subhaerostris Art Mala 3 0.11 96.64 2 29 \\ Ogrid subhaerostris Art Mala 3 0.11 96.64 2 29 \\ Ogrid subhaerostris Art Mala 3 0.11 96.64 2 29 \\ Serpuldae (LPIL) Ann Poly 3 0.11 96.64 2 29 \\ Serpuldae (LPIL) Ann Poly 3 0.11 96.64 1 14 \\ Panopeus herbsti Art Mala 3 0.11 96.74 1 14 \\ Panopeus herbsti Art Mala 2 0.07 97.14 1 14 \\ Andelse (LPIL) Ann Poly 3 0.11 97.07 1 14 \\ Andelse (LPIL) Ann Poly 2 0.07 97.21 1 14 \\ Cryptochironomus (LPIL) Art Mala 2 0.07 97.21 1 14 \\ Cryptochironomus (LPIL) Art Imse 2 0.07 97.75 1 14 \\ Cryptochironomus (LPIL) Art Mala 2 0.07 97.75 1 14 \\ Cryptochironomus (LPIL) Art Mala 2 0.07 97.75 2 29 \\ Leidonotus sublevis Ann Poly 2 0.07 97.75 1 14 \\ Cryptochironomus Sublevis Ann Poly 2 0.07 97.75 2 29 \\ Defined and Sublevis Ann Poly 2 0.07 97.75 2 29 \\ Defined and Sublevis Ann Poly 2 0.07 97.75 1 14 \\ Cryptochironomus Sublevis Ann Poly 2 0.07 97.71 1 14 \\ Cryptochironomus Sublevis Ann Poly 2 0.07 97.85 1 14 \\ Philonotus variabilis Ann Poly 2 0.07 97.85 1 14 \\ Philonotus variabilis Ann Poly 2 0.07 97.85 1 14 \\ Philonotus variabilis Ann Poly 2 0.07 97.85 1 14 \\ Philonotus variabilis Ann Poly 2 0.07 98.87 1 14 \\ Philonotus variabilis Ann Poly 2 0.07 98.87 1 14 \\ Philonotus variabilis Ann Poly 2 0.07 98.87 1 14 \\ Philonotus variabilis Ann Poly 2 0.07 98.83 1 14 \\ Philonotus variabilis Ann Poly 2 0.07 98.83 1 14 \\ Archer Ann Poly 2 0.07 98.85 1 14 \\ Philonotus variabilis Ann Poly 2 0.07 98.85 1 14 \\ Philonotus variabilis Ann Poly 2 0.07 98.85 1 14 \\ Philonot$	Carapus banthonkilus	Art	Mala	3	0.11	95.56	2	20
$ \begin{array}{c} Contuniting (1.P) & Alt & Inise 3 & 0.11 & 95.07 & 1 & 14 \\ Corophium lacustre & Art & Mala 3 & 0.11 & 95.78 & 1 & 14 \\ Corophium lacustre & Art & Mala 3 & 0.11 & 95.78 & 1 & 14 \\ Cyptis pluriseta & Ann & Poly 3 & 0.11 & 96.10 & 1 & 14 \\ Latreates parvalus & Art & Mala 3 & 0.11 & 96.61 & 1 & 14 \\ Latreates parvalus & Art & Mala 3 & 0.11 & 96.61 & 2 & 29 \\ Leptoscolpols (LPL) & Ann & Poly 3 & 0.11 & 96.63 & 2 & 29 \\ Leptoscolpols (LPL) & Mol & Biva 3 & 0.11 & 96.64 & 1 & 14 \\ Mytildae (LPL) & Mol & Biva 3 & 0.11 & 96.64 & 2 & 29 \\ Ogyrides alphaerostris & Art & Mala 3 & 0.11 & 96.64 & 2 & 29 \\ Ogyrides alphaerostris & Art & Mala 3 & 0.11 & 96.64 & 2 & 29 \\ Serpuldae (LPL) & Ann & Poly 3 & 0.11 & 96.64 & 2 & 29 \\ Serpuldae (LPL) & Ann & Poly 3 & 0.11 & 96.64 & 2 & 29 \\ Serpuldae (LPL) & Ann & Poly 3 & 0.11 & 96.64 & 1 & 14 \\ Panopeus herbstit & Art & Mala 3 & 0.11 & 96.74 & 1 & 14 \\ Ampelisca vadorum & Art & Mala 2 & 0.07 & 97.14 & 1 & 14 \\ Ampelisca vadorum & Art & Mala 2 & 0.07 & 97.21 & 1 & 14 \\ Ceratomeris irritabilis & Ann & Poly 2 & 0.07 & 97.28 & 1 & 14 \\ Cyptochironomus (LPL) & Art & Mala 2 & 0.07 & 97.28 & 1 & 14 \\ Cyptochironomus (LPL) & Art & Mala 2 & 0.07 & 97.78 & 1 & 14 \\ Castropoda (LPL) & Mol & Gast 2 & 0.07 & 97.78 & 1 & 14 \\ Lepidonotus sublevis & Ann & Poly 2 & 0.07 & 97.78 & 1 & 14 \\ Lepidonotus sublevis & Ann & Poly 2 & 0.07 & 97.78 & 1 & 14 \\ Melita longistesa & Art & Mala 2 & 0.07 & 97.78 & 1 & 14 \\ Ampelits longistesa & Art & Mala 2 & 0.07 & 97.78 & 1 & 14 \\ Phyllodoce arenae & Ann & Poly 2 & 0.07 & 98.07 & 1 & 14 \\ Phyllodoce arenae & Ann & Poly 2 & 0.07 & 98.57 & 1 & 14 \\ Phyliodoce arenae & Ann & Poly 2 & 0.07 & 98.57 & 1 & 14 \\ Tetraduptomum sp.A & Ann & Poly 2 & 0.07 & 98.57 & 1 & 14 \\ Tetraduptomum sp.A & Ann & Poly 2 & 0.07 & 98.57 & 1 & 14 \\ Tetraduet (LPL) & Ann & Poly 2 & 0.07 & 98.57 & 1 & 14 \\ Tharyx acutus & Ann & Poly 2 & 0.07 & 98.71 & 1 & 14 \\ Tetraduet (LPL) & Ann & Poly 2 & 0.07 & 98.71 & 1 & 14 \\ Tharyx acutus & Ann & Poly 2 & 0.07 & 98.71 & 1 & 14 \\ Tharyx acutu$	Cinotanynus (I PII)	Ant	Imaa	3	0.11	95.50	2	14
	Carboli de (LPIL)	Aft	Disc	3	0.11	95.07	1	14
Corophum lacustreArtMala3 0.11 95.88 114Crassostre virginicaMolBiva3 0.11 95.88 114Gyptis plurisetaAnnPoly3 0.11 96.10 114Latreutes parvulusArtMala3 0.11 96.21 229Leitoscoloplos (LPIL)AnnPoly3 0.11 96.21 229Leptosynapta tenuisEchHolo3 0.11 96.42 114Mytilida (LPIL)MolBiva3 0.11 96.64 229Ogyrides alphaerostrisArtMala3 0.11 96.64 229Serpulida (LPIL)AnnPoly3 0.11 96.64 229Serpulida (LPIL)AnnPoly3 0.11 96.64 229Serpulida (LPIL)AnnPoly3 0.11 96.64 229Serpulida (LPIL)AnnPoly3 0.11 97.07 114Amelisca vadorumArtMala2 0.07 97.28 114Crastostrea (LPIL)ArtImse2 0.07 97.42 229LectoromomusLPIL)ArtImse2 0.07 97.42 229Lepidonotus sublevisAnnPoly2 0.07 97.64 114Lepidonotus sublevisAnnPoly2 </td <td>Corbuildae (LPIL)</td> <td>NIOI</td> <td>Biva</td> <td>3</td> <td>0.11</td> <td>95.78</td> <td>1</td> <td>14</td>	Corbuildae (LPIL)	NIOI	Biva	3	0.11	95.78	1	14
$\begin{array}{c} Crassostrea virginica & Mol & Biva & 3 & 0.11 & 95.99 & 1 & 14 \\ Cyptis pluriseta & Ann & Poly & 3 & 0.11 & 96.11 & 2 & 29 \\ Leitoscoloplos (LPIL) & Ann & Poly & 3 & 0.11 & 96.21 & 2 & 29 \\ Leitoscoloplos (LPIL) & Ann & Poly & 3 & 0.11 & 96.621 & 2 & 29 \\ Myrithdae (LPIL) & Mol & Biva & 3 & 0.11 & 96.64 & 2 & 29 \\ Ogyrides alphaerostris & Ant & Mala & 3 & 0.11 & 96.64 & 2 & 29 \\ Ogyrides alphaerostris & Ant & Mala & 3 & 0.11 & 96.64 & 2 & 29 \\ Ogyrides alphaerostris & Art & Mala & 3 & 0.11 & 96.64 & 2 & 29 \\ Ogyrides alphaerostris & Art & Mala & 3 & 0.11 & 96.64 & 1 & 14 \\ Panopeus herbstii & Art & Mala & 3 & 0.11 & 96.66 & 1 & 14 \\ Tubificidae (LPIL) & Ann & Poly & 3 & 0.11 & 96.85 & 2 & 29 \\ Serpulidae (LPIL) & Ann & Poly & 3 & 0.11 & 97.07 & 1 & 14 \\ Ampelisca vadorum & Art & Mala & 2 & 0.07 & 97.1 & 1 & 14 \\ Ampelisca vadorum & Art & Mala & 2 & 0.07 & 97.21 & 1 & 14 \\ Ceratonereis irritabilis & Ann & Poly & 2 & 0.07 & 97.35 & 1 & 14 \\ Corpochronomus (LPIL) & Art & Mala & 2 & 0.07 & 97.35 & 1 & 14 \\ Eobrolgus spinosus & Art & Mala & 2 & 0.07 & 97.49 & 1 & 14 \\ Eobrolgus spinosus & Art & Mala & 2 & 0.07 & 97.64 & 1 & 14 \\ Melita longisetosa & Ann & Poly & 2 & 0.07 & 97.64 & 1 & 14 \\ Melita longisetosa & Art & Mala & 2 & 0.07 & 97.71 & 1 & 14 \\ Melita longisetosa & Art & Mala & 2 & 0.07 & 97.78 & 2 & 29 \\ Lepidonotus sublevis & Ann & Poly & 2 & 0.07 & 97.64 & 1 & 14 \\ Melita longisetosa & Art & Mala & 2 & 0.07 & 97.85 & 1 & 14 \\ Melita longisetosa & Art & Mala & 2 & 0.07 & 97.85 & 1 & 14 \\ Melita longisetosa & Art & Mala & 2 & 0.07 & 97.85 & 1 & 14 \\ Melita longisetosa & Art & Mala & 2 & 0.07 & 97.85 & 1 & 14 \\ Melita longisetosa & Ann & Poly & 2 & 0.07 & 98.00 & 2 & 29 \\ Sabaco americanus & Ann & Poly & 2 & 0.07 & 98.00 & 2 & 29 \\ Sabaco americanus & Ann & Poly & 2 & 0.07 & 98.50 & 1 & 14 \\ Melita longisetosa & Ann & Poly & 2 & 0.07 & 98.50 & 1 & 14 \\ Mitrine (LPIL) & Ann & Poly & 2 & 0.07 & 98.50 & 1 & 14 \\ Melita (LPIL) & Ann & Poly & 2 & 0.07 & 98.50 & 1 & 14 \\ Mitrine (LPIL) & Ann & Poly & 2 & 0.07$	Corophium lacustre	Art	Mala	3	0.11	95.88	1	14
Gyptis plarisetaAnnPoly3 0.11 96.10 114Latreutes parvulusArtMala3 0.11 96.21 229Leitoscoloplos (LPIL)AnnPoly3 0.11 96.31 229Leptoscoloplos (LPIL)MolBiva3 0.11 96.53 229Nereiphylla fragilisAnnPoly3 0.11 96.64 229Nereiphylla fragilisAnnPoly3 0.11 96.64 229Serpulidae (LPIL)AnnPoly3 0.11 96.64 229Serpulidae (LPIL)AnnPoly3 0.11 96.66 114Ampelisca vadorumArtMala2 0.07 97.14 114Bateidae (LPIL)AnnPoly2 0.07 97.28 114Ceratonereis irritabilisAnnPoly2 0.07 97.28 114Colgus spinosusArtMala2 0.07 97.35 114Cobrolgus spinosusArtMala2 0.07 97.49 114Gastropoda (LPIL)MolGast2 0.07 97.71 114Lepidonotus variabilisAnnPoly2 0.07 97.75 229Lepidonotus variabilisAnnPoly2 0.07 97.71 114Marcha la longisetosaArtMala <td>Crassostrea virginica</td> <td>Mol</td> <td>Biva</td> <td>3</td> <td>0.11</td> <td>95.99</td> <td>1</td> <td>14</td>	Crassostrea virginica	Mol	Biva	3	0.11	95.99	1	14
Latrettes parvulusArtMala30.1196.21229Leitoscoloplos (LPL)AnnPoly30.1196.31229Leptosynapta tenuisEchHolo30.1196.42114Mytilidae (LPL)MolBiva30.1196.64229Ogyrides alphaerostrisArtMala30.1196.64229Ogyrides alphaerostrisArtMala30.1196.64229Serpulidae (LPL)AnnPoly30.1196.65229Serpulidae (LPL)AnnPoly30.1196.96114Tubificidae (LPL)AnnPoly30.1197.07114Bateidae (LPL)AnnPoly20.0797.14114EcoronomusULPL)ArtMala20.0797.28114Corptochronomus (LPL)ArtMala20.0797.74229Euceranus praelongusArtMala20.0797.74114Eobrolgus spinosusArtMala20.0797.71114Eucidonotus sublevisAnnPoly20.0797.71114Metia longisetosaArtMala20.0797.71114Metinal longisetosaArtMala20.0797.72229 <t< td=""><td>Gyptis pluriseta</td><td>Ann</td><td>Poly</td><td>3</td><td>0.11</td><td>96.10</td><td>1</td><td>14</td></t<>	Gyptis pluriseta	Ann	Poly	3	0.11	96.10	1	14
Leitoscoloplos (LPIL)AnnPoly30.1196.31229Leptosynapta tenuisEchHolo30.1196.53229Nereiphylla fragilisAnnPoly30.1196.64229Ogyrides alphaerostrisArtMala30.1196.674114Panopeus herbstiiArtMala30.1196.674114Panopeus herbstiiArtMala30.1197.07114Ampelisca vadorumArtMala20.0797.14114Ampelisca vadorumArtMala20.0797.28114Ceratonere's irritabilisAnnPoly20.0797.35114Eucerannus praelongusArtMala20.0797.42229Eucerannus praelongusArtMala20.0797.75229Eucerannus sublevisAnnPoly20.0797.75229Lepidonotus variabilisAnnPoly20.0797.78114Lepidonotus variabilisAnnPoly20.0797.78114Lepidonotus variabilisAnnPoly20.0797.711114Lepidonotus variabilisAnnPoly20.0797.711114Lepidonotus variabilisAnnPoly20.	Latreutes parvulus	Art	Mala	3	0.11	96.21	2	29
Leptosynapta tenuisEchHolo3 0.11 96.42 114Mytilidae (LPIL)MolBiva3 0.11 96.53 229Ogyrides alphaerostrisArtMala3 0.11 96.64 229Ogyrides alphaerostrisArtMala3 0.11 96.74 114Panopeus herbstiiArtMala3 0.11 96.96 114Tubificidae (LPIL)AnnPoly3 0.11 97.07 114Ampelisca vadorumArtMala2 0.07 97.14 114Bateidae (LPIL)AntMala2 0.07 97.21 114Ceratonereis irritabilisAnnPoly2 0.07 97.28 114Eobrolgus spinosusArtMala2 0.07 97.42 229Euceranus praelongusArtMala2 0.07 97.42 229Lepidonotus sublevisAnnPoly2 0.07 97.64 114Lepidonotus variabilisAnnPoly2 0.07 97.78 229Mitrella lunataMolGast2 0.07 97.78 114Lepidonotus variabilisAnnPoly2 0.07 97.64 114Lepidonotus sublevisAnnPoly2 0.07 97.85 114Notimastus hemipodusAnnP	Leitoscoloplos (LPIL)	Ann	Poly	3	0.11	96.31	2	29
Mytilidæ (LPIL)MolBiva30.1196.53229Nereiphylla fragilisAnnPoly30.1196.64229Ogyrides alphaerostrisArtMala30.1196.64114Panopeus herbstiiArtMala30.1196.85229Serpulidae (LPIL)AnnPoly30.1197.07114Ampelisca vadorumArtMala20.0797.14114Caraoneris irritabilisAnnPoly20.0797.28114Ceratomeris irritabilisAnnPoly20.0797.35114Ceratomeris irritabilisAnnPoly20.0797.42229Eucerams praelongusArtMala20.0797.42229Leucerams praelongusArtMala20.0797.57229Lepidonotus sublevisAnnPoly20.0797.64114Melita longisetosaArtMala20.0797.85114Melita longisetosaArtMala20.0797.85114Melita longisetosaAnnPoly20.0797.85114Melita longisetosaAnnPoly20.0798.00229Notomastus hemipodusAnnPoly20.0798.01114 <td>Leptosynapta tenuis</td> <td>Ech</td> <td>Holo</td> <td>3</td> <td>0.11</td> <td>96.42</td> <td>1</td> <td>14</td>	Leptosynapta tenuis	Ech	Holo	3	0.11	96.42	1	14
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Mytilidae (LPIL)	Mol	Biva	3	0.11	96.53	2	29
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Narainhylla fragilis	Ann	Poly	3	0.11	96.64	$\frac{2}{2}$	20
Ogyrades alphaerostrisArtMala30.1190.74114Panopeus herbstiiArtMala30.1196.85229Serpulidae (LPIL)AnnPoly30.1197.07114Tubificidae (LPIL)AnnOlig30.1197.07114Bateidae (LPIL)AnnPoly20.0797.21114Bateidae (LPIL)ArtMala20.0797.28114Ceratonereis irritabilisAnnPoly20.0797.35114Eobrolgus spinosusArtMala20.0797.42229Euceramus praelongusArtMala20.0797.47229Euceramus praelongusArtMala20.0797.76114Gastropoda (LPIL)MolGast20.0797.77114Melita longisetosaArtMala20.0797.78229Mirrella lunataMolGast20.0797.85114Nephtys pictaAnnPoly20.0797.85114Nephtys pictaAnnPoly20.0797.85114Nephtys pictaAnnPoly20.0798.07114Piromis robertiAnnPoly20.0798.12229Sabaco americanus	Activity of the second se	Am	Mala	2	0.11	90.04	2	29
Panopeus heristiiArtMala30.1190.832229Serpulidae (LPIL)AnnPoly30.1196.96114Tubificidae (LPIL)AnnOlig30.1197.07114Ampelisca vadorumArtMala20.0797.14114Bateidae (LPIL)ArtMala20.0797.28114Ceratonereis irritabilisAnnPoly20.0797.35114Corptochironomus (LPIL)ArtInse20.0797.49114Gastropoda (LPIL)ArtMala20.0797.57229Euceramus praelongusArtMala20.0797.57229Euceranus sublevisAnnPoly20.0797.71114Gastropoda (LPIL)MolGast20.0797.78229Mirella lunataMolGast20.0797.78229Mirella lunataMolGast20.0797.85114Meris ritseiAnnPoly20.0797.85114Nereis ritseiAnnPoly20.0798.00229Notomastus hemipodusAnnPoly20.0798.2122Piromis robertiAnnPoly20.0798.2122Sabaco americ	Ogyriaes aipnaerosiris	An	Mala	3	0.11	90.74	1	14
Serpuidae (LPIL)AnnPoly3 0.11 96.96 114Ampelisca vadorumArtMala2 0.07 97.14 114Ampelisca vadorumArtMala2 0.07 97.14 114Bateidae (LPIL)ArtMala2 0.07 97.21 114 <i>Ceratonereis irritabilis</i> AnnPoly2 0.07 97.28 114 <i>Corptochironomus</i> (LPIL)ArtImse2 0.07 97.35 114 <i>Corptochironomus</i> praelongusArtMala2 0.07 97.42 229 <i>Euceramus praelongus</i> ArtMala2 0.07 97.57 229 <i>Lepidonotus variabilis</i> AnnPoly2 0.07 97.78 229 <i>Mitrella lunata</i> MolGast2 0.07 97.78 229 <i>Mitrella lunata</i> MolGast2 0.07 97.85 114 <i>Nephys picta</i> AnnPoly2 0.07 97.85 114 <i>Nereis riisei</i> AnnPoly2 0.07 98.07 114 <i>Paraeupolymma</i> sp. AAnnPoly2 0.07 98.07 114 <i>Paraeupolymma</i> sp. AAnnPoly2 0.07 98.07 114 <i>Paraeupolymma</i> sp. AAnnPoly2 0.07 98.50 114 <i>Paraeupolymma</i> sp. AAn	Panopeus herbstu	Art	Mala	3	0.11	96.85	2	29
Tubificidae (LPIL)AnnOlig30.1197.07114Ampelisca vadorumArtMala20.0797.14114Bateidae (LPIL)ArtMala20.0797.21114Ceratonereis irritabilisAnnPoly20.0797.28114Cryptochironomus (LPIL)ArtImse20.0797.42229Euceramus praelongusArtMala20.0797.49114Gastropoda (LPIL)MolGast20.0797.71114Lepidonotus sublevisAnnPoly20.0797.71114Melita longisetosaArtMala20.0797.71114Melita longisetosaArtMala20.0797.78229Mirella lunataMolGast20.0797.78229Mirella lunataMolGast20.0797.85114Meenta siberinpodusAnnPoly20.0798.00229Notomastus hemipodusAnnPoly20.0798.07114Paraeupolymnua sp. AAnnPoly20.0798.2122Soloca carenaeAnnPoly20.0798.35114Soloca carenica musAnnPoly20.0798.43114Ann	Serpulidae (LPIL)	Ann	Poly	3	0.11	96.96	1	14
Ampelisca vadorumArtMala2 0.07 97.14 114Bateidae (LPIL)ArtMala2 0.07 97.21 114Caratonereis irritabilisAnnPoly2 0.07 97.28 114Cryptochironomus(LPIL)ArtImse2 0.07 97.35 114Eobrolgus spinosusArtMala2 0.07 97.42 229Euceramus praelongusArtMala2 0.07 97.49 114Gastropoda (LPIL)MolGast2 0.07 97.57 229Lepidonotus sublevisAnnPoly2 0.07 97.57 229Mitrella lunataMolGast2 0.07 97.78 229Mitrella lunataMolGast2 0.07 97.78 229Mitrella lunataMolGast2 0.07 97.85 114Nehtys pictaAnnPoly2 0.07 98.00 229Notomastus hemipodusAnnPoly2 0.07 98.07 114Phyllodoce arenaeAnnPoly2 0.07 98.07 114Phyllodoce arenaeAnnPoly2 0.07 98.28 229Sabelidae (LPIL)AnnPoly2 0.07 98.28 229Sabelidae (LPIL)AnnPoly2	Tubificidae (LPIL)	Ann	Olig	3	0.11	97.07	1	14
Bateidae (LPL)ArtMala2 0.07 97.21 114Ceratonereis irritabilisAnnPoly2 0.07 97.28 114Ceratonereis irritabilisAnnPoly2 0.07 97.35 114Eobrolgus spinosusArtMala2 0.07 97.42 229Euceramus praelongusArtMala2 0.07 97.49 114Gastropoda (LPIL)MolGast2 0.07 97.57 229Lepidonotus sublevisAnnPoly2 0.07 97.64 114Lepidonotus sublevisAnnPoly2 0.07 97.71 114Meita longisetosaArtMala2 0.07 97.78 229Mitrella lunataMolGast2 0.07 97.78 229Mitrella lunataMolGast2 0.07 97.85 114Nephtys pictaAnnPoly2 0.07 97.85 114Nereis riiseiAnnPoly2 0.07 98.00 229Notomastus hemipodusAnnPoly2 0.07 98.14 114Phyllodoce arenaeAnnPoly2 0.07 98.21 22Sabaco americanusAnnPoly2 0.07 98.35 114Scoloplos rubraAnnPoly2 0.07 <	Ampelisca vadorum	Art	Mala	2	0.07	97.14	1	14
Ceratonereis irritabilisAnnPoly2 0.07 97.28 114Cryptochironomus(LPIL)ArtImse2 0.07 97.35 114Eobrolgus spinosusArtMala2 0.07 97.42 229Euceramus praelongusArtMala2 0.07 97.49 114Gastropoda (LPIL)MolGast2 0.07 97.57 229Lepidonotus sublevisAnnPoly2 0.07 97.64 114Lepidonotus variabilisAnnPoly2 0.07 97.71 114Melita longisetosaArtMala2 0.07 97.78 229Mitrella lunataMolGast2 0.07 97.78 114Nereis riiseiAnnPoly2 0.07 97.85 114Nereis riiseiAnnPoly2 0.07 98.00 229Notomastus hemipodusAnnPoly2 0.07 98.14 114Phylodoce arenaeAnnPoly2 0.07 98.28 229Piromis robertiAnnPoly2 0.07 98.35 114Sabellidae (LPIL)AnnPoly2 0.07 98.28 229Piromis robertiAnnPoly2 0.07 98.57 114Sabellidae (LPIL)AnnPoly2 <td>Bateidae (LPIL)</td> <td>Art</td> <td>Mala</td> <td>2</td> <td>0.07</td> <td>97.21</td> <td>1</td> <td>14</td>	Bateidae (LPIL)	Art	Mala	2	0.07	97.21	1	14
Cryptochironomus (LPIL)ArtImse2 0.07 97.35 114Eobrolgus spinosusArtMala2 0.07 97.42 229Euceramus praelongusArtMala2 0.07 97.49 114Gastropoda (LPIL)MolGast2 0.07 97.57 229Lepidonotus sublevisAnnPoly2 0.07 97.64 114Lepidonotus variabilisAnnPoly2 0.07 97.71 114Melita longisetosaArtMala2 0.07 97.78 229Mitrella lunataMolGast2 0.07 97.78 229Notomastus hemipodusAnnPoly2 0.07 97.85 114Nereis risseiAnnPoly2 0.07 98.00 229Notomastus hemipodusAnnPoly2 0.07 98.00 229Notomastus hemipodusAnnPoly2 0.07 98.21 22Piromis robertiAnnPoly2 0.07 98.35 114Sabellidae (LPIL)AnnPoly2 0.07 98.50 114Vittinellidae (LPIL)AnnPoly2 0.07 98.57 114Vittinellidae (LPIL)AnnPoly2 0.07 98.71 114Vittinellidae (LPIL)AnnPoly <t< td=""><td>Ceratonereis irritabilis</td><td>Ann</td><td>Poly</td><td>2</td><td>0.07</td><td>97.28</td><td>1</td><td>14</td></t<>	Ceratonereis irritabilis	Ann	Poly	2	0.07	97.28	1	14
Eobrolgus spinosusArtMala2 0.07 97.42 229Euceramus praelongusArtMala2 0.07 97.49 114Gastropoda (LPIL)MolGast2 0.07 97.49 114Lepidonotus sublevisAnnPoly2 0.07 97.57 229Lepidonotus variabilisAnnPoly2 0.07 97.64 114Lepidonotus variabilisAnnPoly2 0.07 97.78 229Mitrella lunataMolGast2 0.07 97.78 229Mitrella lunataMolGast2 0.07 97.85 114Nephys pictaAnnPoly2 0.07 98.00 229Notomastus hemipodusAnnPoly2 0.07 98.14 114Phyllodoce arenaeAnnPoly2 0.07 98.21 229Sabaco americanusAnnPoly2 0.07 98.35 114Sabellidae (LPIL)AnnPoly2 0.07 98.50 114Scoloplos rubraAnnPoly2 0.07 98.57 114Terebellidae (LPIL)AnnPoly2 0.07 98.71 114Tharyx acutusAnnPoly2 0.07 98.71 114Therebellidae (LPIL)AnnPoly2 0.07	Cryptochironomus (LPIL)	Art	Imse	2	0.07	97.35	1	14
LooroganLoor<	Fobrolous spinosus	Art	Mala	2	0.07	97 42	2	29
Lance trainingThr.Hain2 0.07 97.57 2 29 Lepidonotus sublevisAnnPoly2 0.07 97.57 2 29 Lepidonotus sublevisAnnPoly2 0.07 97.57 2 29 Mitrella lungisetosaArtMala2 0.07 97.71 114Melita longisetosaArtMala2 0.07 97.78 2 29 Mitrella lunataMolGast2 0.07 97.85 114Nephtys pictaAnnPoly2 0.07 97.85 114Nereis riiseiAnnPoly2 0.07 98.00 2 29 Notomastus hemipodusAnnPoly2 0.07 98.00 2 29 Notomastus hemipodusAnnPoly2 0.07 98.14 114Phyllodoce arenaeAnnPoly2 0.07 98.21 2 29 Sabaco americanusAnnPoly2 0.07 98.35 114Scoloplos rubraAnnPoly2 0.07 98.35 114Terebellidae (LPIL)AnnPoly2 0.07 98.57 114Terebellidae (LPIL)AnnPoly2 0.07 98.57 114Terebellidae (LPIL)AnnPoly2 0.07 98.57 114Terebellidae (LPIL)AnnPoly2<	Fuceranus praelongus	Art	Mala	$\frac{1}{2}$	0.07	97.49	1	14
Construction<	Gastropoda (I PII)	Mol	Gast	$\frac{2}{2}$	0.07	07.57	2	20
Lepidonolus sublevisAnnPoly2 0.07 97.64 114Lepidonolus variabilisAnnPoly2 0.07 97.71 114Melita longisetosaArtMala2 0.07 97.78 229Mitrella lunataMolGast2 0.07 97.78 114Nephys pictaAnnPoly2 0.07 97.78 114Nereis riiseiAnnPoly2 0.07 98.00 229Notomastus hemipodusAnnPoly2 0.07 98.00 229Notomastus hemipodusAnnPoly2 0.07 98.07 114Paraeupolymnua sp. AAnnPoly2 0.07 98.14 114Phyllodoce arenaeAnnPoly2 0.07 98.21 229Sabaco americanusAnnPoly2 0.07 98.28 229Sabaco americanusAnnPoly2 0.07 98.55 114Scoloplos rubraAnnPoly2 0.07 98.57 114Terebellidae (LPIL)MolBiva2 0.07 98.71 114Tharyx acutusAnnPoly2 0.07 98.57 114Anter CurlinaMolGast1 0.04 98.82 114Acteocina canaliculataMolGast1 0.04 <	Lanidon otus sublavis	Ann	Dalu	2	0.07	97.57	2	14
LeptaonotusAnnPoly2 0.07 97.11 114Melita longisetosaArtMala2 0.07 97.78 229Mitrella lunataMolGast2 0.07 97.85 114Nephys pictaAnnPoly2 0.07 97.85 114Nereis riiseiAnnPoly2 0.07 98.00 229Notomastus hemipodusAnnPoly2 0.07 98.00 229Notomastus hemipodusAnnPoly2 0.07 98.07 114Paraeupolymula sp. AAnnPoly2 0.07 98.14 114Phyllodoce arenaeAnnPoly2 0.07 98.21 229Sabaco americanusAnnPoly2 0.07 98.28 229Sabaco americanusAnnPoly2 0.07 98.35 114Sabellidae (LPIL)AnnPoly2 0.07 98.50 114Terebellidae (LPIL)MolBiva2 0.07 98.57 114Tharyx acutusAnnPoly2 0.07 98.57 114Acteocina canaliculataMolGast1 0.04 98.82 114Ampharetidae (LPIL)AnnPoly1 0.04 98.85 114Ampharetidae (LPIL)AnnPoly1 0.04		Ann	Poly	2	0.07	97.04	1	14
Melita longisetosaArtMala2 0.07 97.78 2 29 Mitrella lunataMolGast2 0.07 97.85 114Nephys pictaAnnPoly2 0.07 97.92 114Nereis riiseiAnnPoly2 0.07 98.00 229Notomastus hemipodusAnnPoly2 0.07 98.00 229Notomastus hemipodusAnnPoly2 0.07 98.07 114Paraeupolymnia sp. AAnnPoly2 0.07 98.14 114Phyllodoce arenaeAnnPoly2 0.07 98.21 229Sabaco americanusAnnPoly2 0.07 98.28 229Sabaco americanusAnnPoly2 0.07 98.35 114Sabellidae (LPIL)AnnPoly2 0.07 98.35 114Terebellidae (LPIL)MolBiva2 0.07 98.57 114Tharyx acutusAnnPoly2 0.07 98.57 114Vitrinellidae (LPIL)MolGast2 0.07 98.71 114Vitrinellidae (LPIL)MolGast1 0.04 98.82 114Ampharetidae (LPIL)AnnPoly1 0.04 98.85 114Annachis lafresnayiMolGast1 0.04 <	Lepidonotus variabilis	Ann	Poly	2	0.07	97.71	1	14
Mitrella lunataMolGast2 0.07 97.85 114Neptys pictaAnnPoly2 0.07 97.92 114Nereis riiseiAnnPoly2 0.07 98.00 229Notomastus hemipodusAnnPoly2 0.07 98.07 114Paraeupolymnia sp. AAnnPoly2 0.07 98.07 114Phyllodoce arenaeAnnPoly2 0.07 98.14 114Phyllodoce arenaeAnnPoly2 0.07 98.28 229Sabaco americanusAnnPoly2 0.07 98.35 114Sabellidae (LPIL)AnnPoly2 0.07 98.35 114Scoloplos rubraAnnPoly2 0.07 98.57 114Terebellidae (LPIL)MolBiva2 0.07 98.57 114Tharyx acutusAnnPoly2 0.07 98.57 114Tharyx acutusAnnPoly2 0.07 98.57 114Acteocina canaliculataMolGast2 0.07 98.78 114Ampharetidae (LPIL)AnnPoly2 0.07 98.78 114Anachis lafresnayiMolGast1 0.04 98.85 114Anachis lafresnayiMolGast1 0.04 98.9	Melita longisetosa	Art	Mala	2	0.07	97.78	2	29
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Piromis robertiAnnPoly2 0.07 98.28 2 29 Sabaco americanusAnnPoly2 0.07 98.35 114Sabellidae (LPIL)AnnPoly2 0.07 98.35 114Scoloplos rubraAnnPoly2 0.07 98.43 114Terebellidae (LPIL)MolBiva2 0.07 98.50 114Terebellidae (LPIL)MolBiva2 0.07 98.57 114Terebellidae (LPIL)AnnPoly2 0.07 98.57 114Tharyx acutusAnnPoly2 0.07 98.71 114Acteocina canaliculataMolGast2 0.07 98.78 114Ampharetidae (LPIL)AnnPoly1 0.04 98.82 114Acteocina canaliculataMolGast1 0.04 98.85 114Ampharetidae (LPIL)AnnPoly1 0.04 98.89 114Anachis lafresnayiMolBiva1 0.04 98.93 114Anachis lafresnayiMolGast1 0.04 98.93 114	Phyllodoce arenae	Ann	Polv	2	0.07	98.21	2	29
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Subact and the functionAnnPoly2 0.07 98.33 114Sabellidae (LPIL)AnnPoly2 0.07 98.43 114Scoloplos rubraAnnPoly2 0.07 98.50 114Tellina (LPIL)MolBiva2 0.07 98.57 114Terebellidae (LPIL)AnnPoly2 0.07 98.57 114Tharyx acutusAnnPoly2 0.07 98.64 114Vitrinellidae (LPIL)MolGast2 0.07 98.71 114Acteocina canaliculataMolGast1 0.04 98.82 114Ampharetidae (LPIL)AnnPoly1 0.04 98.85 114Anachis lafresnayiMolBiva1 0.04 98.93 114Carrietlidae (LPIL)AnnPoly1 0.04 98.93 114	Sabaco americanus	Ann	Poly	2	0.07	98.35	1	14
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Tetulida (LFIL)MolBiva2 0.07 98.57 114Terebellidae (LPIL)AnnPoly2 0.07 98.64 114Tharyx acutusAnnPoly2 0.07 98.71 114Vitrinellidae (LPIL)MolGast2 0.07 98.78 114Acteocina canaliculataMolGast1 0.04 98.82 114Ampharetidae (LPIL)AnnPoly1 0.04 98.85 114Amygdalum papyriaMolBiva1 0.04 98.89 114Anachis lafresnayiMolGast1 0.04 98.93 114Caraitellidae (LPIL)AnnPoly1 0.04 98.93 114	Scolopios rubra	Ann	Poly	2	0.07	98.50	1	14
Terebellidae (LPIL)AnnPoly2 0.07 98.64 114Tharyx acutusAnnPoly2 0.07 98.71 114Vitrinellidae (LPIL)MolGast2 0.07 98.71 114Acteocina canaliculataMolGast1 0.04 98.82 114Ampharetidae (LPIL)AnnPoly1 0.04 98.85 114Ampharetidae (LPIL)AnnPoly1 0.04 98.85 114Amygdalum papyriaMolBiva1 0.04 98.93 114Carnitelidae (LPIL)AnnPoly1 0.04 98.93 114Anachis lafresnayiMolGast1 0.04 98.93 114		Mol	Biva	2	0.07	98.57	1	14
Tharyx acutusAnnPoly2 0.07 98.71 114Vitrinellidae (LPIL)MolGast2 0.07 98.78 114Acteocina canaliculataMolGast1 0.04 98.82 114Ampharetidae (LPIL)AnnPoly1 0.04 98.85 114Amygdalum papyriaMolBiva1 0.04 98.89 114Anachis lafresnayiMolGast1 0.04 98.93 114	Terebellidae (LPIL)	Ann	Poly	2	0.07	98.64	1	14
Vitrinellidae (LPIL) Mol Gast 2 0.07 98.78 1 14 Acteocina canaliculata Mol Gast 1 0.04 98.82 1 14 Ampharetidae (LPIL) Ann Poly 1 0.04 98.85 1 14 Amygdalum papyria Mol Biva 1 0.04 98.89 1 14 Anachis lafresnayi Mol Gast 1 0.04 98.93 1 14 Convictilidae (LPIL) Ann Poly 1 0.04 98.89 1 14	Tharyx acutus	Ann	Poly	2	0.07	98.71	1	14
Acteocina canaliculata Mol Gast 1 0.04 98.82 1 14 Ampharetidae (LPIL) Ann Poly 1 0.04 98.85 1 14 Amygdalum papyria Mol Biva 1 0.04 98.89 1 14 Anachis lafresnayi Mol Gast 1 0.04 98.93 1 14 Caraitellidae (LPIL) Ann Poly 1 0.04 98.93 1 14	Vitrinellidae (LPIL)	Mol	Gast	2	0.07	98.78	1	14
Ampharetidae (LPIL) Ann Poly 1 0.04 98.85 1 14 Amygdalum papyria Mol Biva 1 0.04 98.85 1 14 Anachis lafresnayi Mol Gast 1 0.04 98.93 1 14 Carriellidae (LPIL) Ann Poly 1 0.04 98.93 1 14	Acteocina canaliculata	Mol	Gast	1	0.04	98.82	1	14
Amygdalum papyriaMolBiva10.0498.89114Anachis lafresnayiMolGast10.0498.93114Conit Ulidae (LPIL)AnnPalue10.0498.93114	Ampharetidae (LPIL)	Ann	Polv	1	0.04	98.85	1	14
Anachis lafresnayi Mol Gast 1 0.04 98.93 1 14	Amvgdalum papyria	Mol	Biva	1	0.04	98.89	1	14
Control $d_{0,0}(0,0,0)$ for $d_{0,0}(0,0,0)$ for $d_{0,0}(0,0,0,0)$ for $d_{0,0}(0,0,0,0,0)$ for $d_{0,0}(0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0$	Anachis lafresnavi	Mol	Gast	- 1	0.04	98 93	1	14
Cabitellique (LFIL) Ann POIV I 0.04 98.90 I 14	Capitellidae (LPIL)	Ann	Polv	1	0.04	98.96	1	14

Table 2. Continued:

			No. of		Cumulative	Station	% Station
Taxa	Phylum	Class	Individuals	% of Total	%	Occurrence	Occurrence
Cerapus (LPIL)	Art	Mala	1	0.04	99.00	1	14
Chione intapurpurea	Mol	Biva	1	0.04	99.03	1	14
Cirratulidae (LPIL)	Ann	Poly	1	0.04	99.07	1	14
Columbellidae (LPIL)	Mol	Gast	1	0.04	99.11	1	14
Corbula (LPIL)	Mol	Biva	1	0.04	99.14	1	14
Diplodonta (LPIL)	Mol	Biva	1	0.04	99.18	1	14
Epitonium (LPIL)	Mol	Gast	1	0.04	99.21	1	14
Epitonium multistriatum	Mol	Gast	1	0.04	99.25	1	14
Glycinde solitaria	Ann	Poly	1	0.04	99.28	1	14
Hydrobiidae (LPIL)	Mol	Gast	1	0.04	99.32	1	14
Ilyanassa trivittata	Mol	Gast	1	0.04	99.36	1	14
Mediomastus californiensis	Ann	Poly	1	0.04	99.39	1	14
Monoculodes (LPIL)	Art	Mala	1	0.04	99.43	1	14
Nassarius vibex	Mol	Gast	1	0.04	99.46	1	14
Odostomia (LPIL)	Mol	Gast	1	0.04	99.50	1	14
Owenia fusiformis	Ann	Poly	1	0.04	99.53	1	14
Phoronis (LPIL)	Pho	_	1	0.04	99.57	1	14
Pinnotheridae (LPIL)	Art	Mala	1	0.04	99.61	1	14
Polypedilum scalaenum group	Art	Imse	1	0.04	99.64	1	14
Porcellanidae (LPIL)	Art	Mala	1	0.04	99.68	1	14
Spiochaetopterus oculatus	Ann	Poly	1	0.04	99.71	1	14
Spionidae (LPIL)	Ann	Poly	1	0.04	99.75	1	14
Streblosoma hartmanae	Ann	Poly	1	0.04	99.79	1	14
Streptosyllis pettiboneae	Ann	Poly	1	0.04	99.82	1	14
Syllis (LPIL)	Ann	Poly	1	0.04	99.86	1	14
Synidotea (LPIL)	Art	Mala	1	0.04	99.89	1	14
Ungulinidae (LPIL)	Mol	Biva	1	0.04	99.93	1	14
Veneridae (LPIL)	Mol	Biva	1	0.04	99.96	1	14
Vitrinella floridana	Mol	Gast	1	0.04	100.00	1	14

Taxa Key

Ann=Annelida Poly=Polychaeta Olig=Oligochaeta Art=Arthropoda Cni=Cnidaria Pho=Phoronida Anth=Anthozoa Por=Porifera Ech=Echinodermata Rhy=Rhynchocoela Holo=Holothuroidea Anop=Anopla Ophi=Ophiuroidea Mol=Mollusca Biva=Bivalvia Inse=Insecta Mala=Malacostraca Ostr=Ostracoda Cho=Chordata Gast=GastropodaAsci=Ascidiacea

Taxa	Total No. Taxa	% of Total	Total No. Individuals	% of Total
Annelida				
Oligochaeta	2	1.4	7	0.3
Polychaeta	59	41.3	1,163	41.6
Mollusca				
Bivalvia	23	16.1	734	26.3
Gastropoda	15	10.5	115	4.1
~				
Cnidaria		o -	100	4.0
Anthozoa	1	0.7	120	4.3
A 41 1.				
Arthropoda	2	0.1	6	0.2
Insecta	3	2.1	0	0.2
Malacostraca	32	22.4	449	10.1
Ostracoda	1	0.7	28	1.0
Eshinodormata				
Holothuroidoo	1	0.7	3	0.1
Ophiuroidoo	1	0.7	3	0.1
Opinuroidea	1	0.7	4	0.1
Rhynchocoola	2	1 /	96	3 /
Kiryhenococia	<u>ک</u>	1.4	20	5.4
Other Taxa	3	21	69	2.5
Total	143	2.1	2.794	2.5

Table 3. Summary of overall abundance of major benthic macroinfaunal
taxonomic groups for the St. John's River stations, July 2000.

		Total No.		Total No.	
Station ID	Taxa	Taxa	% of Total	Individuals	% of Total
1	Annelida	5	21.7	366	44.7
	Mollusca	8	34.8	329	40.2
	Arthropoda	9	39.1	87	10.6
	Echinodermata	0	0.0	0	0.0
	Other Taxa	1	4.3	36	4.4
	Total	23		818	
2	Annelida	2	25.0	35	37.6
	Mollusca	5	62.5	52	55.9
	Arthropoda	0	0.0	0	0.0
	Echinodermata	0	0.0	0	0.0
	Other Taxa	1	12.5	6	6.5
	Total	8		93	
3	Annelida	12	42.9	210	75.8
	Mollusca	5	17.9	5	1.8
	Arthropoda	9	32.1	52	18.8
	Echinodermata	0	0.0	0	0.0
	Other Taxa	2	7.1	10	3.6
	Total	28		277	
4	Annelida	14	38.9	61	29.2
	Mollusca	12	33.3	108	51.7
	Arthropoda	9	25.0	37	17.7
	Echinodermata	0	0.0	0	0.0
	Other Taxa	1	2.8	3	1.4
	Total	36		209	
5	Annelida	34	45.3	356	44.4
	Mollusca	17	22.7	39	4.9
	Arthropoda	20	26.7	255	31.8
	Echinodermata	1	1.3	4	0.5
	Other Taxa	3	4.0	147	18.4
	Total	75		801	
6	Annelida	6	40.0	37	74.0
	Mollusca	3	20.0	3	6.0
	Arthropoda	4	26.7	7	14.0
	Echinodermata	0	0.0	0	0.0
	Other Taxa	2	13.3	3	6.0
	Total	15		50	- · ·
7	Annelida	25	46.3	105	19.2
	Mollusca	9	16.7	313	57.3
	Arthropoda	13	24.1	45	8.2
	Echinodermata	1	19	3	0.5
	Other Taxa	6	11.1	80	14.7
	Total	54		546	

Table 4. Summary of abundance of major benthic macroinfaunal taxonomic groups
by station for the St. John's River stations, July 2000.

Table 5.	Percentage abundance of dominant benthic macroinfaunal taxa (>10% of the total) for the
	St. John's River stations, July 2000.

Taxa	1	2	3	4	5	6	7
Annelida Polychaeta Mediomastus ambiseta Nereis succinea Paraonis fulgens Sabellaria vulgaris Streblospio benedicti	37.2	29.0	12.6 53.1	11.5	26.0	58.0	
Arthropoda Malacostraca <i>Paracaprella pusilla</i>					15.6		
Cnidaria Anthozoa <i>Actiniaria</i> (LPIL)					13.1		
M							
Mollusca Bivalvia Gemma gemma Macoma mitchelli Mytilopsis leucophaeata Tellinidae (LPIL) Gastropoda Odostomia impressa	33.9	29.0 10.8		42.1			53.5
Doniform							
Porifera (LPIL)							10.3

Table 6.	Summary	of the	benthic 1	macroinfaunal	data for	the St.	John's	River	stations,	July	2000.

Station	Rep	No. of Taxa	No. of Indvs	Density (no/m²)	Mean No. Taxa	Taxa (SD)	Mean Density	Density (SD)	Total No. Taxa	Total No. Individuals	H' Diversity	J' Evenness
1	A B C	17 15 16	221 359 238	5525 8975 5950	16.0	1.0	6816.7	1881.2	23	818	1.77	0.56
2	A B C	6 8 6	15 44 34	375 1100 850	6.7	1.2	775.0	368.3	8	93	1.80	0.87
3	A B C	13 15 20	56 41 180	1400 1025 4500	16.0	3.6	2308.3	1907.3	28	277	1.93	0.58
4	A B C	21 23 7	56 146 7	1400 3650 175	17.0	8.7	1741.7	1762.5	36	209	2.44	0.68
5	A B C	45 40 41	277 221 303	6925 5525 7575	42.0	2.6	6675.0	1047.6	75	801	2.83	0.66
6	A B C	7 10 4	25 20 5	625 500 125	7.0	3.0	416.7	260.2	15	50	1.75	0.65
7	A B C	37 16 20	163 126 257	4075 3150 6425	24.3	11.2	4550.0	1688.4	54	546	2.10	0.53

Table 7. Statistical analysis for density and taxa differences among stations for the St. John's River stations, July 2000.

DENSITY DATA

-	Shapiro-Wi	k W Test fo	or Normality			
	W= 0.93	P	rob < W = 0.11	92		
ANOVA Table	Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
-	Model	6	11767.27	1961.21	10.31	0.0002
	Error	14	2663.31	190.24		
	Total	20	14430.58			

TAXA DATA

-	Shapiro-Wil	k W Test fo	or Normality			
	W= 0.93	P	rob < W = 0.12	212		
ANOVA Table	Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
-	Model Error Total	6 14 20	30.54 6.04 36.58	5.01 0.43	11.79	<0.0001

Table 8. Density and taxa post-hoc results for the St. John's River stations, July 2000.



* indicates pairs of means that are significantly different.

Table 9. Two-way matrix	of station and	species group	is for the St. J	onn's River si	tations, July 2	000.		
	_1				_2			
	1	3	2	4	5	7	6	
Actiniaria (LPIL)	0	0	0	0	105	14	1	
Paracaprella pusilla	0	0	0	0	125	1	1	
Batea catharinensis	0	0	0	0	69	1	2	
Sabellaria vulgaris	0	0	0	1	208	0	0	Α
Eusarsiella zostericola	0	6	0	0	20	2	0	
Dipolydora socialis	0	0	0	6	18	30		
Porifera (LPIL)	0	0	0	0	0	56	0	
Gemma gemma	0	0	0	0	0	292	0	
Ischadium recurvum	25	0	0	2	0	0	0	
Melitidae (LPIL)	56	1	0	1	1	1	0	
Nereis succinea	43	0	0	24	1	4	0	
Tubulanus (LPIL)	36	10	6	0	34	8	2	В
Mytilopsis leucophaeata	277	0	0	0	0	0	0	
Streblospio benedicti	304	147	27	6	2	11	2	
Mediomastus ambiseta	0	35	0	0	0	3	0	
Macoma mitchelli	0	1	27	0	0	1	0	С
Odostomia impressa	0	0	0	88	0	0	0	D
Paraonis fulgens	0	0	0	0	0	0	29	Ε

Table 9. Two-way matrix of station and species groups for the St. John's River stations, July 2000.





Figure 2. Depth and temperature data for the St. John's River stations, July 2000.

Depth (m)

Figure 3. Salinty and dissolved oxygen data for the St. John's River stations, July 2000.



Salinity (ppt)

Dissolved Oxygen (mg/l)

Station



Figure 4. Sediment composition for the St. John's River stations, July 2000.



Figure 6. Mean particle size data for the St. John's River stations, July 2000.







Figure 8. Percent total organic carbon (TOC) for the St. John's River stations, July 2000.





Figure 9. Percent abundance of major taxonomic groups for the St. John's River stations, July 2000.



Figure 11. Mean macroinvertebrate density for the St. John's River stations, July 2000.





Figure 13. Mean number of taxa per replicate for the St. John's River stations, July 2000.











Figure 17. Taxa evenness (J') for the St. John's River stations, July 2000.





Figure 19. Station dendrogram from the cluster analysis for St. John's river stations, July 2000.



Figure 20. Taxa dendrogram from the cluster analysis for St. John's river stations, July 2000.



APPENDIX A1. QUALITY ASSURANCE STATEMENT

Client/Project NOAA

Work Assignment Title St. John's River HAB Study-Cruise 1
Work Assignment Number Task Number DO-5
Description of Data Set or Deliverable: 21 Benthic macroinvertebrate samples collected June 9-11, 2000; 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

Date

Signature of Project Manager

Date

APPENDIX A2. QUALITY CONTROL REWORKS

Client/Project NOAA-St. John's River HAB Study-Cruise 1

Task Number DO 5

Sorting Results:	Sample #	% Accuracy		
	SJ-103-3	100%		
	SJ-106-2	100%		
	SJ-103-1	100%		

Taxonomy Results:	Sample #	Taxa	% Accuracy	
	SJ-106-1	Crust./Moll.	100%	
	SJ-102-2	Crust./Moll.	96%	
	SJ-102-2	Poly./Misc.	100%	
	SJ-105-3	Poly./Misc.	99%	

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

Signature of QA Officer or Reviewer

Date

Appendix A3. Lowest practical taxa level definitions for the St. John's River stations, July 2000.

Taxa	Phylum	Class	Definition
Streblospio benedicti	Ann	Poly	
Gemma gemma	Mol	Biva	
Mytilopsis leucophaeata	Mol	Biva	
Sabellaria vulgaris	Ann	Poly	
Paracaprella pusilla	Art	Mala	
Actiniaria (LPIL)	Cni	Anth	order is lowest identification level.
Odostomia impressa	Mol	Gast	
Batea catharinensis	Art	Mala	
Nereis succinea	Ann	Poly	
Melitidae (LPIL)	Art	Mala	specimen lacks third uropod.
Porifera (LPIL)	Por	_	phylum is lowest identification level
Dipolydora socialis	Ann	Poly	
Rhynchocoela (LPIL)	Rhy	_	no identifiable characters.
Mediomastus (LPIL)	Ann	Poly	anterior portions only, pygidium needed for species ID.
Tubulanus (LPIL)	Rhy	Anop	genus is lowest identification level.
Mediomastus ambiseta	Ann	Poly	-
Ampelisca (LPIL)	Art	Mala	juvenile specimen or missing characters
Macoma mitchelli	Mol	Biva	
Paraonis fulgens	Ann	Poly	
Eusarsiella zostericola	Art	Ostr	
Ischadium recurvum	Mol	Biva	
Rangia cuneata	Mol	Biva	
Cyclaspis varians	Art	Mala	
Diopatra cuprea	Ann	Poly	
Melîta (LPÎL)	Art	Mala	adult male needed for species identification
Xanthidae (LPIL)	Art	Mala	missing appendages.
Tellinidae (LPIL)	Mol	Biva	crushed, and/or juvenile specimens
Grandidierella bonnieroides	Art	Mala	
Leucon americanus	Art	Mala	
Pista quadrilobata	Ann	Poly	
Ascidiacea (LPIL)	Cho	Asci	
Hypereteone (LPIL)	Ann	Poly	
Lucina multilineata	Mol	Biva	
Marenzellaria viridis	Ann	Poly	