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Wetlands, Coastal & Nonpoint Source Section
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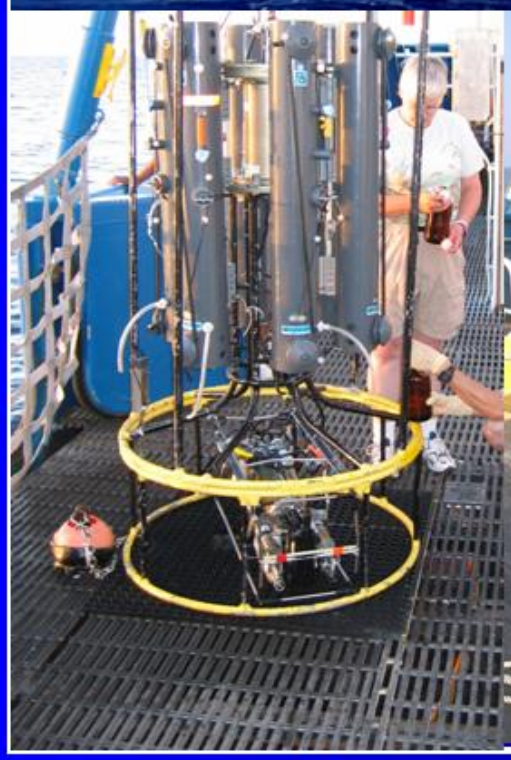
Savannah ODMDS Status and Trends
May 2006



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ACKNOWLEDGEMENTS

Samples were collected May 4-5, 2006 from the Savannah Ocean Dredged Material Disposal Site (Doug Johnson, Site Manager; Gary W. Collins, Chief Scientist). Sample tracking and custody were performed by Phyllis Meyer. Water quality profiling and sampling were led by Christopher McArthur. Sediment sampling was led by Steve Blackburn. On-board sample processing of the invertebrate samples, chemical samples, and the sediment particle size samples were led by Doug Johnson, Jennifer Derby and Kris Carter, respectively.

In addition, the scientific party would like to express their appreciation to the following members of senior-level management for taking the time out of their hectic schedules to allow us the opportunity to demonstrate the capabilities of the OSV Bold, along with our ocean protection monitoring techniques: Regional Administrator J.I. Palmer, Jr., Chief of Staff Don Christy, Water Division Director James Giattina, and WCNS Branch Chief Tom Welborn.

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INTRODUCTION

Ocean disposal of dredged materials can affect the environment of a disposal site by disturbing the benthic community and potentially causing long-term reduction of oxygen in the pore waters of the sediments and the overlying waters. Natural oceanographic processes can also be responsible for transporting disposed materials offsite into nearby habitats.

As part of Region 4's strategy to monitor the effects of dredged material disposal within the marine environment, routine surveys of the benthos and water column within and adjacent to our sites are conducted so that their status may be assessed. In addition, the data is archived so that over time, trends which may occur can be observed. These status and trends surveys are consistent with the requirements of 40 C.F.R. 228.9. The present study being discussed was conducted aboard the Ocean Survey Vessel (OSV) Bold on May 4-5, 2006.

BACKGROUND

The Savannah ODMDS was designated by EPA in 1987. The ODMDS has typically received an annual average of over 900,000 cubic yards. The exception to those volumes was during the deepening of the entrance channel from 1993-94, when volumes averaged 3 million cubic yards per year.

A Site Management and Monitoring Plan was developed for the Savannah ODMDS in 1997. Annual bathymetry surveys have been conducted at the site by the U. S. Army Corps of Engineers. The first status and trends survey conducted at this site was in 1992.

Survey Area and Location

The study area is within and surrounding the Savannah, GA ODMDS located offshore Tybee Island. The ODMDS is approximately 4.26 square nautical miles (nmi) in area. Twelve stations were selected in order to analyze the sediment grain size, chemical, and biological characteristics of two areas – one where disposal has occurred and the other one undisturbed by disposal. Of these 12, one (1) station received water quality sampling. Depths in this area average 37 feet. The ODMDS boundary corner coordinates are:

31°55'53"N 80°44'20"W
31°57'55"N 80°46'48"W
31°57'55"N 80°44'20"W
31°55'53"N 80°46'48"W

The ODMDS, survey area and station locations are shown in Figure 1.

METHODS AND MATERIALS

Method Rationale: Characterization of the benthic community and sediment size/chemistry at selected stations, followed by analysis of community parameters via statistical treatment, allows for identification and interpretation of changes in the community structure. Such community statistics can be used to draw inferences regarding perturbations to the benthic macroinvertebrate community and subsequently allow for judgments regarding the likelihood of impact from dredged material disposal.

Sampling Stations

The boundaries of the Savannah ODMDS measure approximately 2 X 2 nmi. Twelve stations (see Table 1 and Figure 1) were established by selecting half within and half outside of the site, which provides two treatments with 6 replicates/treatment. Station locations were selected by a stratified, random method.

Water Quality

To characterize the general water quality associated with the dump site, the following water column parameters were sampled: conductivity, dissolved oxygen (DO), salinity, temperature, density, turbidity, % light transmission and Chlorophyll a.

All measurements were collected utilizing the ship's CTD. Go Flow® bottles attached to the CTD/rosette frame were tripped at the bottom and near the surface to obtain water samples for the laboratory analysis. Once the rosette was back aboard the ship, the bottles were emptied directly into the appropriate sample containers, labeled, and refrigerated until demobilization. Laboratory analyses of the water include nutrients, metals, PAHs, PCBs and pesticides. In addition, one other sample container was filled with bottom water and analyzed for dioxins.

Seafloor Sampling

Bottom sampling at all twelve stations was accomplished by a minimum of two deployments of a Young grab (surface area = 0.04 m^2; depth of 10 cm) from the stern of the ship. After retrieval of the grab and confirmation of an adequate sample, the device was either sub-sampled in order to obtain discrete samples for sediment particle size analyses and sediment chemical analyses, or used entirely for benthic macroinvertebrate identification. The sampling device and handling/preservative protocol for each type of sample follows below:

Sediment Particle Size

Two separate samples for particle size were collected from the Young grab by acrylic 5 cm diameter coring tubes. The subsamples were placed into whirl packs, labeled, and frozen for return to the lab. The samples were analyzed by subcontractor utilizing a wet sieve method (see Vittor, 2007).

Sediment Chemistry

Analyses for the following parameters were conducted at the SESD lab in Athens, Georgia: heavy metals scan, nutrients which includes total phosphorous (TP), NO2+NO3, NH3, and TKN, extractable organic compounds, pesticides, and PCBs. The sample was transferred to a glass pan and thoroughly mixed. The sample was alloquated into two 236.6 ml. glass containers and preserved by storing at 4 C until analyzed. One container was analyzed for extractable organic compounds and the other was analyzed for metals and nutrients. In addition, at stations SA04, SA07, SA08 and SA12, one additional container was filled from the sample and analyzed for dioxins. The limited number of dioxin samples were due to budgetary constraints.

Benthic Macroinvertebrate Infauna

Sediment from a separate deployment of the grab were collected to obtain benthic macroinvertebrate organisms. On-board processing involved washing the sample through a #35 screen (0.5mm). The sample retained on the screen after washing was preserved in 10% seawater formalin with staining solution. Benthic containers were labeled both internally and externally and stored for transfer to contract lab facilities. The details of sorting and identification of infaunal taxa are described in Vittor, 2007.

All sampling procedures and sample preservation for analyses were according to the SESD Standard Operating Procedures (SOP), (US EPA 1996, 2002).

RESULTS AND DISCUSSION

Water Quality

The results of the water quality profiles are summarized in Table 2. In general, the narrow range of values seen within the data demonstrates the well-mixed nature of the ODMDS's water column.

Turbidity ranged from 0.55 to 1.06 NTUs, while dissolved oxygen (DO) readings ranged from 6.50 mg/L to 6.84 mg/L (see Table 2 and Figure 2).

Temperature and salinity profiles also showed that the waters within and around the Savannah ODMDS are very well-mixed. Temperatures ranged from 20.93 to 21.57 ^{o}C; salinities ranged from 31.37 to 32.58 ppt (see Table 2 and Figure 3).

Chemical analyses of the water samples collected as part of this study showed all analytes to be at or below the detection limit with the limited exceptions of arsenic, copper and a few of the least problematic dioxin congeners (see Appendix D).

Seafloor Sampling

Sediment Particle Size.

The results of the sediment particle size analyses are given in Table 3. In general, all stations were found to be predominantly sand with small amounts of gravel and silt/clay. The two most notable exceptions were Stations SA01 and SA06, which both had more than 16% gravel.

Sediment Chemistry.

The sediment chemistry showed nearly all contaminants to be below detection limits with the notable exception of ten metals (see Table 4) and a variety of dioxin congeners. Because the average concentration for stations from within the ODMDS was consistently lower than the average concentration for stations from outside the site, for all metals, a test for statistical difference between these two treatments was deemed unnecessary.

The results of dioxin analyses are provided in Appendix C. Although several dioxin congeners were detectable across the four sediment stations, no distinctive pattern can be discerned, either within the two stations inside the ODMDS or outside the ODMDS. The most notable pattern found within the data seems to be the relatively higher concentrations found at SA07, which did have 4-5 times the amount of silts and clays found at the other three stations analyzed for dioxin. Despite the substantially higher silt/clay fraction found at SA07, it still did not average more than 2.8 % of the total sediments for that station.

Benthic Macroinvertebrate Infauna.

The benthic infauna data is detailed and summarized in "Savannah, Georgia ODMDS 2006 Benthic Community Assessment "(Vittor, 2007). Polychaetes dominated the total assemblage (60.3%), and also ranked first in number of taxa (54.7%) represented. In terms of abundance, the polychaetes were followed by malacostracans (9.1%) and bivalves (8.0%): by taxa, the polychaetes were followed by malacostracans (19.3%) and bivalves (10.0%).

The dominant taxa found outside the ODMDS were the polychaete, *Spiophanes bombyx* (9.8%), the chordate, *Branchiostoma* [LPIL] (8.6%) and the bivalve, *Crassinella lunulata* (5.5%). Inside the ODMDS, the dominant taxa were the polychaete, *Spiophanes bombyx* (20.2%), the polychaete, *Spio pettiboneae* (6.9%), the amphipod, *Rhepoxynius hudsoni* (6.7%), the bivalve, *Tellina* [LPIL] (5.7%), the cumacean, *Oxyurostylis smithi* (5.2%) and the polychaete, *Mediomastus californiensis* (5.1%).

Mean densities ranged from 1175 organisms/m^2 at Station SA05 to 31000 organisms/m^2 at Station SA01. Although densities averaged 9950 outside the ODMDS

compared to 3687.5 inside the ODMDS, there was not a significant difference in densities between stations inside vs. outside (Vittor, 2007).

The mean number of taxa ranged from 21 taxa/station at Station SA05 to 61 taxa/station at Station SA01. Again, although taxa richness averaged 42.5 outside the ODMDS compared to 34.8 inside the ODMDS, there was not a significant difference in mean number of taxa between stations inside vs. outside (Vittor, 2007).

The results of cluster, ANOSIM and SIMPLER analyses are discussed in detail within Vittor, 2007. In summary, these results indicate that assemblages inside and outside the ODMDS are similar. Table 5 lists the infaunal community parameters by station.

CONCLUSIONS

When comparing the various study parameters between stations located within the ODMDS and those outside the ODMDS, no significant differences can be found. Table 6 summarizes the main parameters of this study, demonstrating that no physical, chemical nor biological difference can be seen.

REFERENCES

ASTM D-422. Standard Test Method for Particle Size Analysis of Soils. American Society for Testing and Materials. Pennsylvania. 1994.

USEPA. 1996. Environmental Investigations Standard Operating Procedures and Quality Assurance Manual. US Environmental Protection Agency, Region 4. Athens, GA.

USEPA. 2002. Standard Operation Procedures Ecological Assessment Branch. US Environmental Protection Agency, Region 4. Athens, GA.

Vittor. 2007 – Savannah Harbor, Georgia ODMDS 2006 Benthic Community Assessment. Barry A. Vittor & Associates, Inc., Mobile, Alabama.

Table 1. Savannah ODMDS Status and Trends Stations –May 2006.

2006 Station ID	(Degrees, minutes) Latitude(N)	Longitude(W)	Young Grabs(y/n)	CTD Casts(y/n)
SA01	31 58.46000 N	80 45.18000 W	Y	N
SA02	31 57.80000 N	80 46.18000 W	Y	N
SA03	31 57.52000 N	80 46.65000 W	Y	N
SA04	31 57.62000 N	80 45.34000 W	Y	Y
SA05	31 57.80000 N	80 44.50999 W	Y	N
SA06	31 57.50000 N	80 43.40000 W	Y	N
SA07	31 56.77028 N	80 47.15000 W	Y	N
SA08	31 57.00000 N	80 46.00000 W	Y	N
SA09	31 56.81067 N	80 44.90000 W	Y	N
SA10	31 56.20000 N	80 43.36000 W	Y	N
SA11	31 55.72001 N	80 47.16999 W	Y	N
SA12	31 55.65000 N	80 45.18000 W	Y	N

Table 2. Savannah ODMDS Water Quality data – May 2006

Depth (meters)	Temperature ©	Salinity (ppt)	DO (mg/L)	Turbidity (ntu's)
1.51	21.54	31.45	6.82	0.88
1.70	21.56	31.41	6.82	0.94
2.04	21.57	31.38	6.82	1.06
2.47	21.57	31.38	6.82	0.94
2.70	21.56	31.39	6.84	0.98
3.13	21.56	31.41	6.82	0.98
3.62	21.55	31.42	6.83	0.93
3.54	21.55	31.42	6.83	0.94
3.42	21.55	31.41	6.84	0.91
3.60	21.56	31.39	6.84	0.98
3.90	21.57	31.37	6.84	0.92
4.13	21.57	31.37	6.84	0.95
4.32	21.57	31.37	6.83	1.00
4.60	21.46	31.68	6.82	0.85
5.02	21.36	31.96	6.79	0.91
5.35	21.29	32.15	6.77	0.77
5.56	21.19	32.32	6.71	0.61
5.81	21.10	32.41	6.71	0.55
6.12	20.99	32.51	6.69	0.62
6.51	20.95	32.56	6.65	0.73
6.85	20.94	32.58	6.59	0.93
7.17	20.93	32.58	6.53	0.87
7.31	20.93	32.58	6.52	0.83
7.69	20.93	32.58	6.50	0.90
7.97	20.93	32.58	6.51	0.93
8.12	20.93	32.58	6.51	0.95
8.33	20.93	32.58	6.51	0.90

Table 3. Savannah ODMDS Sediment particle size – May 2006.

NOTE: station IDs omitted to demonstrate that each serves as a replicate for each treatment (inside vs. outside)

	Outside			**Inside**		
	silt/clay	*Sand*	*gravel*	*silt/clay*	*sand*	*Gravel*
	1.5	82.4	16.1	0.5	97.3	2.3
	0.3	83.5	16.2	1.0	98.7	0.4
	2.8	97.1	0.1	0.5	99.1	0.4
	0.4	96.8	2.8	0.2	99.4	0.4
	0.0	99.6	0.3	0.4	99.6	0.0
	0.6	99.1	0.3	0.4	94.0	5.6
Mean	0.93	93.08	5.97	0.50	98.02	1.52

Table 4. Metal Analyses of Sediments – Savannah ODMDS, May 2006.

Aluminum

Outside	Inside
530	770
1600	1500
950	670
1200	780
350	840
3300	560

	Outside	Inside
mean	1321.67	853.33
std dev	1069.12	331.76
var	1143017	110067

Arsenic

Outside	Inside
2.0	1.4
1.7	1.7
2.8	1.8
2.5	2.2
2.7	1.2
2.0	1.9

	Outside	Inside
mean	2.28	1.70
std dev	0.445	0.358
var	0.198	0.128

Cadmium

Outside	Inside
0.12	0.2
0.18	0.12
0.30	0.31
0.12	0.13
0.12	0.12
0.13	0.22

	Outside	Inside
mean	0.16	0.18
std dev	0.072	0.076
var	0.005	0.006

Chromium

Outside	Inside
4	4.2
1.3	5.2
8.8	4.2
2.6	3.6
7.2	3.6
5.2	4.4

	Outside	Inside
mean	4.85	4.20
std dev	2.815	0.593
var	7.927	0.352

Copper

Outside	Inside
0.50	0.49
0.49	0.63
1.50	0.50
0.49	0.49
0.68	0.50
0.50	0.49

	Outside	Inside
mean	0.69	0.52
std dev	0.402	0.056
var	0.162	0.003

Iron

Outside	Inside
2700	2000
1300	3100
5600	1900
1400	2400
3100	2200
1800	1600

	Outside	Inside
mean	2650	2200
std dev	1613.4	517.7
var	2603000	268000

Lead

Outside	Inside
1.40	1.20
0.62	1.50
3.20	0.95
1.20	0.99
1.50	1.10
1.40	1.20

	Outside	Inside
mean	1.55	1.16
std dev	0.867	0.198
var	0.751	0.039

Manganese

Outside	Inside
58	26
33	46
62	34
70	50
47	41
29	26

	Outside	Inside
mean	49.8	37.2
std dev	16.41	10.17
var	269.4	103.4

Nickel

Outside	Inside
0.98	0.99
0.99	1.00
2.00	1.00
0.98	0.98
1.10	0.99
1.00	0.99

	Outside	Inside
mean	1.18	0.99
std dev	0.41	0.01
var	0.165	0.000

Zinc

Outside	Inside
5.6	4.9
2.4	6.4
11.0	5.0
3.6	5.5
7.8	4.6
5.6	4.6

	Outside	Inside
mean	6.0	5.2
std dev	3.08	0.69
var	9.456	0.475

Table 5. Infaunal Community Parameters – Savannah ODMDS, May 2006.

Station	Taxa Richness	Density	Diversity	Evenness
Outside the ODMDS				
SA01	61	31000.0	3.34	0.81
SA06	42	4700.0	2.83	0.76
SA07	44	7275.0	3.25	0.86
SA10	58	10275.0	3.02	0.74
SA11	24	2850.0	2.05	0.65
SA12	26	3600.0	2.60	0.80
Mean	42.5	9950.0	2.85	0.77
Std Dev.	15.5	10664.5		
Inside the ODMDS				
SA02	36	5850.0	2.75	0.77
SA03	32	3475.0	2.77	0.80
SA04	22	1725.0	2.51	0.81
SA05	21	1175.0	2.37	0.78
SA08	49	5850.0	3.14	0.81
SA09	49	4050.0	3.41	0.88
Mean	34.8	3687.5	2.82	0.81
Std. Dev.	12.4	1984.6		

Table 6. Comparative Summary – Savannah ODMDS, May 2006.

		Inside ODMDS	Outside ODMDS
Grain Size Analyses			
		2006	**2006**
	% gravel	**1.52**	**5.97**
	% sand	**98.02**	**93.08**
	% silt/clay	**0.50**	**0.93**
Sediment chemistry		Mean conc. (ppm)	Mean conc. (ppm)
	Aluminum	**931.43**	**1321.67**
	Arsenic	**1.71**	**2.28**
	Cadmium	**0.17**	**0.16**
	Chromium	**4.33**	**4.85**
	Copper	**0.52**	**0.69**
	Iron	**2343**	**2650**
	Lead	**1.19**	**1.55**
	Manganese	**38.4**	**49.8**
	Nickel	**0.99**	**1.18**
	Zinc	**5.3**	**6.0**
Infauna analyses			
	Taxa richness (#spp./station)		
	Minimum	**21**	**24**
	Maximum	**49**	**61**
	Mean	**34.8**	**42.5**
	Density (#organisms/m2)		
	Minimum	**1175**	**2850**
	Maximum	**5850**	**31000**
	Mean	**3687.5**	**10664.5**
	Taxa diversity (H')		
	Mean	**2.82**	**2.85**
	Taxa evenness (J')		
	Mean	**0.81**	**0.77**

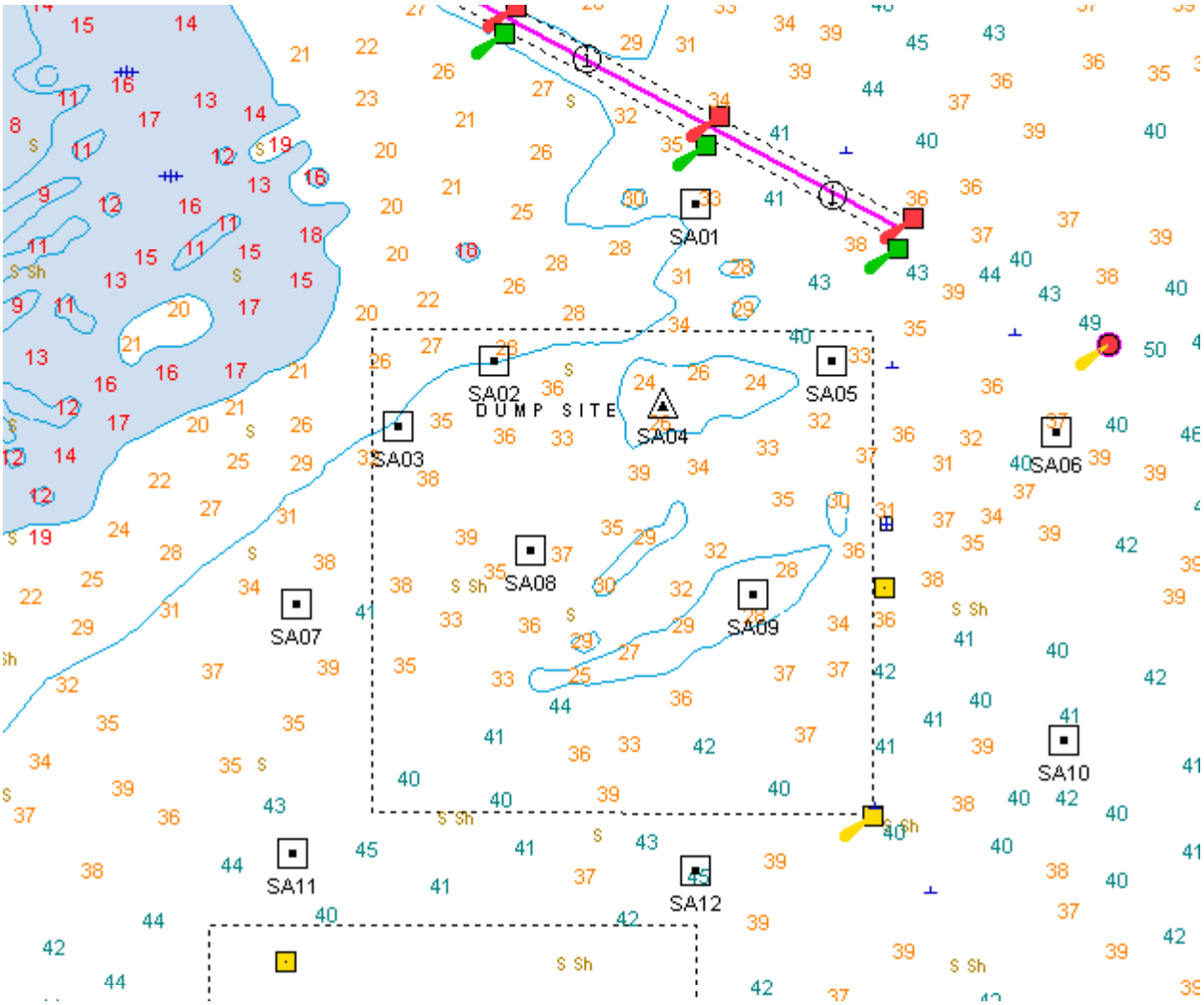

Figure 1. Savannah sample stations, May, 2006
(station SA04 was also sampled for water)

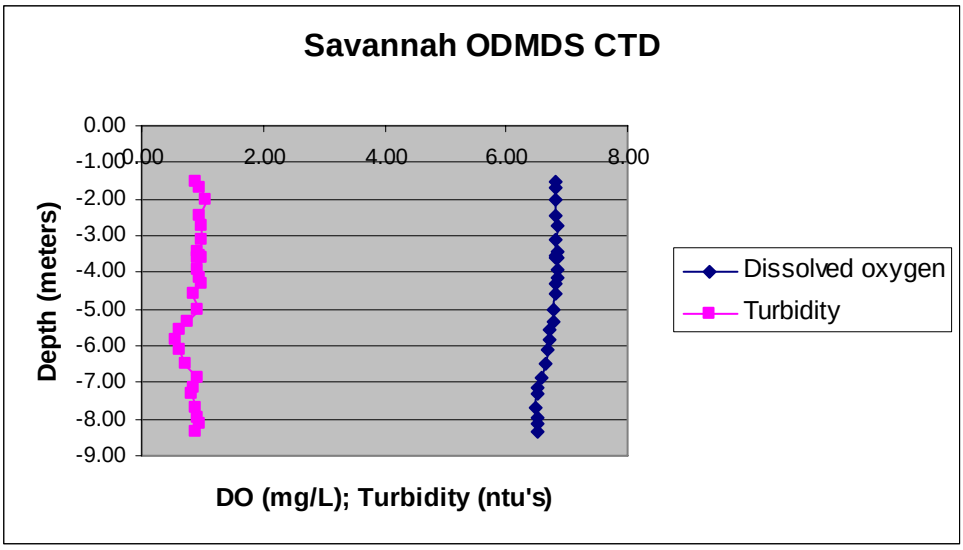

Figure 2. Dissolved Oxygen and Turbidity Profiles – Savannah ODMDS, May 2006

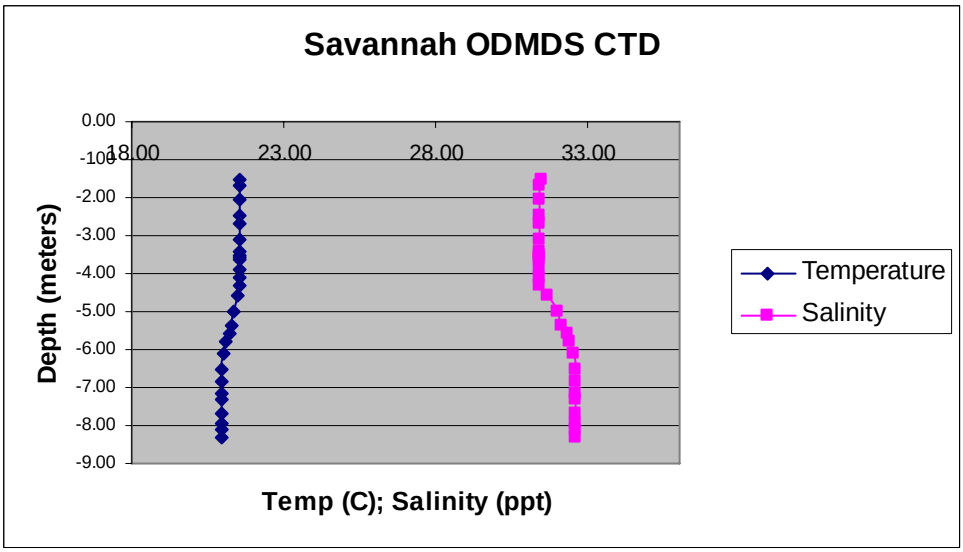

Figure 3. Temperature and Salinity Profiles – Savannah ODMDS, May 2006.

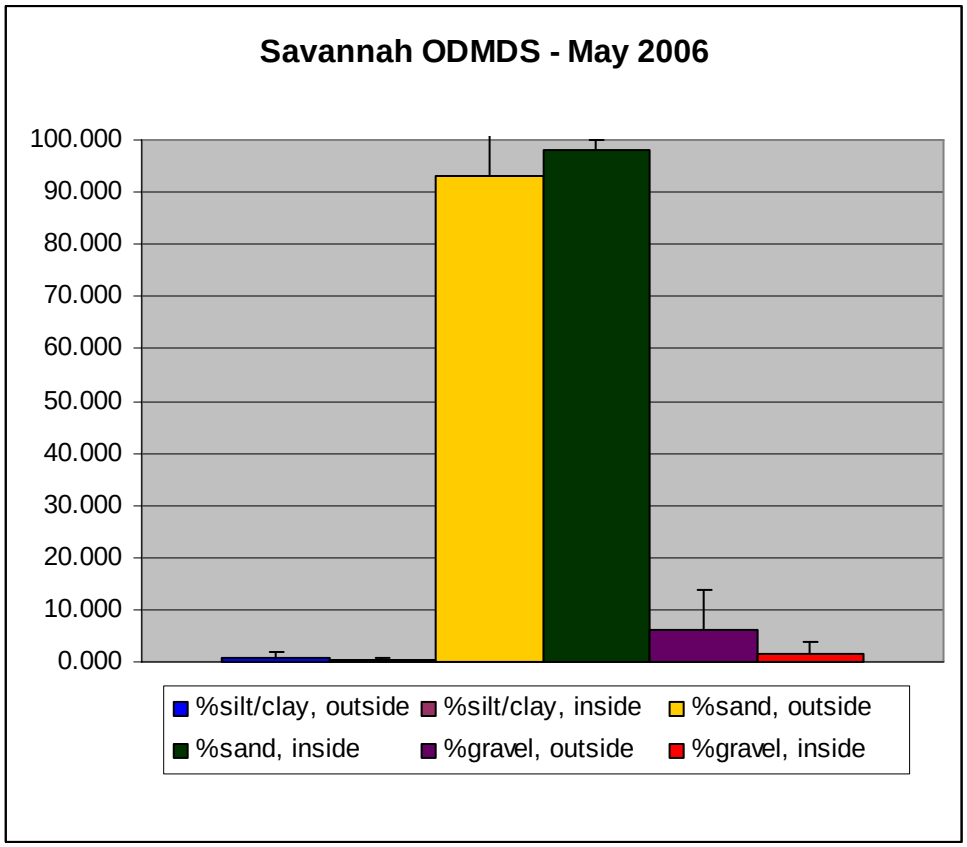

Figure 4. Grain Size Distribution, Savannah ODMDS – May 2006.

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APPENDIX A

SCIENTIFIC PARTY

Name	Survey Responsibility	Organization
1) Gary Collins	Chief Scientist	EPA/ Atlanta
2) Christopher McArthur	Water Quality/Navigation	EPA/ Atlanta
3) Doug Johnson	Invertebrate Processing	EPA/Atlanta
4) Phyllis Meyer	Sample Tracking	EPA/Athens
5) Steve Blackburn	Deck Ops	EPA/Atlanta
6) Jennifer Derby	Sample Processing	EPA/Atlanta
7) Kris Carter	Sample Processing	EPA/Atlanta

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Appendix B

Sediment Particle Size Distribution

Table B1.

	%silt/clay	%sand	%gravel
SA01	1.50	82.40	16.10
SA02	0.50	97.30	2.30
SA03	1.00	98.70	0.40
SA04	0.50	99.10	0.40
SA05	0.20	99.40	0.40
SA06	0.30	83.50	16.20
SA07	2.80	97.10	0.10
SA08	0.40	99.60	0.00
SA09	0.40	94.00	5.60
SA10	0.40	96.80	2.80
SA11	0.00	99.60	0.30
SA12	0.60	99.10	0.30

APPENDIX C

Sediment Chemistry – Metals, Extractables, Pesticides, PCBs and Dioxins

Table C1. Sediment Metals Analyses - Savannah ODMDS, May 2006.
(concentrations reported as mg/kg)

	SA01	SA02	SA03	SA03D	SA04	SA05	SA06	SA07	SA08	SA09	SA10	SA11	SA12
Aluminum	1200	770	1500	1400	670	780	350	3300	840	560	530	1600	950
Antimony	0.24U	0.25U	0.25U	0.25U	0.25U	0.25U	0.25U	0.25U	0.25U	0.25U	0.25U	0.25U	0.25U
Arsenic	2	1.4	1.7	1.8	1.8	2.2	1.7	2.8	1.2	1.9	2.5	2.7	2
Beryllium	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U
Cadmium	0.13U	0.2	0.12U	0.12U	0.31	0.13	0.12U	0.12U	0.12U	0.22	0.12U	0.18	0.3
Chromium	4	4.2	5.2	5.1	4.2	4.4	1.3	8.8	3.6	3.6	2.6	7.2	5.2
Copper	0.5U	0.49U	0.63	0.55	0.5U	0.49U	0.49U	1.5	0.5U	0.49U	0.49U	0.68	0.5U
Iron	2700	2000	3100	3200	1900	2400	1300	5600	2200	1600	1400	3100	1800
Lead	1.4	1.2	1.5	1.4	0.95	0.99	0.62	3.2	1.1	1.2	1.2	1.5	1.4
Manganese	58	26	46	46	34	50	33	62	41	26	70	47	29
Nickel	0.98U	0.99U	1U	0.98U	1U	0.98U	0.99U	2	0.99U	0.99U	0.98U	1.1	1U
Selenium	0.49U	0.49U	0.5U	0.49U	0.5U	0.49U	0.49U	0.5U	0.5U	0.49U	0.49U	0.49U	0.5U
Silver	0.49U	0.49U	0.5U	0.49U	0.5U	0.49U	0.49U	0.5U	0.5U	0.49U	0.49U	0.49U	0.5U
Thallium	0.24U	0.25U	0.25U	0.25U	0.25U	0.25U	0.25U	0.25U	0.25U	0.25U	0.25U	0.25U	0.25U
Total Mercury	0.05U	0.046U	0.049U	0.048U	0.048U	0.047U	0.047U	0.046U	0.048U	0.046U	0.046U	0.048U	0.048U
Zinc	5.6	4.9	6.4	6.4	5	5.5	2.4	11	4.6	4.6	3.6	7.8	5.6

U-Analyte not detected at or above reporting limit. The number is the minimum quantitation limit.

Table C2. Sediment Extractables Analyses - Savannah ODMDS, May 2006.

	SA01	SA02	SA03	SA03D	SA04	SA05	SA06	SA07	SA08	SA09	SA10	SA11	SA12
2-Methylnaphthalene	17	18	18	18	18	18	18	21	18	17	17	18	18
Acenaphthene	9.2	9.2	9.5	9.6	9.4	9.4	9.3	11	9.6	9.1	9.1	9.8	9.4
Acenaphthylene	9	9.1	9.4	9.4	9.2	9.3	9.2	11	9.4	9	9	9.6	9.3
Anthracene	8.2	8.3	8.5	8.6	8.4	8.4	8.3	9.7	8.6	8.1	8.1	8.7	8.4
Benzo(a)Anthracene	8.2	8.3	8.5	8.6	8.4	8.4	8.3	9.7	8.6	8.1	8.1	8.7	8.4
Benzo(b)Fluoranthene	8.9	9	9.3	9.3	9.1	9.2	9	11	9.3	8.9	8.8	9.5	9.2
Benzo(ghi)Perylene	8.2	8.3	8.5	8.6	8.4	8.4	8.3	9.7	8.6	8.1	8.1	8.7	8.4
Benzo(k)Fluoranthene	8.2	8.3	8.5	8.6	8.4	8.4	8.3	9.7	8.6	8.1	8.1	8.7	8.4
Benzo-a-Pyrene	8.2	8.3	8.5	8.6	8.4	8.4	8.3	9.7	8.6	8.1	8.1	8.7	8.4
Chrysene	8.2	8.3	8.5	8.6	8.4	8.4	8.3	9.7	8.6	8.1	8.1	8.7	8.4
Dibenzo(a,h)Anthracene	8.7	8.8	9	9.1	8.9	8.9	8.8	10	9.1	8.6	8.6	9.2	8.9
Fluoranthene	8.2	8.3	8.5	8.6	8.4	8.4	8.3	9.7	8.6	8.1	8.1	8.7	8.4
Fluorene	8.2	8.3	8.5	8.6	8.4	8.4	8.3	9.7	8.6	8.1	8.1	8.7	8.4
Indeno (1,2,3-cd) Pyrene	8.2	8.3	8.5	8.6	8.4	8.4	8.3	9.7	8.6	8.1	8.1	8.7	8.4
Naphthalene	22	22	23	23	22	22	22	26	23	22	22	23	22
Phenanthrene	8.2	8.3	8.5	8.6	8.4	8.4	8.3	9.7	8.6	8.1	8.1	8.7	8.4
Pyrene	13	13	14	14	13	14	13	16	14	13	13	14	14

NOTE: All values were "U" flagged – Analyte not detected at or above reporting limit.

Table C3. Sediment Pesticides Analyses - Savannah ODMDS, May 2006.

(concentrations reported as ug/kg)

	SA01	SA02	SA03	SA03D	SA04	SA05	SA06	SA07	SA08	SA09	SA10	SA11	SA12
4,4'-DDD (p,p'-DDD)	1	1	1.1	0.98	1.2	1.2	1	1	1	0.99	1	1.2	0.82
4,4'-DDE (p,p'-DDE)	0.4	0.48	0.58	0.39	0.59	5.4	0.61	0.4	0.54	0.4	0.41	0.62	0.33
4,4'-DDT (p,p'-DDT)	1	1.5	1.4	0.98	1.3	12	1.5	1	1.4	1.4	1.4	1.5	0.82
Aldrin	4	4.1	3.9	3.9	4.1	4.6	4.1	4	4.1	4	4.1	3.3	3.3
alpha-BHC	4	4.1	3.9	3.9	4.1	4.6	4.1	4	4.1	4	4.1	3.3	3.3
alpha-Chlordane /2	4	4.1	3.9	3.9	4.1	4.6	4.1	4	4.1	4	4.1	3.3	3.3
beta-BHC	4	4.1	3.9	3.9	4.1	4.6	4.1	4	4.1	4	4.1	3.3	3.3
cis-Nonachlor /2	4	4.1	3.9	3.9	4.1	4.6	4.1	4	4.1	4	4.1	3.3	3.3
delta-BHC	4	4.1	3.9	3.9	4.1	5.5	4.1	4	4.1	4	4.1	3.3	3.3
Dieldrin	0.4	0.41	0.54	0.39	0.6	0.46	0.41	0.4	0.41	0.4	0.41	0.5	0.33
Endosulfan I (alpha)	4	4.1	3.9	3.9	4.1	4.6	4.1	4	4.1	4	4.1	3.3	3.3
Endosulfan II (beta)	10	10	9.8	9.8	10	12	10	9.9	10	9.9	10	8.3	8.2
Endosulfan Sulfate	10	10	9.8	9.8	10	12	10	9.9	10	9.9	10	8.3	8.2
Endrin	10	10	9.8	9.8	10	12	10	9.9	10	9.9	10	8.3	8.2
Endrin Ketone	10	10	9.8	9.8	10	12	10	9.9	10	9.9	10	8.3	8.2
gamma-BHC (Lindane)	4	4.1	3.9	3.9	4.1	4.6	4.1	4	4.1	4	4.1	3.3	3.3
gamma-Chlordane /2	4	4.1	3.9	3.9	4.1	4.6	4.1	4	4.1	4	4.1	3.3	3.3
Heptachlor	4	4.1	3.9	3.9	4.1	4.6	4.1	4	4.1	4	4.1	3.3	3.3
Heptachlor Epoxide	4	4.1	3.9	3.9	4.1	4.6	4.1	4	4.1	4	4.1	3.3	3.3
Methoxychlor	20	20	20	20	20	23	20	20	20	20	20	17	16
Toxaphene	40	41	39	39	41	46	41	40	41	40	41	33	33
trans-Nonachlor /2	4	4.1	3.9	3.9	4.1	4.6	4.1	4	4.1	4	4.1	3.3	3.3

NOTE: all values were "U" flagged -Analyte not detected at or above reporting limit. The number is the minimum quantitation limit.

Table C4. Sediment PCBs - Savannah ODMDS, May 2006.

(concentrations reported as ug/kg)

	SA01	SA02	SA03	SA03D	SA04	SA05	SA06	SA07	SA08	SA09	SA10	SA11	SA12
PCB Congener #8	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #18	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #28	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #44	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #49	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #52	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #66	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #77	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #87	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #101	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #105	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #118	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #126	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #128	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #138	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #153	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #156	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #169	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #170	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #180	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #183	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #184	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #187	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #195	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #206	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1
PCB Congener #209	0.82	1	1	1	0.99	1	0.83	0.46	1	0.98	0.98	1	1

NOTE: all values were "U" flagged -Analyte not detected at or above reporting limit. The number is the minimum quantitation limit.

Table C5. Sediment Dioxin Analyses - Savannah ODMDS, May 2006.

(concentrations are reported in ng/kg)

	SA04	SA07	SA08	SA12
2,3,7,8-Tetrachlorodibenzodioxin	0.095 U	0.089 U	0.037 U	0.037 U
Tetrachlorodibenzodioxin (Total)	0.21	2.80	0.170	0.14
1,2,3,7,8-Pentachlorodibenzodioxin	0.55 U	0.26	0.077 U	0.037 U
Pentachlorodibenzodioxin (Total)	0.55 U	6.30	0.580	0.33
1,2,3,4,7,8-Hexachlorodibenzodioxin	0.43 U	0.47	0.076 U	0.050 U
1,2,3,6,7,8-Hexachlorodibenzodioxin	0.94	0.96	0.14 U	0.071 U
1,2,3,7,8,9-Hexachlorodibenzodioxin	0.45 U	1.50	0.13 U	0.10 U
Hexachlorodibenzodioxin (Total)	7.20	43.00	3.700	2.60
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	2.80	18.00	2.200	1.3 U
Heptachlorodibenzodioxin (Total)	7.90	68.00	6.900	3.40
Octachlorodibenzodioxin	12.00	180.00	22.000	14.00
2,3,7,8-Tetrachlorodibenzofuran	0.18 U	0.14 U	0.13 U	0.10 U
Tetrachlorodibenzofuran (Total)	0.18 U	0.34	0.120	0.08
1,2,3,7,8-Pentachlorodibenzofuran	0.25 U	0.080 U	0.051 U	0.028 U
2,3,4,7,8-Pentachlorodibenzofuran	0.25 U	0.081 U	0.053 U	0.045 U
Pentachlorodibenzofuran (Total)	0.25 U	0.10	0.056	0.028 U
1,2,3,4,7,8-Hexachlorodibenzofuran	0.28 U	0.12 U	0.041 U	0.036 U
1,2,3,6,7,8-Hexachlorodibenzofuran	0.29 U	0.12 U	0.04 U	0.034 U
1,2,3,7,8,9-Hexachlorodibenzofuran	0.35 U	0.16 U	0.056 U	0.048 U
2,3,4,6,7,8-Hexachlorodibenzofuran	0.29 U	0.12 U	0.043 U	0.036 U
Hexachlorodibenzofuran (Total)	0.53	0.75	0.280	0.10
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.00	0.82	0.27 U	0.14 U
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.40 U	0.24	0.094 U	0.078 U
Heptachlorodibenzofuran (Total)	3.00	2.00	52.000	0.14 U
Octachlorodibenzofuran	0.87 U	1.5 U	0.84 U	0.34 U
Avian Toxic. Equiv. Value, TEQ-98	1.1	0.95	0.24	0.16
Fish Toxic. Equiv. Value,TEQ-98	1.3	0.85	0.35	0.25
Mammalian Toxic. Equiv. Value, TEQ-98	1.2	0.75	0.22	0.15

APPENDIX D

Water Chemistry - Metals, Extractables, Pesticides, PCBs and Dioxins

Table D1. Water Metals Analyses - Savannah ODMDS, May 2006

(concentrations reported as ug/L; except Lead - mg/L)

	Top	Bottom
Aluminum	50u	50u
Antimony	2.5u	2.5u
Arsenic	13	11
Beryllium	1.2u	1.2u
Cadmium	1.2u	1.2u
Chromium	7.9u	6.8u
Copper	7.6	8
Iron	0.22u	0.17u
Lead	2.5u	2.5u
Manganese	5u	5u
Nickel	2.5u	2.5u
Selenium	5.5u	5.5u
Silver	1.2u	1.2u
Thallium	2.5u	2.5u
Total Mercury	0.2u	0.2u
Zinc	14u	13u

Table D2. Water Extractables Analyses - Savannah ODMDS, May 2006.

(concentrations are reported as ug/L)

	SA top	SA bottom
2-Methylnaphthalene	10	10
Acenaphthene	10	10
Acenaphthylene	10	10
Anthracene	10	10
Benzo(a)anthracene	10	10
Benzo(b)Fluoranthene	10	10
Benzo(ghi)Perylene	10	10
Benzo(k)Fluoranthene	10	10
Benzo-a-Pyrene	10	10
Chrysene	10	10
Dibenzo(a,h)Anthracene	10	10
Fluoranthene	10	10
Fluorene	10	10
Indeno(1,2,3-cd)Pyrene	10	10
Naphthalene	10	10
Phenanthrene	10	10
Pyrene	10	10

NOTE: all values were "U"flagged (analyte not detected at or above reporting limit… the number is the minimum quantitation limit.)

Table D3. Water Pesticides Analyses - Savannah ODMDS, May 2006
(concentrations reported as ug/L)

	top	bottom
4,4'-DDD (p,p'-DDD)	0.051	0.05
4,4'-DDE (p,p'-DDE)	0.021	0.02
4,4'-DDT (p,p'-DDT)	0.051	0.05
Aldrin	0.03	0.02
alpha-BHC	0.021	0.02
alpha-Chlordane /2	0.021	0.02
beta-BHC	0.021	0.02
cis-Nonachlor /2	0.021	0.02
delta-BHC	0.021	0.02
Dieldrin	0.021	0.02
Endosulfan I (alpha)	0.021	0.02
Endosulfan II (beta)	0.051	0.05
Endosulfan Sulfate	0.06	0.06
Endrin	0.051	0.05
Endrin Ketone	0.051	0.05
gamma-BHC (Lindane)	0.021	0.02
gamma-Chlordane /2	0.021	0.02
Heptachlor	0.021	0.02
Heptachlor Epoxide	0.021	0.02
Methoxychlor	0.1	0.1
Toxaphene	2	2
trans-Nonachlor /2	0.021	0.02

NOTE: all values were "U" flagged (analyte not detected at or above reporting limit-
(number is minimum quantitation limit)

Table D4. Water PCBs Analyses - Savannah ODMDS, May 2006
(concentrations reported as ug/L)

	top	bottom
PCB Congener #8	0.016	0.02
PCB Congener #18	0.016	0.02
PCB Congener #28	0.016	0.02
PCB Congener #44	0.016	0.02
PCB Congener #49	0.016	0.02
PCB Congener #52	0.016	0.02
PCB Congener #66	0.016	0.02
PCB Congener #77	0.016	0.02
PCB Congener #87	0.016	0.02
PCB Congener #101	0.016	0.02
PCB Congener #105	0.016	0.02
PCB Congener #118	0.016	0.02
PCB Congener #126	0.016	0.02
PCB Congener #128	0.016	0.02
PCB Congener #138	0.016	0.02
PCB Congener #153	0.016	0.02
PCB Congener #156	0.016	0.02
PCB Congener #169	0.016	0.02
PCB Congener #170	0.016	0.02
PCB Congener #180	0.016	0.02
PCB Congener #183	0.016	0.02
PCB Congener #184	0.016	0.02
PCB Congener #187	0.016	0.02
PCB Congener #195	0.016	0.02
PCB Congener #206	0.016	0.02
PCB Congener #209	0.016	0.02

NOTE: all values were "U" flagged (analyte not detected at or above reporting limit-
(number is minimum quantitation limit)

Table D5. Bottom Water Dioxin Analyses - Savannah ODMDS, May 2006

(concentrations reported as pg/L)

2,3,7,8-Tetrachlorodibenzodioxin	0.00046 U
Tetrachlorodibenzodioxin (Total)	0.00046 U
1,2,3,7,8-Pentachlorodibenzodioxin	0.00041 U
Pentachlorodibenzodioxin (Total)	0.00041 U
1,2,3,4,7,8-Hexachlorodibenzodioxin	0.00050 U
1,2,3,6,7,8-Hexachlorodibenzodioxin	0.00049 U
1,2,3,7,8,9-Hexachlorodibenzodioxin	0.00051 U
Hexachlorodibenzodioxin (Total)	0.00049 U
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	0.0021 U
Heptachlorodibenzodioxin (Total)	0.0008
Octachlorodibenzodioxin	0.012
2,3,7,8-Tetrachlorodibenzofuran	0.00057 U
Tetrachlorodibenzofuran (Total)	0.00057 U
1,2,3,7,8-Pentachlorodibenzofuran	0.00037 U
2,3,4,7,8-Pentachlorodibenzofuran	0.00065
Pentachlorodibenzofuran (Total)	0.00063
1,2,3,4,7,8-Hexachlorodibenzofuran	0.00063 U
1,2,3,6,7,8-Hexachlorodibenzofuran	0.00053 U
1,2,3,7,8,9-Hexachlorodibenzofuran	0.0010 U
2,3,4,6,7,8-Hexachlorodibenzofuran	0.00069 U
Hexachlorodibenzofuran (Total)	0.0017 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.0015
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.0012
Heptachlorodibenzofuran (Total)	0.0027
Octachlorodibenzofuran	0.0063 U
Avian Toxic. Equiv. Value, TEQ-98	0.0017
Fish Toxic. Equiv. Value,TEQ-98	0.0025
Mammalian Toxic. Equiv. Value, TEQ-98	0.0018

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APPENDIX E

Benthic Data Extracted from Vittor, 2007.

Table 2. Summary of overall abundance of major benthic macroinfaunal taxonomic groups for the Savannah Harbor, Georgia ODMDS, May 2006.

Outside the ODMDS

Taxa	Totoal No. Taxa	% Total	Total No. Individuals	% Total
Annelida				
Oligochaeta	2	1.3	62	2.6
Polychaeta	82	54.7	1,439	60.3
Mollusca				
Bivalvia	15	10.0	190	8.0
Gastropoda	5	3.3	33	1.4
Arthropoda				
Malacostraca	29	19.3	217	9.1
Ostracoda	3	2.0	21	0.9
Echinodermata				
Echinoidea	2	1.3	7	0.3
Holothuroidea	1	0.7	8	0.3
Ophiuroidea	3	2.0	86	3.6
Other Taxa	8	5.3	325	13.6
Total	**150**		**2,388**	

Inside the ODMDS

Taxa	Total No. Taxa	% Total	Total No. Individuals	% Total
Annelida				
Oligochaeta	1	1.0	6	0.7
Polychaeta	45	44.6	502	56.7
Mollusca				
Bivalvia	13	12.9	93	10.5
Gastropoda	5	5.0	9	1.0
Arthropoda				
Malacostraca	26	25.7	213	24.1
Ostracoda	1	1.0	1	0.1
Echinodermata				
Ophiuroidea	1	1.0	4	0.5
Other Taxa	9	8.9	57	6.4
Total	**101**		**885**	

Table 3. Summary of abundance of major benthic macroinfaunal taxonomic groups by station for the Savannah Harbor, Georgia ODMDS, May 2006.

Station	Taxa	Total No. Taxa	% Total	Total No. Individuals	% Total
1Out	Annelida	33	54.1	816	65.8
	Mollusca	11	18.0	184	14.8
	Arthropoda	10	16.4	96	7.7
	Echinodermata	3	4.9	80	6.5
	Other Taxa	4	6.6	64	5.2
	Total	**61**		**1240**	**100.0**
6Out	Annelida	25	59.5	101	53.7
	Mollusca	4	9.5	4	2.1
	Arthropoda	10	23.8	10	5.3
	Echinodermata	1	2.4	7	3.7
	Other Taxa	2	4.8	66	35.1
	Total	**42**		**188**	**100.0**
7Out	Annelida	23	52.3	204	70.1
	Mollusca	3	6.8	10	3.4
	Arthropoda	11	25.0	40	13.7
	Echinodermata	3	6.8	10	3.4
	Other Taxa	4	9.1	27	9.3
	Total	**44**		**291**	**100.0**
10Out	Annelida	37	63.8	256	62.3
	Mollusca	4	6.9	10	2.4
	Arthropoda	11	19.0	35	8.5
	Echinodermata	2	3.4	3	0.7
	Other Taxa	4	6.9	107	26.0
	Total	**58**		**411**	**100.0**
11Out	Annelida	17	70.8	50	43.9
	Mollusca	2	8.3	2	1.8
	Arthropoda	4	16.7	5	4.4
	Echinodermata	0	0.0	0	0.0
	Other Taxa	1	4.2	57	50.0
	Total	**24**		**114**	**100.0**
12Out	Annelida	14	53.8	74	51.4
	Mollusca	4	15.4	13	9.0
	Arthropoda	5	19.2	52	36.1
	Echinodermata	1	3.8	1	0.7
	Other Taxa	2	7.7	4	2.8
	Total	**26**		**144**	**100.0**
2In	Annelida	22	61.1	181	77.4
	Mollusca	4	11.1	20	8.5
	Arthropoda	6	16.7	27	11.5
	Echinodermata	0	0.0	0	0.0
	Other Taxa	4	11.1	6	2.6
	Total	**36**		**234**	**100.0**
3In	Annelida	17	53.1	87	62.6
	Mollusca	3	9.4	13	9.4
	Arthropoda	7	21.9	12	8.6
	Echinodermata	0	0.0	0	0.0
	Other Taxa	5	15.6	27	19.4
	Total	**32**		**139**	**100.0**
4In	Annelida	6	27.3	18	26.1
	Mollusca	4	18.2	9	13.0
	Arthropoda	10	45.5	39	56.5
	Echinodermata	1	4.5	1	1.4
	Other Taxa	1	4.5	2	2.9
	Total	**22**		**69**	**100.0**
5In	Annelida	8	38.1	13	27.7
	Mollusca	2	9.5	3	6.4
	Arthropoda	10	47.6	30	63.8
	Echinodermata	0	0.0	0	0.0
	Other Taxa	1	4.8	1	2.1
	Total	**21**		**47**	**100.0**
8In	Annelida	22	44.9	130	55.6
	Mollusca	7	14.3	30	12.8
	Arthropoda	14	28.6	60	25.6
	Echinodermata	0	0.0	0	0.0
	Other Taxa	6	12.2	14	6.0
	Total	**49**		**234**	**100.0**
9In	Annelida	22	44.9	79	48.8
	Mollusca	11	22.4	27	16.7
	Arthropoda	12	24.5	46	28.4
	Echinodermata	1	2.0	3	1.9
	Other Taxa	3	6.1	7	4.3
	Total	**49**		**162**	**100.0**

Table 4. Wet-weight biomass of major benthic macroinfaunal taxonomic groups by station for the Savannah Harbor, Georgia ODMDS, May 2006.

1Out	Biomass (g)
Annelida	0.6639
Mollusca	0.4429
Arthropoda	0.4743
Echinodermata	0.4716
Other Taxa	0.4358
Total	2.4885

2In	Biomass (g)
Annelida	0.6626
Mollusca	0.5676
Arthropoda	0.4432
Echinodermata	0.0000
Other Taxa	0.4388
Total	2.1122

6Out	Biomass (g)
Annelida	0.4850
Mollusca	0.4351
Arthropoda	1.0590
Echinodermata	0.4312
Other Taxa	1.2329
Total	3.6432

3In	Biomass (g)
Annelida	0.5251
Mollusca	0.4483
Arthropoda	0.4330
Echinodermata	0.0000
Other Taxa	0.4596
Total	1.8660

7Out	Biomass (g)
Annelida	1.1525
Mollusca	0.4766
Arthropoda	0.4970
Echinodermata	27.1612
Other Taxa	0.5362
Total	29.8235

4In	Biomass (g)
Annelida	0.4482
Mollusca	0.4324
Arthropoda	0.4525
Echinodermata	0.4291
Other Taxa	0.4293
Total	2.1915

10Out	Biomass (g)
Annelida	1.0942
Mollusca	0.4329
Arthropoda	0.4461
Echinodermata	0.4394
Other Taxa	4.7878
Total	7.2004

5In	Biomass (g)
Annelida	0.4648
Mollusca	0.4642
Arthropoda	0.4447
Echinodermata	0.0000
Other Taxa	0.4312
Total	1.8049

11Out	Biomass (g)
Annelida	0.5362
Mollusca	0.0000
Arthropoda	0.4296
Echinodermata	0.0000
Other Taxa	1.2023
Total	2.1681

8In	Biomass (g)
Annelida	0.5443
Mollusca	0.5964
Arthropoda	0.4574
Echinodermata	1.6926
Other Taxa	0.5056
Total	3.7963

12Out	Biomass (g)
Annelida	0.4607
Mollusca	0.4377
Arthropoda	0.4386
Echinodermata	0.4304
Other Taxa	0.4434
Total	2.2108

9In	Biomass (g)
Annelida	0.4558
Mollusca	0.9101
Arthropoda	0.4473
Echinodermata	0.4316
Other Taxa	0.4644
Total	2.7092

Table 5. Distribution and abundance of benthic macroinfaunal taxa for stations outside the Savannah Harbor, Georgia ODMDS, May 2006.

Taxa	Phylum	Class	No. of Individuals	% Total	Cumulative %	Station Occurrence	% Station Occurrence
Spiophanes bombyx	Ann	Poly	234	9.80	9.80	6	100
Branchiostoma (LPIL)	Cho	Lept	205	8.58	18.38	3	50
Crassinella lunulata	Mol	Biva	131	5.49	23.87	3	50
Polycirrus eximius	Ann	Poly	108	4.52	28.39	1	17
Scoletepis texana	Ann	Poly	108	4.52	32.91	1	17
Ampeliscidae (LPIL)	Ann	Poly	102	4.27	37.19	4	67
Travisia hobsonae	Ann	Poly	95	3.98	41.16	3	50
Ophiuroidea (LPIL)	Ech	Ophi	80	3.35	44.51	5	83
Prionospio cristata	Ann	Poly	80	3.35	47.86	5	83
Owenia fusiformis	Ann	Poly	69	2.89	50.75	5	83
Mediomastus (LPIL)	Ann	Poly	55	2.30	53.06	3	50
Rhynchocoela (LPIL)	Rhy	-	51	2.14	55.19	5	83
Tubificidae (LPIL)	Ann	Olig	51	2.14	57.33	3	50
Spio pettiboneae	Ann	Poly	46	1.93	59.25	5	83
Diopatra cuprea	Ann	Poly	44	1.84	61.10	2	33
Oxyurostylis smithi	Art	Mala	43	1.80	62.90	4	67
Mediomastus californiensis	Ann	Poly	36	1.51	64.41	1	17
Spiophanes missionensis	Ann	Poly	36	1.51	65.91	1	17
Tubulanus (LPIL)	Rhy	Anop	32	1.34	67.25	2	33
Rhepoxynius hudsoni	Art	Mala	30	1.26	68.51	4	67
Goniadides carolinae	Ann	Poly	27	1.13	69.64	3	50
Nephtys picta	Ann	Poly	25	1.05	70.69	2	33
Polygordius (LPIL)	Ann	Poly	23	0.96	71.65	3	50
Unciola irrorata	Art	Mala	23	0.96	72.61	3	50
Rhawania heteroseta	Ann	Poly	22	0.92	73.53	2	33
Ekmanyon levis	Art	Mala	22	0.92	74.46	2	33
Schistomeringos pectinata	Ann	Poly	17	0.71	75.17	2	33
Gastropoda (LPIL)	Mol	Gast	16	0.67	75.84	1	17
Phyllodocidae (LPIL)	Ann	Poly	16	0.67	76.51	1	17
Ranilerma mollinum	Art	Cirr	16	0.67	77.18	1	17
Phoronis (LPIL)	Pho	-	15	0.63	77.81	1	17
Phyllodoce (LPIL)	Ann	Poly	15	0.63	78.43	3	50
Tellina (LPIL)	Mol	Biva	15	0.63	79.06	3	50
Magelona sp. H	Ann	Poly	14	0.59	79.65	1	17
Mediomastus ambiseta	Ann	Poly	12	0.50	80.15	1	17
Batea catharinensis	Art	Mala	11	0.46	80.61	3	50
Enchytraeidae (LPIL)	Ann	Olig	11	0.46	81.07	4	67
Axiothella oculata	Ann	Poly	10	0.42	81.49	2	33
Cirratulidae (LPIL)	Ann	Poly	10	0.42	81.91	2	33
Edotia triloba	Art	Mala	10	0.42	82.33	1	17
Bivalvia (LPIL)	Mol	Biva	9	0.38	82.71	2	33
Eumida sanguinea	Ann	Poly	9	0.38	83.08	2	33
Exogone (LPIL)	Ann	Poly	9	0.38	83.46	2	33
Hemipodus roseus	Ann	Poly	9	0.38	83.84	2	33
Prionospio (LPIL)	Ann	Poly	9	0.38	84.21	4	67
Sipuncula (LPIL)	Sip	-	9	0.38	84.59	1	17
Tharyx acutus	Ann	Poly	9	0.38	84.97	1	17
Actiniaria (LPIL)	Cni	Anth	8	0.34	85.30	3	50
Ampelisca abdita	Art	Mala	8	0.34	85.64	1	17
Cyathura (LPIL)	Art	Mala	8	0.34	85.97	1	17
Exogone dispar	Ann	Poly	8	0.34	86.31	1	17
Goniada littorea	Ann	Poly	8	0.34	86.64	2	33

Table 5 continued:

Taxa	Phylum	Class	No. of Individuals	% Total	Cumulative %	Station Occurrence	% Station Occurrence
Hesionidae (LPIL)	Ann	Poly	8	0.34	86.98	3	50
Holothuroidea (LPIL)	Ech	Holo	8	0.34	87.31	1	17
Pectinaria gouldii	Ann	Poly	8	0.34	87.65	1	17
Pinnixa (LPIL)	Art	Mala	8	0.34	87.98	2	33
Acridae (LPIL)	Art	Mala	7	0.29	88.27	3	50
Caecum johnsoni	Mol	Gast	7	0.29	88.57	1	17
Metaitron tricellatus	Art	Mala	7	0.29	88.86	2	33
Paramphinome sp. B	Ann	Poly	7	0.29	89.15	2	33
Parapionosyllis webelacheae	Ann	Poly	7	0.29	89.45	1	17
Tanaissus psammophilus	Art	Mala	7	0.29	89.74	2	33
Ampharetidae (LPIL)	Ann	Poly	6	0.25	89.99	1	17
Ancistrosyllis hartmanae	Ann	Poly	6	0.25	90.24	3	50
Aricidea wassi	Ann	Poly	6	0.25	90.49	1	17
Exogone lourei	Ann	Poly	6	0.25	90.75	1	17
Glyceridae (LPIL)	Ann	Poly	6	0.25	91.00	2	33
Lepidonotus sp. A	Ann	Poly	6	0.25	91.25	2	33
Moira atropos	Ech	Echi	6	0.25	91.50	1	17
Litocorsa antennata	Ann	Poly	5	0.21	91.71	2	33
Monticellina dorsobranchialis	Ann	Poly	5	0.21	91.92	2	33
Nereididae (LPIL)	Ann	Poly	5	0.21	92.13	2	33
Polycirrus plumosus	Ann	Poly	5	0.21	92.34	2	33
Ricinula punctostriatus	Mol	Gast	5	0.21	92.55	2	33
Sphaerosyllis piriferopsis	Ann	Poly	5	0.21	92.76	1	17
Americhelidium americanum	Art	Mala	4	0.17	92.92	3	50
Amphiuridae (LPIL)	Ech	Ophi	4	0.17	93.09	1	17
Anadara transversa	Mol	Biva	4	0.17	93.26	1	17
Aricidea taylori	Ann	Poly	4	0.17	93.43	1	17
Armandia maculata	Ann	Poly	4	0.17	93.59	1	17
Brania wellfleetensis	Ann	Poly	4	0.17	93.76	1	17
Calyptraeidae (LPIL)	Mol	Gast	4	0.17	93.93	1	17
Cyathura burbancki	Art	Mala	4	0.17	94.10	1	17
Erichthonius brasiliensis	Art	Mala	4	0.17	94.26	1	17
Gastrochaena hians	Mol	Biva	4	0.17	94.43	1	17
Listriella barnardi	Art	Mala	4	0.17	94.60	1	17
Lumbrineris latreilli	Ann	Poly	4	0.17	94.77	1	17
Lyonsia hyalina	Mol	Biva	4	0.17	94.93	1	17
Microphthalmus (LPIL)	Ann	Poly	4	0.17	95.10	1	17
Mytilidae (LPIL)	Mol	Biva	4	0.17	95.27	1	17
Nereis falax	Ann	Poly	4	0.17	95.44	1	17
Nucula (LPIL)	Mol	Biva	4	0.17	95.60	1	17
Oweniidae (LPIL)	Ann	Poly	4	0.17	95.77	2	33
Sigambra tentaculata	Ann	Poly	4	0.17	95.94	1	17
Spiochaetopterus oculatus	Ann	Poly	4	0.17	96.11	1	17
Turbellaria (LPIL)	Pla	Turb	4	0.17	96.27	1	17
Veneridae (LPIL)	Mol	Biva	4	0.17	96.44	1	17
Ervilia concentrica	Mol	Biva	3	0.13	96.57	2	33
Nephtys (LPIL)	Ann	Poly	3	0.13	96.69	2	33
Nereis micromma	Ann	Poly	3	0.13	96.82	2	33
Pisione remota	Ann	Poly	3	0.13	96.94	1	17
Ratiderma darbyi	Art	Ostr	3	0.13	97.07	1	17
Sphaerosyllis taylori	Ann	Poly	3	0.13	97.19	1	17
Synelmis ewingi	Ann	Poly	3	0.13	97.32	2	33
Abra aequalis	Mol	Biva	2	0.08	97.40	1	17
Aglaophamus verrilli	Ann	Poly	2	0.08	97.49	1	17

Table 5 continued:

Taxa	Phylum	Class	No. of Individuals	% Total	Cumulative %	Station Occurrence	% Station Occurrence
Amphilochidae (LPIL)	Art	Mala	2	0.08	97.57	2	33
Apoprionospio (LPIL)	Ann	Poly	2	0.08	97.65	1	17
Cerophiidae (LPIL)	Art	Mala	2	0.08	97.74	1	17
Dentatisyllis carolinae	Ann	Poly	2	0.08	97.82	1	17
Hemipholis elongata	Ech	Ophi	2	0.08	97.91	1	17
Leptocheirus (LPIL)	Art	Mala	2	0.08	97.99	1	17
Phyllodoce mucosa	Ann	Poly	2	0.08	98.07	1	17
Prionospio perkisi	Ann	Poly	2	0.08	98.16	1	17
Processa (LPIL)	Art	Mala	2	0.08	98.24	1	17
Protodorvillea kefersteini	Ann	Poly	2	0.08	98.32	2	33
Pseudopolunedes ambon	Art	Ostr	2	0.08	98.41	1	17
Pteromeris perplana	Mol	Biva	2	0.08	98.49	2	33
Sigalion sp. A	Ann	Poly	2	0.08	98.58	2	33
Spiophanes (LPIL)	Ann	Poly	2	0.08	98.66	1	17
Syllidae (LPIL)	Ann	Poly	2	0.08	98.74	1	17
Tellina iris	Mol	Biva	2	0.08	98.83	1	17
Ampelisca (LPIL)	Art	Mala	1	0.04	98.87	1	17
Aonides (LPIL)	Ann	Poly	1	0.04	98.91	1	17
Articulata cernati	Ann	Poly	1	0.04	98.95	1	17
Bathyporeia parkeri	Art	Mala	1	0.04	98.99	1	17
Cardiidae (LPIL)	Mol	Biva	1	0.04	99.04	1	17
Cyclaspis varians	Art	Mala	1	0.04	99.08	1	17
Echinoidea (LPIL)	Ech	Echi	1	0.04	99.12	1	17
Galathowenia oculata	Ann	Poly	1	0.04	99.16	1	17
Glycera (LPIL)	Ann	Poly	1	0.04	99.20	1	17
Grubeosyllis clavata	Ann	Poly	1	0.04	99.25	1	17
Hydrozoa (LPIL)	Cni	Hydr	1	0.04	99.29	1	17
Isaeidae (LPIL)	Art	Mala	1	0.04	99.33	1	17
Leucon americanus	Art	Mala	1	0.04	99.37	1	17
Magelona papillicornis	Ann	Poly	1	0.04	99.41	1	17
Monoculhura sp. C	Art	Mala	1	0.04	99.46	1	17
Micropodopus raneyi	Art	Mala	1	0.04	99.50	1	17
Pionosyllis quadrioculata	Ann	Poly	1	0.04	99.54	1	17
Politolana polita	Art	Mala	1	0.04	99.58	1	17
Polydora cornuta	Ann	Poly	1	0.04	99.62	1	17
Scoloplos rubra	Ann	Poly	1	0.04	99.66	1	17
Semele maculoides	Mol	Biva	1	0.04	99.71	1	17
Sigalionidae (LPIL)	Ann	Poly	1	0.04	99.75	1	17
Spionidae (LPIL)	Ann	Poly	1	0.04	99.79	1	17
Taylorpholoe hirsuta	Ann	Poly	1	0.04	99.83	1	17
Terebellidae (LPIL)	Ann	Poly	1	0.04	99.87	1	17
Trypanosyllis coeliaca	Ann	Poly	1	0.04	99.92	1	17
Turbinidae (LPIL)	Mol	Gast	1	0.04	99.96	1	17
Unciola (LPIL)	Art	Mala	1	0.04	100.00	1	17

Taxa Key

Ann=Annelida
- Olig=Oligochaeta
- Poly=Polychaeta

Art=Arthropoda
- Mala=Malacostraca
- Ostr=Ostracoda

Cho=Chordata
- Lept=Leptocardia

Cni=Cnidaria
- Anth=Anthozoa
- Hydr=Hydrozoa

Ech=Echinodermata
- Echi=Echinoidea
- Holo=Holothuroidea
- Ophi=Ophiuroidea

Mol=Mollusca
- Biva=Bivalvia
- Gast=Gastropoda

Pho=Phoronida

Pla=Platyhelminthes
- Turb=Turbellaria

Rhy=Rhynchocoela
- Anop=Anopla

Sip=Sipuncula

Table 6. Distribution and abundance of benthic macroinfaunal taxa for stations inside the Savannah Harbor, Georgia ODMDS, May 2006.

Taxa	Phylum	Class	No. of Individuals	% Total	Cumulative %	Station Occurrence	% Station Occurrence
Spiophanes bombyx	Ann	Poly	179	20.23	20.23	6	100
Spio pettiboneae	Ann	Poly	61	6.89	27.12	6	100
Rhepoxynius hudsoni	Art	Mala	59	6.67	33.79	6	100
Tellina (LPIL)	Mol	Biva	50	5.65	39.44	5	83
Oxyurostylis smithi	Art	Mala	46	5.20	44.63	6	100
Mediomastus californiensis	Ann	Poly	45	5.08	49.72	3	50
Mediomastus (LPIL)	Ann	Poly	28	3.16	52.88	5	83
Eudevenopus honduranus	Art	Mala	20	2.26	55.14	6	100
Magelona papillicornis	Ann	Poly	18	2.03	57.18	4	67
Owenia fusiformis	Ann	Poly	17	1.92	59.10	4	67
Rhynchocoela (LPIL)	Rhy	-	16	1.81	60.90	5	83
Apoprionospio dayi	Ann	Poly	15	1.69	62.60	1	17
Protohaustorius sp. B	Art	Mala	15	1.69	64.29	5	83
Tubulanus (LPIL)	Rhy	Anop	15	1.69	65.99	3	50
Onuphidae (LPIL)	Ann	Poly	14	1.58	67.57	4	67
Crassinella duplinana	Mol	Biva	12	1.36	68.93	3	50
Metatiron tropakis	Art	Mala	12	1.36	70.28	4	67
Magelona sp. H	Ann	Poly	11	1.24	71.53	3	50
Polycirrus eximius	Ann	Poly	11	1.24	72.77	1	17
Americheliidum americanum	Art	Mala	10	1.13	73.90	3	50
Nephtys picta	Ann	Poly	10	1.13	75.03	4	67
Actiniaria (LPIL)	Cni	Anth	9	1.02	76.05	3	50
Batea catharinensis	Art	Mala	9	1.02	77.06	2	33
Polygordius (LPIL)	Ann	Poly	9	1.02	78.08	3	50
Prionospio cristata	Ann	Poly	8	0.90	78.98	3	50
Tellina iris	Mol	Biva	8	0.90	79.89	2	33
Tharyx acutus	Ann	Poly	8	0.90	80.79	1	17
Crassinella lunulata	Mol	Biva	7	0.79	81.58	4	67
Metatiron triocellatus	Art	Mala	7	0.79	82.37	2	33
Phoronis (LPIL)	Pho	-	7	0.79	83.16	1	17
Acanthohaustorius intermedius	Art	Mala	6	0.68	83.84	2	33
Onuphis eremita oculata	Ann	Poly	6	0.68	84.52	2	33
Scoletepis texana	Ann	Poly	6	0.68	85.20	2	33
Tubificidae (LPIL)	Ann	Olig	6	0.68	85.88	3	50
Cyclaspis varians	Art	Mala	5	0.56	86.44	3	50
Phyllodoce (LPIL)	Ann	Poly	5	0.56	87.01	4	67
Branchiostoma (LPIL)	Cho	Lept	4	0.45	87.46	2	33
Eumida sanguinea	Ann	Poly	4	0.45	87.91	1	17
Ophiuroidea (LPIL)	Ech	Ophi	4	0.45	88.36	2	33
Prionospio (LPIL)	Ann	Poly	4	0.45	88.81	3	50
Rictaxis punctostriatus	Mol	Gast	4	0.45	89.27	2	33
Cirratulidae (LPIL)	Ann	Poly	3	0.34	89.60	1	17
Dentatisyllis carolinae	Ann	Poly	3	0.34	89.94	1	17
Edotia triloba	Art	Mala	3	0.34	90.28	2	33
Goniada littorea	Ann	Poly	3	0.34	90.62	2	33
Hydrozoa (LPIL)	Cni	Hydr	3	0.34	90.96	3	50
Kalliapseudes (LPIL)	Art	Mala	3	0.34	91.30	1	17
Leitoscoloplos (LPIL)	Ann	Poly	3	0.34	91.64	3	50
Metatiron (LPIL)	Art	Mala	3	0.34	91.98	3	50
Nephtys (LPIL)	Ann	Poly	3	0.34	92.32	2	33
Spionidae (LPIL)	Ann	Poly	3	0.34	92.66	2	33
Spisula solidissima	Mol	Biva	3	0.34	92.99	2	33
Acteocina bidentata	Mol	Gast	2	0.23	93.22	1	17

Table 6 continued:

Taxa	Phylum	Class	No. of Individuals	% Total	Cumulative %	Station Occurrence	% Station Occurrence
Apoprionospio (LPIL)	Ann	Poly	2	0.23	93.45	2	33
Bathyporeia parkeri	Art	Mala	2	0.23	93.67	1	17
Cardiidae (LPIL)	Mol	Biva	2	0.23	93.90	1	17
Lyonsia hyalina	Mol	Biva	2	0.23	94.12	1	17
Pandora (LPIL)	Mol	Biva	2	0.23	94.35	2	33
Phyllodoce arenae	Ann	Poly	2	0.23	94.58	1	17
Semele (LPIL)	Mol	Biva	2	0.23	94.80	1	17
Semele nuculoides	Mol	Biva	2	0.23	95.03	1	17
Spiochaetopterus oculatus	Ann	Poly	2	0.23	95.25	2	33
Spiophanes missionensis	Ann	Poly	2	0.23	95.48	1	17
Synelmis ewingi	Ann	Poly	2	0.23	95.71	2	33
Tanaissus psammophilus	Art	Mala	2	0.23	95.93	1	17
Ampelisca (LPIL)	Art	Mala	1	0.11	96.05	1	17
Ampelisca bicarinata	Art	Mala	1	0.11	96.16	1	17
Ancistrosyllis hartmanae	Ann	Poly	1	0.11	96.27	1	17
Aonides paucibranchiata	Ann	Poly	1	0.11	96.38	1	17
Armandia agilis	Ann	Poly	1	0.11	96.50	1	17
Ascidiacea (LPIL)	Cho	Asci	1	0.11	96.61	1	17
Bathyporeia (LPIL)	Art	Mala	1	0.11	96.72	1	17
Bemlos (LPIL)	Art	Mala	1	0.11	96.84	1	17
Bhawania heteroseta	Ann	Poly	1	0.11	96.95	1	17
Caecum johnsoni	Mol	Gast	1	0.11	97.06	1	17
Calyptraeidae (LPIL)	Mol	Gast	1	0.11	97.18	1	17
Corbula (LPIL)	Mol	Biva	1	0.11	97.29	1	17
Cyclaspis pustulata	Art	Mala	1	0.11	97.40	1	17
Diplodonta (LPIL)	Mol	Biva	1	0.11	97.51	1	17
Erichthonius brasiliensis	Art	Mala	1	0.11	97.63	1	17
Glycera dibranchiata	Ann	Poly	1	0.11	97.74	1	17
Glycera sp. E	Ann	Poly	1	0.11	97.85	1	17
Grandidierella bonnieroides	Art	Mala	1	0.11	97.97	1	17
Haustoriidae (LPIL)	Art	Mala	1	0.11	98.08	1	17
Hypereteone (LPIL)	Ann	Poly	1	0.11	98.19	1	17
Magelona (LPIL)	Ann	Poly	1	0.11	98.31	1	17
Nephtyidae (LPIL)	Ann	Poly	1	0.11	98.42	1	17
Olivella sayana	Mol	Gast	1	0.11	98.53	1	17
Oweniidae (LPIL)	Ann	Poly	1	0.11	98.64	1	17
Parapionosyllis uebelackerae	Ann	Poly	1	0.11	98.76	1	17
Phascolion strombi	Sip	-	1	0.11	98.87	1	17
Phoxocephalidae (LPIL)	Art	Mala	1	0.11	98.98	1	17
Phyllodoce mucosa	Ann	Poly	1	0.11	99.10	1	17
Pinnixa (LPIL)	Art	Mala	1	0.11	99.21	1	17
Polydora cornuta	Ann	Poly	1	0.11	99.32	1	17
Protodorvillea kefersteini	Ann	Poly	1	0.11	99.44	1	17
Pseudophilomedes ambon	Art	Ostr	1	0.11	99.55	1	17
Pteromeris perplana	Mol	Biva	1	0.11	99.66	1	17
Sigalionidae (LPIL)	Ann	Poly	1	0.11	99.77	1	17
Sipuncula (LPIL)	Sip	-	1	0.11	99.89	1	17
Unciola (LPIL)	Art	Mala	1	0.11	100.00	1	17

Taxa Key

Ann=Annelida
- Olig=Oligochaeta
- Poly=Polychaeta

Art=Arthropoda
- Mala=Malacostraca
- Ostr=Ostracoda

Cho=Chordata
- Asci=Ascidiacea
- Lept=Leptocardia

Cni=Cnidaria
- Anth=Anthozoa
- Hydr=Hydrozoa

Ech=Echinodermata
- Ophi=Ophiuroidea

Mol=Mollusca
- Biva=Bivalvia
- Gast=Gastropoda

Pho=Phoronida

Rhy=Rhynchocoela
- Anop=Anopla

Sip=Sipuncula

Table 8. Summary of assemblage parameters for the Savannah Harbor, Georgia ODMDS stations, May 1992 and 2006.

2006 Station	Date (m/d/y)	Total No. Taxa	Total No. Individuals	Density (nos/m²)	H' Shannon (log e)	J' Pielou Evenness	D Margalef Richness
1Out	5/1/06	61	1240	31000.0	3.34	0.81	8.42
6Out	5/1/06	42	188	4700.0	2.83	0.76	7.83
7Out	5/1/06	44	291	7275.0	3.25	0.86	7.58
10Out	5/1/06	58	411	10275.0	3.02	0.74	9.47
11Out	5/1/06	24	114	2850.0	2.05	0.65	4.86
12Out	5/1/06	26	144	3600.0	2.60	0.80	5.03
	Mean	42.5		9950.0	2.85	0.77	7.20
	SD	15.5		10664.5			
2In	5/1/06	36	234	5850.0	2.75	0.77	6.42
3In	5/1/06	32	139	3475.0	2.77	0.80	6.28
4In	5/1/06	22	69	1725.0	2.51	0.81	4.96
5In	5/1/06	21	47	1175.0	2.37	0.78	5.19
8In	5/1/06	49	234	5850.0	3.14	0.81	8.80
9In	5/1/06	49	162	4050.0	3.41	0.88	9.43
	Mean	34.8		3687.5	2.82	0.81	6.85
	SD	12.4		1984.6			

1992 Station	Date	Mean No. Taxa	Total No. Individuals	Mean Density (nos/m²)	H' Shannon (log e)	J' Pielou Evenness	D Margalef Richness
Outside							
1	May-92	8.8	248	2093	2.92	0.76	8.16
2	May-92	24.9	970	8186	3.38	0.75	13.09
3	May-92	21.1	1092	9215	2.85	0.64	12.44
7	May-92	18.5	438	3696	3.87	0.84	16.44
11	May-92	28.3	5152	43477	1.74	0.36	13.81
12	May-92	24.8	935	7890	3.67	0.75	19.00
	Mean	21.1		12426.2	3.07	0.68	13.82
Inside							
4	May-92	21.5	992	83.71	3.03	0.60	111.74
5	May-92	22.7	862	7274	3.40	0.74	14.05
6	May-92	19.3	956	8068	2.79	0.66	9.91
8	May-92	17.7	687	5797	3.18	0.74	11.33
9	May-92	20.3	778	6565	3.10	0.68	14.57
10	May-92	27.1	782	6599	3.96	0.81	19.81
	Mean	21.4		5731.1	3.24	0.71	30.24

Figure 3. Summary of overall abundance of major benthic macroinfaunal taxonomic groups for the Savannah Harbor, Georgia ODMDS stations, 2006.

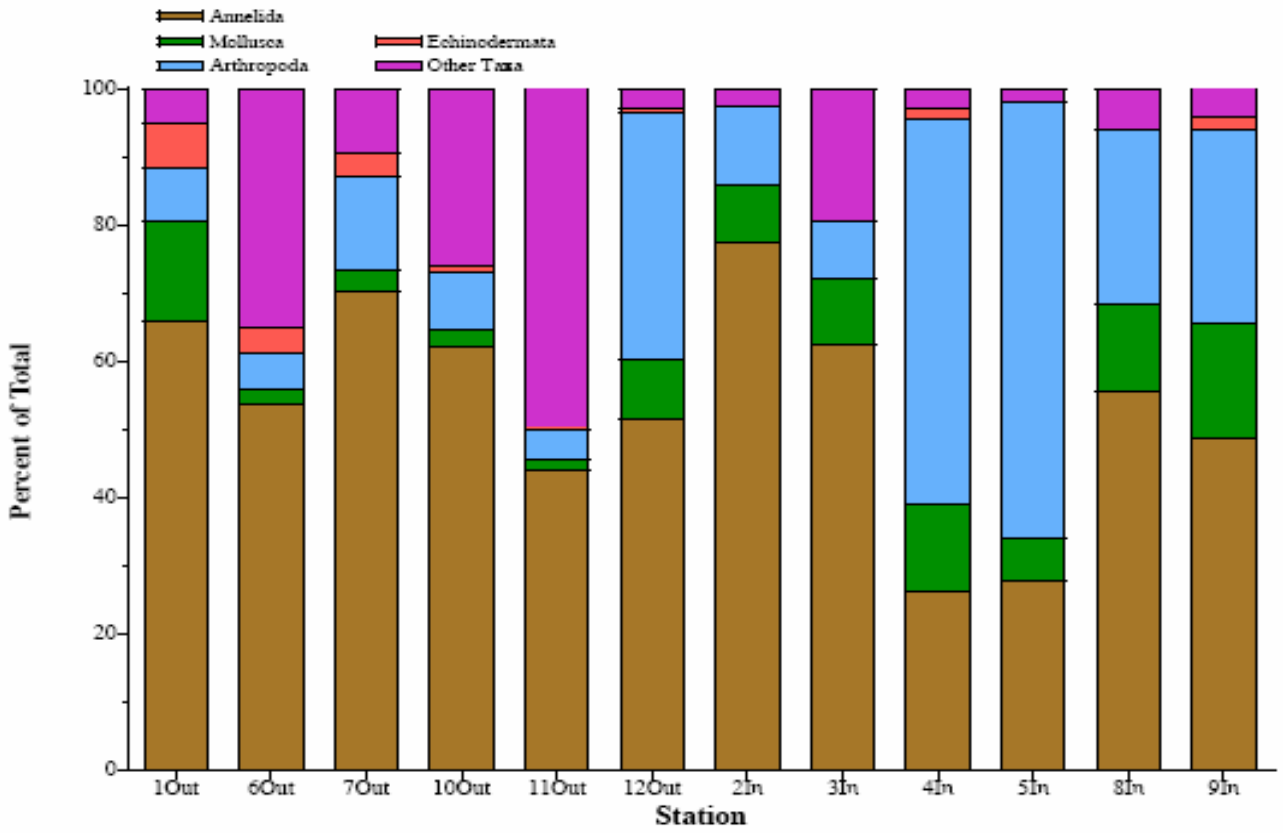
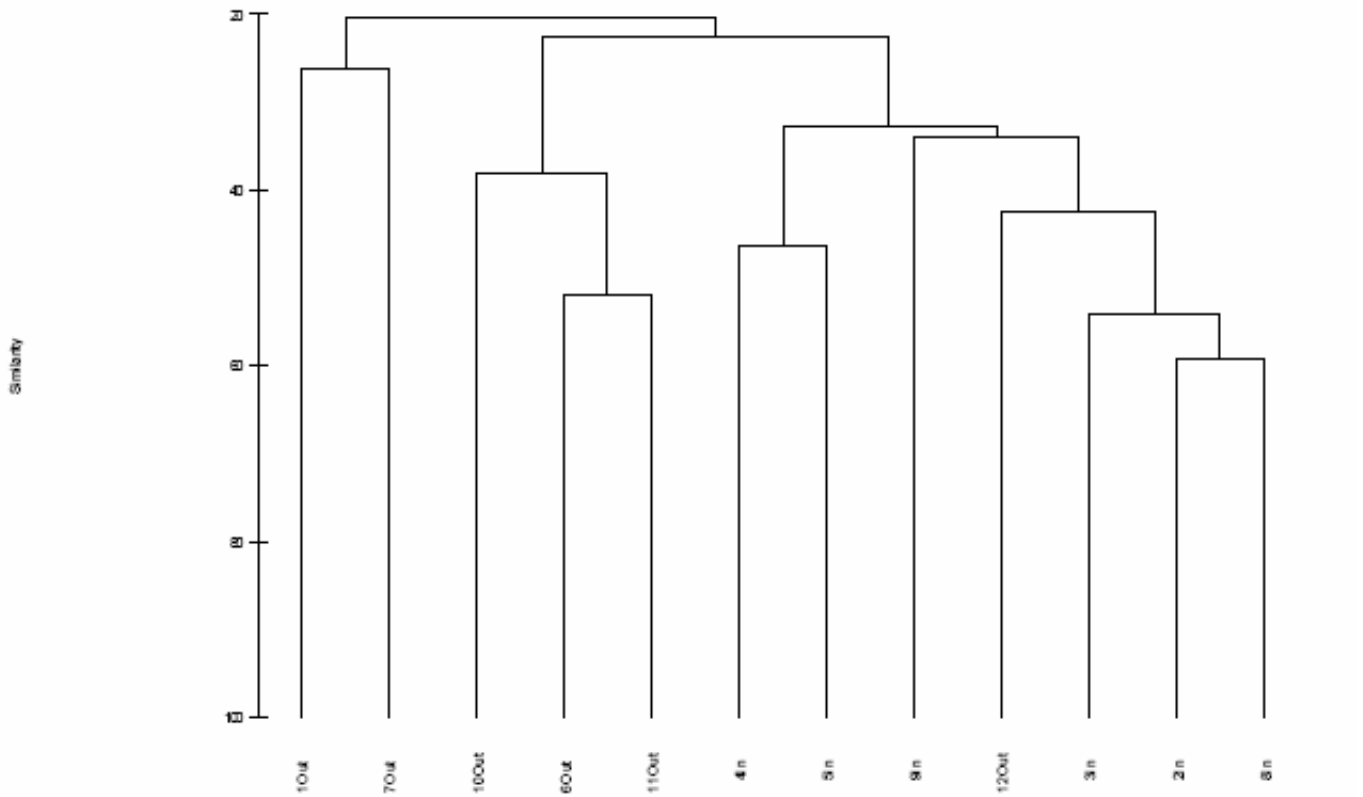


Figure 9. Cluster analysis of the Savannah Harbor ODMDS stations, May 2006.



APPENDIX F

Target Detection Limits

ANALYTE	Water ug/L (ppb)	Sediment mg/kg (ppm)
Antimony	2.5	2
Arsenic	5	1
Aluminum	500	50
Beryllium	30	0.5
Cadmium	2.5	0.5
Chromium	50	1
Copper*	4.8	1
Iron	500	25
Lead	5	0.5
Manganese	100	1
Mercury	0.2	0.05
Nickel*	74	2
Selenium	10	4
Silver*	1.9	1
Thallium	5	0.5
Zinc*	50	1
Ammonia	0.05	2.5
Nitrate+Nitrite	0.05	12.5
Phosphorus, Total	0.01	25
Phosphorus, Ortho	0.01	25
Sulfate	0.1	1
Sulfide	0.04	0.4
Kjeldahl Nitrogen	0.05	12.5
Total Solids/dry weight		0.01
Total Org. Carbon	5 (0.0005%)	0.001

ANALYTE	Water ug/L(ppb)	Soil/Sed* ug/kg(ppb)
2-Methylnaphthalene	10	20
Acenaphthene	10	10
Acenaphthylene	10	20
Anthracene	10	20
Benzo(a)anthracene	10	20
Benzo(a)pyrene	10	20
Benzo(b/k)fluoranthene	10	20
Benzo(g,h,i)perylene	10	20
Chrysene	10	20
Dibenz(a,h)anthracene	10	20
Fluoranthene	10	20
Fluorene	10	10
Indeno(1,2,3,c,d)pyrene	10	20
Naphthalene	10	20
Phenanthrene	10	20
Pyrene	10	20

ANALYTE	Water ug/L(ppb)	Soil/Sed* ug/kg(ppb)
(3- and/or 4-)Methylphenol	10	100
1,2,4-Trichlorobenzene	10	200
2,4-Dimethylphenol	10	20
2-Methylphenol	10	50
Benzyl Butyl Phthalate	10	200
Bis(2-ethylhexyl)phthalate	10	200
Di-n-butylpthalate	10	200
Di-n-octylphthalate	10	200
Dibenzofuran	10	200
Diethyl phthalate	10	200
Dimethyl Phthalate	10	200
Hexachlorobenzene	10	200
Hexachlorobutadiene	10	200
Hexachlorocyclopentadiene	10	200
Hexachloroethane	10	200
N-Nitrosodiphenylamine	10	200
Pentachlorophenol	20	100
Phenol	10	100

ANALYTE	Water ug/L (ppb)	Sediment ug/kg (ppb)
Aldrin	0.5	20
Heptachlor*	0.05	20
Hept. Epoxide*	0.05	20
alpha-BHC	0.5	20
Beta-BHC	0.5	20
gamma-BHC*	0.1	20
Delta-BHC	0.5	20
Endosulfan- I*	0.05	20
Dieldrin*	0.5	1
p,p'-DDT*	0.1	2
p,p'-DDD*	0.1	2
p,p'-DDE*	0.1	2
Endrin*	0.05	20
Endosulfan -II*	0.05	20
Endosulfan- SO4*	0.5	20
Endrin Ketone	0.5	20
Methoxychlor	1	50
g-chlordane*	0.1	5
a-chlordane*	0.1	5
Trans-nonachlor*	0.1	20
cis-nonachlor	0.5	20
Toxaphene*	2	50
PCB (as Congeners - see list)	0.02	1

PCB Congenger	Water ug/L (ppb)	Sediment ug/kg (ppb)
8	0.02	1
18	0.02	1
28	0.02	1
44	0.02	1
49	0.02	1
52	0.02	1
66	0.02	1
77	0.02	1
87	0.02	1
101	0.02	1
105	0.02	1
118	0.02	1
126	0.02	1
128	0.02	1
138	0.02	1
153	0.02	1
156	0.02	1
169	0.02	1
170	0.02	1
180	0.02	1
183	0.02	1
184	0.02	1
187	0.02	1
195	0.02	1
206	0.02	1
209	0.02	1

Congener	Sediment Target RL (ng/Kg)	Water Target RL (pg/L)
2,3,7,8-TCDD	1	10
1,2,3,7,8-PentaCDD	2.5	50
1,2,3,4,7,8-HexaCDD	5	50
1,2,3,6,7,8-HexaCDD	5	50
1,2,3,7,8,9-HexaCDD	5	50
1,2,3,4,6,7,8-HeptaCDD	5	50
1,2,3,4,6,7,8,9-OCDD	10	100
2,3,7,8-TetraCDF	1	10
1,2,3,7,8-PentaCDF	2.5	50
2,3,4,7,8-PentaCDF	2.5	50
1,2,3,4,7,8-HexaCDF	5	50
1,2,3,6,7,8-HexaCDF	5	50
1,2,3,7,8,9-HexaCDF	5	50
2,3,4,6,7,8-HexaCDF	5	50
1,2,3,4,6,7,8-HeptaCDF	5	50
1,2,3,4,7,8,9-HeptaCDF	5	50
1,2,3,4,6,7,8,9-OCDF	10	100