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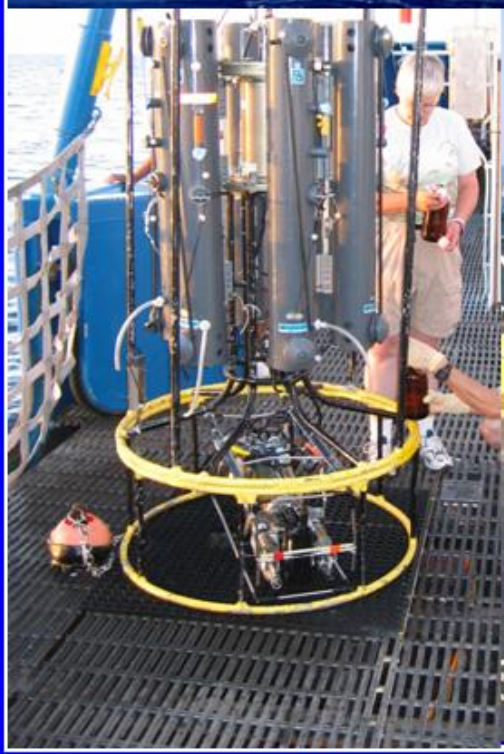
United States
Environmental Protection
Agency

Water Management Division
Wetlands, Coastal & Nonpoint Source Section
Atlanta, GA

December, 2007

Brunswick ODMDS Status and Trends
May 2006



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ACKNOWLEDGEMENTS

Samples were collected May 7-8, 2006 from the Brunswick 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.

Appropriate Citation:
U.S. EPA. 2007. **Brunswick ODMDS - Status and Trends, December 2007.** U.S. Environmental Protection Agency, Region 4, Water Management Division, Wetlands, Coastal & Nonpoint Source Branch, Coastal Section, SNAFC, 61 Forsyth St. SW, Atlanta, GA 30303.

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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, May 7-8, 2006.

BACKGROUND

The Brunswick ODMDS was designated by EPA in 1989. The ODMDS receives an average of over 900,000 cubic yards of dredged material annually from the Brunswick Harbor Navigation Project. Project sediments typically range from 2 to 72 percent fine-grained material.

A Site Management and Monitoring Plan was developed for the Brunswick ODMDS in 1999. Annual bathymetry surveys have been conducted at the site by the Corps of Engineers. The last status and trends survey conducted at this ODMDS was in July 1995.

Survey Area and Location

The study area is within and surrounding the Brunswick, GA ODMDS located offshore Jekyll Island. The survey area is approximately 2 square nautical miles (nmi). 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 received water quality sampling. Depths in this area average approximately 30 feet. The ODMDS boundary corner coordinates are:

31°02'35"N 81°17'40"W
31°02'35"N 81°16'30"W
31°00'30"N 81°16'30"W
31°00'30"N 81°17'42"W

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

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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 Brunswick ODMDS measure approximately 1 X 2 nmi. Twelve stations (see Table 1 and Figure 1) were established by selecting half within and half outside of the site. Station locations were selected in a stratified, random manner.

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 accomplished utilizing the OSV Bold's CTD. At the surface and bottom, Go Flow® bottles attached to the CTD/rosette frame were deployed to obtain grab 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 analysis of the water includes 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:

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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 at the Science and Ecosystem Support Division (SESD) laboratory by laser defraction (USEPA, 2001a). In addition, SESD provided data from all stations by wet sieving the fraction of the sample larger than 2 mm (USEPA, 2001b). The results of the laser analyses were converted from '% volume' to 'wet weight.'

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 B01, B04, B07 and B12, one additional container was filled from the sample and analyzed for dioxins. Due to tight budgetary constraints, only four discrete samples for dioxin analyses were allocated to this study.

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 profile are summarized in Table 2. The data showed the site's water column to be extremely well-mixed, evident by the narrow ranges seen within all the parameters measured.

Dissolved oxygen during the sample period exhibited a narrow range (6.14 – 6.28 mg/L; see Table 2 and Figure 2) while turbidity ranged from 1.51 to 2.85 NTUs (see Table 2 and Figure 2). Temperature and salinity (see Table 2 and Figure 3) profiles also showed that the waters sampled at the Brunswick ODMDS are well-mixed. Temperatures ranged from 22.30 to 22.91 ^{o}C; salinities ranged from 33.02 to 33.73 ppt.

Chemical analyses of the water samples collected as part of this study showed that, with the exception of three metals and several dioxin congeners, all analytes to be undetectable within the specified target reporting limits. The metals that were detected were aluminum (60 - 86 ug/L), arsenic (12 – 15 ug/L), and copper (8.4 ug/L).

Seafloor Sampling

Sediment Particle Size.

The results of the sediment particle size analyses are given in Table 3. Both zones sampled during this survey are dominated by sediments in the sand fraction with small percentages of both gravel and silt/clays (see Table 3 and Figure 4).

Sediment Chemistry.

As with water chemical analyses, only select dioxin congerers and nine metals were detected in sediments taken from the ODMDS and surrounding area. The metals data is summarized in Table 4. For all nine metals detected, the mean concentration of the sediments were consistently lower for stations within the ODMDS than those outside the site. With the exception of results for iron, variability was also much higher at stations surrounding the site than at stations within the site.

Benthic Macroinvertebrate Infauna.

The benthic infauna data is detailed and summarized in “Brunswick, Georgia ODMDS 2006 Benthic Community Assessment “(Vittor, 2007). Polychaetes dominated the total assemblage (59.5%), and also ranked first in number of taxa (48.3%) represented. In terms of abundance, the polychaetes were followed by malacostracans (29.8%), bivalves (2.5%) and ophiuroids (1.6%): by taxa, the polychaetes were followed by malacostracans (23.3%), bivalves (12.2%) and gastropods (5.8%). In general, the stations representing both inside the ODMDS and outside the ODMDS were dominated by a mixed assemblage of polychaetes and arthropods.

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The dominant taxa found inside the ODMDS were the polychaete *Spiophanes bombyx* (31.95 %), the amphipod *Oxyurostylis smithi* (11.6%) and the amphipod *Protohaustorius* sp. B (5.75%).

The dominant taxa found outside the ODMDS were the polychaete *Spiophanes bombyx* (19.81%), the polychaete *Mediomastus* [LPIL] (12.01%), the polychaete *Mediomastus ambiseta* (8.23%), the amphipod *Metatiron tropakis* (7.24%) and the amphipod *Oxyurostylis smithi* (7.04%).

Mean densities were 7937.8 organisms/m^2 within the ODMDS and 104475.0 organisms/m^2 outside the ODMDS. There was not a significant difference in density between stations inside vs. outside (Vittor, 2007).

The mean number of taxa was 42.3 taxa/station inside the ODMDS 46.5 taxa/station outside the ODMDS. Again, 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, no significant differences are found between the benthic infaunal communities of the Brunswick ODMDS and those of the surrounding area. Table 6 summarizes the main parameters of this study, demonstrating that no physical, chemical nor biological difference can be seen.

The mean grain size is nearly identical both within and outside the ODMDS. While both taxa richness and density of the infaunal communities show numerical higher means outside the site than within, there is no statistical difference between the two areas. Statistical analysis was not done to compare metals concentrations due to the fact that sediments within the site averaged lower than those outside the site. The main objective of Status and Trends studies is identifying 'signs/symptoms' of potential adverse impacts due to dumping of dredged materials within the ODMDS. The presence of significantly elevated contaminant levels within the site compared to outside would be such a 'sign/symptom.' In this case, the reverse was true.

In conclusion, the data collected in May 2006 shows that the benthic communities within the Brunswick ODMDS compare favorably with those adjacent to the dump site, and at the most basic levels of comparison, no long term adverse impact from dumping of dredged material has occurred.

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

2006 Station ID	(Degrees, minutes) Latitude(N)	Longitude(W)	Young Grabs(y/n)	CTD Casts(y/n)
BR01	31 02.47725 N	81 15.92801 W	y	n
BR02	31 00.92317 N	81 15.92801 W	y	n
BR03	31 00.00023 N	81 16.30868 W	y	n
BR04	31 00.00023 N	81 17.59168 W	y	n
BR05	31 00.85031 N	81 18.00055 W	y	n
BR06	31 01.67598 N	81 18.49401 W	y	n
BR07	31 02.28302 N	81 17.38020 W	y	n
BR08	31 02.29516 N	81 16.66116 W	y	n
BR09	31 01.57885 N	81 17.30970 W	y	y
BR10	31 01.56671 N	81 16.67525 W	y	n
BR11	31 00.92317 N	81 17.32380 W	y	n
BR12	31 00.92317 N	81 16.70345 W	y	n

Table 2. Brunswick ODMDS Water Quality (CTD) Data – May 2006

Depth (meters)	Depth (feet)	Temperature ©	Salinity (ppt)	DO (mg/L)	Turbidity (ntu's)
1.21	3.97	**22.93**	*33.02*	6.27	1.81
1.44	4.72	22.91	33.03	6.27	1.82
1.61	5.29	22.92	33.02	6.27	1.80
1.88	6.17	22.87	33.08	6.26	1.88
2.16	7.08	22.91	33.03	6.27	1.80
2.45	8.04	22.74	33.24	**6.28**	1.79
2.70	8.86	22.74	33.23	6.21	1.81
2.90	9.51	22.83	33.13	6.23	1.71
3.27	10.73	22.77	33.20	6.27	1.64
3.63	11.91	22.60	33.39	6.24	1.66
3.88	12.73	22.58	33.42	6.22	1.59
4.09	13.42	22.56	33.44	6.21	*1.51*
4.35	14.27	22.55	33.45	6.21	1.53
4.59	15.06	22.47	33.54	6.21	1.52
4.78	15.68	22.44	33.58	6.20	1.60
4.97	16.30	22.39	33.64	6.18	1.56
5.24	17.19	22.31	33.72	6.17	**2.85**
5.39	17.68	*22.30*	**33.73**	*6.14*	2.49
5.63	18.47	22.33	33.70	6.14	2.03
5.75	18.86	22.33	33.70	6.14	2.00
6.05	19.84	22.33	33.70	6.14	2.04
6.23	20.43	22.32	33.71	6.15	2.28

NOTE: Numbers in bold type reflect maximum values observed within each parameter whereas those in italics reflect minimum values.

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Table 3. Brunswick ODMDS Sediment particle size – April 2006.

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

Laser analysis (% wet weight)

	Outside			Inside		
	%fines	%sands	%gravel	%fines	%sands	%gravel
	0.60	98.80	0.6	1.40	97.40	1.2
	8.90	88.50	2.6	1.40	95.60	3.0
	5.70	91.00	3.3	1.40	97.20	1.4
	2.30	88.00	9.7	0.40	83.10	16.5
	5.40	89.10	5.5	2.70	95.00	2.3
	9.20	89.90	0.9	25.80	73.20	1.0
mean	**5.35**	**90.88**	**3.77**	**5.52**	**90.25**	**4.24**
std dev	**3.45**	**4.02**	**3.43**	**9.96**	**9.92**	**6.08**
variance	**11.88**	**16.17**	**11.75**	**99.27**	**98.49**	**36.91**

Wet sieve method (% wet weight)
:

	Outside			Inside		
	%fines	%sands	%gravel	%fines	%sands	%gravel
	1.30	98.10	0.6	1.50	97.30	1.2
	3.60	93.80	2.6	1.40	95.60	3.0
	1.80	94.90	3.3	1.50	97.10	1.4
	1.90	88.40	9.7	1.10	82.40	16.5
	3.00	91.50	5.5	2.30	95.40	2.3
	4.00	95.10	0.9	7.70	91.30	1.0
mean	**2.60**	**93.63**	**3.77**	**2.58**	**93.18**	**4.24**
std dev	**1.09**	**3.34**	**3.43**	**2.54**	**5.71**	**6.08**
variance	**1.19**	**11.13**	**11.75**	**6.44**	**32.57**	**36.91**

Table 4.

Aluminum

Outside	Inside
520	590
1300	590
610	510
1000	260
1800	720
1900	1700

	Outside	Inside
mean	1188.3	728.3
Std dev	584.75	499.90
var	341937	249897

Arsenic

Outside	Inside
1.2	1.1
2.4	1.2
1.4	1.1
2	0.7
2.5	1.4
2.9	1.7

	Outside	Inside
mean	2.07	1.20
std dev	0.662	0.335
var	0.439	0.112

Cadmium

Outside	Inside
0.14	0.14
0.19	0.12
0.12	0.12
0.13	0.12
0.2	0.12
0.14	0.15

	Outside	Inside
mean	0.153	0.128
std dev	0.033	0.013
var	0.0011	0.0002

Chromium

Outside	Inside
3.5	2.9
5.1	2.7
3.2	2.2
4.3	1.3
6.7	3.5
6.8	4.9

	Outside	Inside
mean	4.93	2.92
std dev	1.56	1.22
var	2.42	1.49

Iron

Outside	Inside
1200	1300
1800	1300
1400	1300
2100	820
3500	1300
4500	2900

	Outside	Inside
mean	2416.7	1486.7
std dev	1304.48	718.52
var	1701667	516267

Lead

Outside	Inside
0.86	0.83
1.30	0.73
0.76	0.70
1.20	0.49
2.00	0.96
1.90	1.50

	Outside	Inside
mean	1.337	0.868
std dev	0.517	0.346
var	0.267	0.120

Manganese

Outside	Inside
22	29
29	78
37	44
43	25
69	31
89	39

	Outside	Inside
mean	48.2	41.0
std dev	25.71	19.40
var	661.0	376.4

Nickel

Outside	Inside
1.00	0.99
1.10	0.98
0.98	0.98
0.99	0.99
1.20	0.99
1.20	1.10

	Outside	Inside
mean	1.078	1.005
std dev	0.1036	0.0468
var	0.0107	0.0022

Zinc

Outside	Inside
2.7	2.9
4.6	2.8
2.9	2.4
4.3	1.7

	Outside	Inside

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7.3	3.0	mean	5.23	3.03
9.6	5.4	std dev	2.70	1.25
		var	7.29	1.57

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

Station	Taxa Richness	Density	Diversity	Evenness
Outside the ODMDS				
B01	27	3450.0	2.50	0.76
B02	77	12150.0	3.55	0.82
B03	54	6775.0	2.83	0.71
B04	51	20150.0	2.38	0.61
B05	40	15050.0	2.17	0.59
B06	30	5275.0	2.21	0.65
Mean	46.5	10475.0	2.61	0.69
Std. Dev.	18.45	6440.85		
Inside the ODMDS				
B07	31	3927.0	2.62	0.76
B08	49	10825.0	2.52	0.65
B09	37	6600.0	2.69	0.74
B10	43	5425.0	3.13	0.83
B11	41	9075.0	2.29	0.62
B12	53	11775.0	2.45	0.62
Mean	42.3	7937.8	2.62	0.70
Std. Dev.	8.0	3115.9		

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

		Inside ODMDS	Outside ODMDS
Grain Size Analyses			
Wet sieve		**2006**	**2006**
	% gravel	4.24	3.77
	% sand	93.18	93.63
	% silt/clay	2.58	2.60
Laser			
	% gravel	4.24	3.77
	% sand	90.25	90.88
	% silt/clay	5.52	5.35

Sediment chemistry		Mean conc. (ppm)	Mean conc. (ppm)
	Aluminum	692.9	1188.3
	Arsenic	1.17	2.07
	Cadmium	0.127	0.153
	Chromium	2.80	4.93
	Iron	1445.7	2416.7
	Lead	0.836	1.337
	Manganese	41.3	48.2
	Nickel	1.003	1.078
	Zinc	2.94	5.23

Infauna analyses			
Taxa richness (#spp./station)			
	Minimum	31.0	27.0
	Maximum	53.0	77.0
	Mean	42.3	46.5
Density (#organisms/m2)			
	Minimum	3927.0	3450.0
	Maximum	11775.0	20150.0
	Mean	7937.8	10475.0
Taxa diversity (H')			
	Mean	2.62	2.61
Taxa evenness (J')			
	Mean	0.70	0.69

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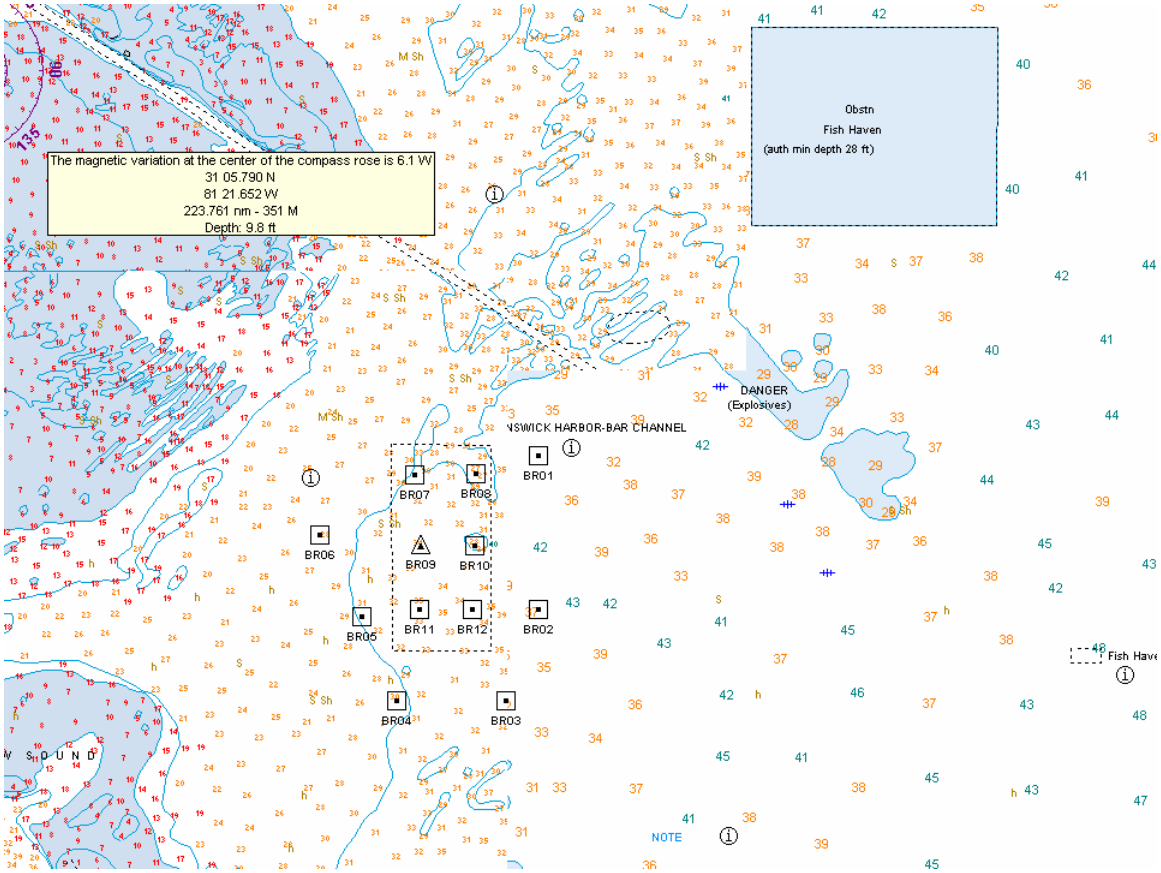

Figure 1. Brunswick sample stations, May, 2006
(station BR09 also sampled for water samples)

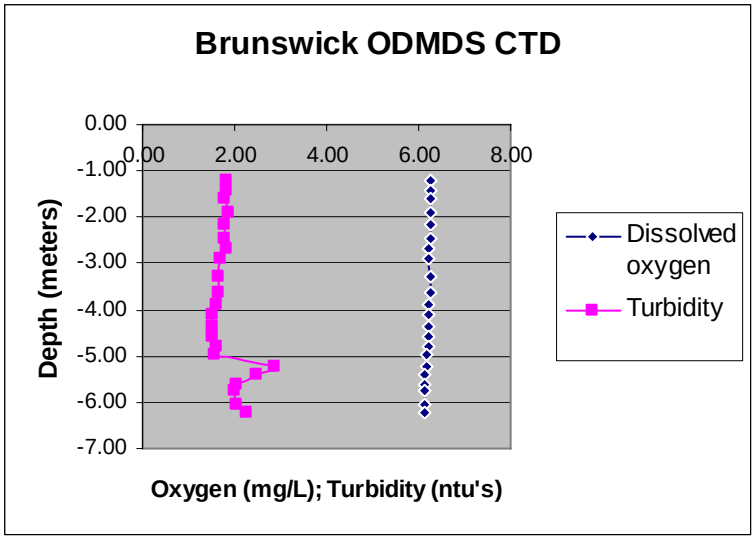

Figure 2. Dissolved Oxygen and Turbidity Profiles – Brunswick ODMDS, May 2006

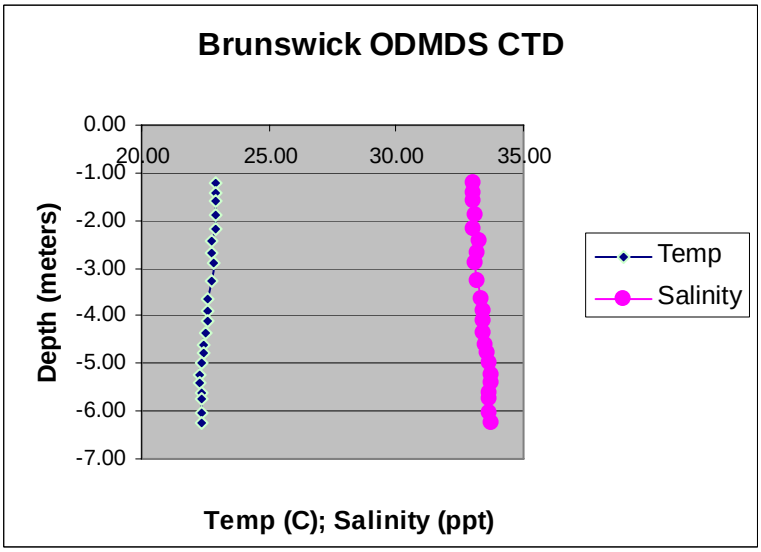

Figure 3. Temperature and Salinity Profiles – Brunswick ODMDS, May 2006

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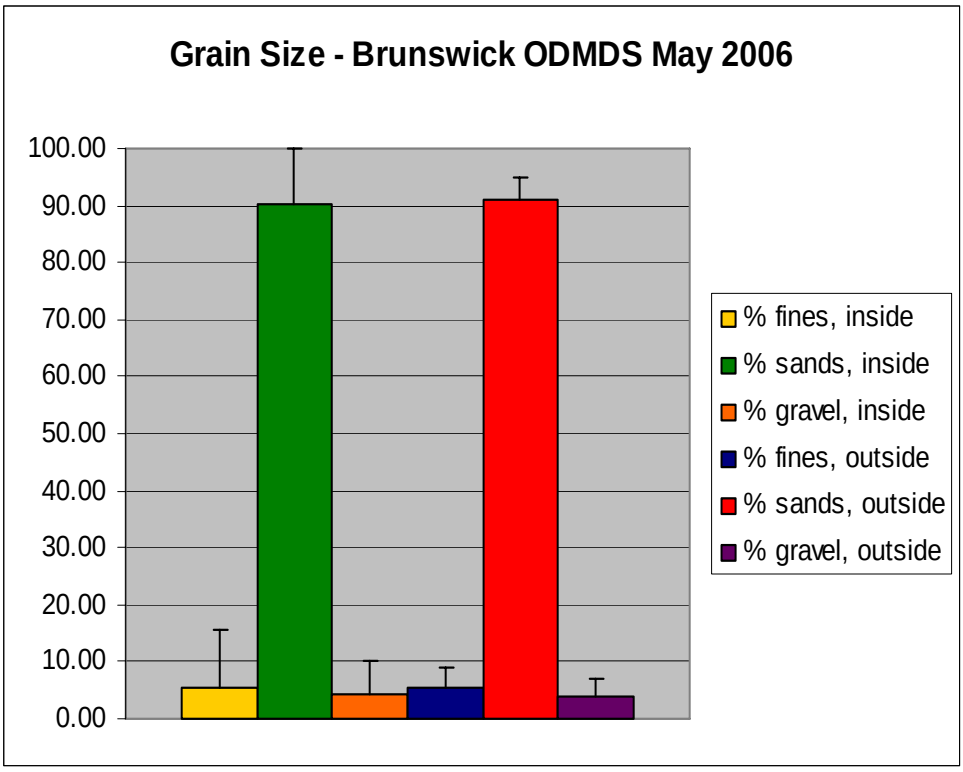

Figure 4. Grain Size Distribution – Brunswick ODMDS, May 2006

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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 – Laser Analysis and Wet Sieve

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Table B1. – Laser Analysis

% by weight

	clay	silt	Very.fine sand	fine.sand	medium sand	coarse sand	very coarse sand	Gravel
BR01	0.5	0.1	4.2	53.4	26.2	11.6	3.4	0.6
BR02	1.9	7.0	5.1	35.3	22.2	18.3	7.6	2.6
BR03	1.4	4.3	4.1	32.8	26.3	18.7	9.0	3.3
BR04	0.8	1.5	3.3	29.3	19.5	15.7	20.3	9.7
BR05	1.6	3.8	17.6	43.0	11.7	9.2	7.6	5.5
BR06	2.5	6.7	31.0	50.1	4.3	4.5	0.0	0.9
BR07	1.0	0.4	5.4	54.2	23.8	10.1	3.9	1.2
BR08	1.0	0.4	5.0	50.1	23.6	10.8	6.2	3.0
BR09	0.9	0.5	4.1	43.1	31.4	13.7	5.0	1.4
BR10	0.2	0.2	0.1	1.7	12.2	38.3	30.8	16.5
BR11	1.0	1.7	4.9	36.8	23.8	19.6	9.8	2.3
BR12	3.7	22.1	11.5	38.4	14.4	8.3	0.5	1.0

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Table B2. – Wet Sieve Analysis

% by weight

	Clay	silt	Very.fine sand	fine.sand	medium sand	coarse sand	very coarse sand	Gravel
BR01	1.2	0.1	2.8	68.0	23.6	2.8	0.7	0.6
BR02	1.7	1.9	5.5	61.3	18.5	6.3	2.2	2.6
BR03	1.5	0.3	2.7	47.7	36.4	5.8	2.4	3.3
BR04	1.5	0.4	4.3	50.4	19.2	6.1	8.2	9.7
BR05	1.7	1.3	16.3	63.8	6.8	2.2	2.4	5.5
BR06	2.0	2.0	26.8	66.3	1.4	0.4	0.2	0.9
BR07	1.4	0.1	3.9	76.9	12.2	2.9	1.4	1.2
BR08	1.3	0.1	3.6	73.8	13.1	3.0	2.1	3.0
BR09	1.4	0.1	3.2	64.9	22.8	4.5	1.7	1.4
BR10	1.0	0.1	0.4	6.2	25.5	31.8	18.4	16.5
BR11	1.7	0.6	5.4	58.4	18.9	8.8	4.0	2.3
BR12	2.2	5.5	10.2	66.1	12.4	1.8	0.8	1.0

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APPENDIX C

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

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

	B01	B02	B03	B04	B05	B06	B07	B08	B09	B09D	B10	B11	B12
Aluminum	520	1300	610	1000	1800	1900	590	590	510	480	260	720	1700
Antimony	0.25u	0.25u	0.25u	0.25u	0.25u	0.25u	0.25u	0.24u	0.24u	0.25u	0.25u	0.25u	0.25u
Arsenic	1.2	2.4	1.4	2	2.5	2.9	1.1	1.2	1.1	0.96	0.7	1.4	1.7
Beryllium	0.3u	0.3u	0.3u	0.3u	0.3u	0.3u	0.3u	0.29u	0.29u	0.3u	0.3u	0.3u	0.3u
Cadmium	0.14	0.19	0.12u	0.13	0.2	0.14	0.14	0.12u	0.12u	0.12u	0.12u	0.15	0.12u
Chromium	3.5	5.1	3.2	4.3	6.7	6.8	2.9	2.7	2.2	2.1	1.3	3.5	4.9
Copper	1u	0.99u	0.98u	0.99u	0.99u	0.99u	0.99u	0.98u	0.98u	0.99u	0.99u	0.99u	1u
Iron	1200	1800	1400	2100	3500	4500	1300	1300	1300	1200	820	1300	2900
Lead	0.86	1.3	0.76	1.2	2	1.9	0.83	0.73	0.7	0.64	0.49	0.96	1.5
Manganese	22	29	37	43	69	89	29	78	44	43	25	31	39
Nickel	1u	1.1	0.98u	0.99u	1.2	1.2	0.99u	0.98u	0.98u	0.99u	0.99u	0.99u	1.1
Selenium	0.5u	0.5u	0.49u	0.49u	0.5u	0.5u	0.49u	0.49u	0.49u	0.5u	0.5u	0.49u	0.5u
Silver	0.5u	0.5u	0.49u	0.49u	0.5u	0.5u	0.49u	0.49u	0.49u	0.5u	0.5u	0.49u	0.5u
Thallium	0.25u	0.25u	0.25u	0.25u	0.25u	0.25u	0.25u	0.24u	0.24u	0.25u	0.25u	0.25u	0.25u
Total Mercury	0.048u	0.048u	0.046u	0.046u	0.049u	0.048u	0.048u	0.048u	0.048u	0.046u	0.048u	0.046u	0.046u
Zinc	2.7	4.6	2.9	4.3	7.3	9.6	2.9	2.8	2.4	2.4	1.7	3	5.4

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

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

(concentrations reported as ug/kg, dry weight)

	B01	B02	B03	B04	B05	B06	B07	B08	B09	B09D	B10	B11	B12
2-Methylnaphthalene	18	18	18	17	18	18	17	18	17	18	17	17	18
Acenaphthene	9.4	9.2	9.4	9.2	9.5	9.6	9.2	9.5	9.2	9.4	9.1	9.1	9.6
Acenaphthylene	9.3	9.1	9.3	9.1	9.4	9.5	9.1	9.3	9.1	9.3	9	9	9.5
Anthracene	8.4	8.3	8.4	8.2	8.5	8.6	8.2	8.4	8.2	8.4	8.1	8.2	8.6
Benzo(a)anthracene	8.4	8.3	8.4	8.2	8.5	8.6	8.2	8.4	8.2	8.4	8.1	8.2	8.6
Benzo(b)Fluoranthene	9.2	9	9.1	9	9.2	9.4	9	9.2	8.9	9.2	8.8	8.9	9.4
Benzo(ghi)Perylene	8.4	8.3	8.4	8.2	8.5	8.6	8.2	8.4	8.2	8.4	8.1	8.2	8.6
Benzo(k)Fluoranthene	8.4	8.3	8.4	8.2	8.5	8.6	8.2	8.4	8.2	8.4	8.1	8.2	8.6
Benzo-a-Pyrene	8.4	8.3	8.4	8.2	8.5	8.6	8.2	8.4	8.2	8.4	8.1	8.2	8.6
Chrysene	8.4	8.3	8.4	8.2	8.5	8.6	8.2	8.4	8.2	8.4	8.1	8.2	8.6
Dibenzo(a,h)Anthracene	8.9	8.8	8.9	8.7	9	9.1	8.7	9	8.7	8.9	8.6	8.6	9.1
Fluoranthene	8.4	8.3	8.4	8.2	8.5	8.6	8.2	8.4	8.2	8.4	8.1	8.2	8.6
Fluorene	8.4	8.3	8.4	8.2	8.5	8.6	8.2	8.4	8.2	8.4	8.1	8.2	8.6
Indeno(1,2,3-cd)Pyrene	8.4	8.3	8.4	8.2	8.5	8.6	8.2	8.4	8.2	8.4	8.1	8.2	8.6
Naphthalene	***22***	***22***	***22***	***22***	***22***	***23***	***22***	***22***	***22***	***22***	***22***	***22***	***23***
Phenanthrene	8.4	8.3	8.4	8.2	8.5	8.6	8.2	8.4	8.2	8.4	8.1	8.2	8.6
Pyrene	14	13	14	13	14	14	13	14	13	14	13	13	14

NOTE: all values were "U" flagged (analyte not detected at or above reporting limit…the number is the minimum quantitation limit.)
* Numbers in bold and italic type exceeded the target detection limit.

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Table C3. Sediment PCB/Pesticides Analyses - Brunswick ODMDS, May 2006.

(concentrations reported as ug/kg, dry weight)

	B01	B02	B03	B04	B05	B06	B07	B08	B09	B09D	B10	B11	B12
4,4'-DDD (p,p'-DDD)	1	1.1	1	0.99	1	1	0.99	1	0.99	1	0.97	1.6	1
4,4'-DDE (p,p'-DDE)	0.4	0.49	0.4	0.46	0.48	0.41	0.4	0.4	0.4	0.4	0.39	0.46	0.65
4,4'-DDT (p,p'-DDT)	1.5	1.5	1.5	1.6	1.6	1.7	1.3	1.5	1.5	1.5	1.4	1.5	1.6
Aldrin	4	3.9	4	3.9	4	4.1	4	4	4	4	3.9	3.9	4.2
alpha-BHC	4	3.9	4	3.9	4	4.1	4	4	4	4	3.9	3.9	4.2
alpha-Chlordane /2	4	3.9	4	3.9	4	4.1	4	4	4	4	3.9	3.9	4.2
beta-BHC	4	3.9	4	3.9	4	4.1	4	4	4	4	3.9	3.9	4.2
cis-Nonachlor /2	4	3.9	4	3.9	4	4.1	4	4	4	4	3.9	3.9	4.2
delta-BHC	4	3.9	4	3.9	4	4.1	4	4	4	4	3.9	3.9	4.2
Dieldrin	0.4	0.39	0.4	0.4	0.4	0.41	0.54	0.54	0.4	0.4	0.44	0.39	0.42
Endosulfan I (alpha)	4	3.9	4	3.9	4	4.1	4	4	4	4	3.9	3.9	4.2
Endosulfan II (beta)	10	9.9	10	9.9	10	10	9.9	10	9.9	10	9.7	9.8	10
Endosulfan Sulfate	10	9.9	10	9.9	10	10	9.9	10	9.9	10	9.7	9.8	10
Endrin	10	9.9	10	9.9	10	10	9.9	10	9.9	10	9.7	9.8	10
Endrin Ketone	10	9.9	10	9.9	10	10	9.9	10	9.9	10	9.7	9.8	10
gamma-BHC (Lindane)	4	3.9	4	3.9	4	4.1	4	4	4	4	3.9	3.9	4.2
gamma-Chlordane /2	4	3.9	4	3.9	4	4.1	4	4	4	4	3.9	3.9	4.2
Heptachlor	4	3.9	4	3.9	4	4.1	4	4	4	4	3.9	3.9	4.2
Heptachlor Epoxide	4	3.9	4	3.9	4	4.1	4	4	4	4	3.9	3.9	4.2
Methoxychlor	20	20	20	20	20	21	20	20	20	20	19	20	21
Toxaphene	40	39	40	39	40	41	40	40	40	40	39	39	42
trans-Nonachlor /2	4	3.9	4	3.9	4	4.1	4	4	4	4	3.9	3.9	4.2
PCB Congener #8	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #18	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #28	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #44	1	***1.5***	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #49	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #52	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #66	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #77	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #87	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #101	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1

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Table C3. Continued.

PCB Congener #105	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #118	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #126	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #128	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #138	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #153	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #156	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #169	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #170	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #180	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #183	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #184	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #187	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #195	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #206	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1
PCB Congener #209	1	0.99	1	0.99	1	1	0.99	1	0.99	1	0.97	0.98	1

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

*Numbers in bold and italic type exceeded the target detection limit.

Table C4. Sediment Dioxin Analyses - Brunswick ODMDS, May 2006.
(concentrations are reported in ng/kg)

	B01	B04	B07	B12
2,3,7,8-Tetrachlorodibenzodioxin	0.03u	0.035u	0.047u	0.087u
Tetrachlorodibenzodioxin (Total)	0.03u	0.39	0.11	1.5
1,2,3,7,8-Pentachlorodibenzodioxin	0.035u	0.047u	0.23u	0.32u
Pentachlorodibenzodioxin (Total)	0.26	1.1	0.23u	3.9
1,2,3,4,7,8-Hexachlorodibenzodioxin	0.047u	0.11u	0.25u	0.31u
1,2,3,6,7,8-Hexachlorodibenzodioxin	0.046u	0.13u	0.26u	0.52u
1,2,3,7,8,9-Hexachlorodibenzodioxin	0.068u	0.26u	0.26u	0.77u
Hexachlorodibenzodioxin (Total)	1.5	7.6	2.3	22
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	0.85u	3.7	2.7	9.9
Heptachlorodibenzodioxin (Total)	2.7	13	5.6	33
Octachlorodibenzodioxin	7.5	41	16	120
2,3,7,8-Tetrachlorodibenzofuran	0.14u	0.14u	0.12u	0.18u
Tetrachlorodibenzofuran (Total)	0.25	0.29	0.12	0.44
1,2,3,7,8-Pentachlorodibenzofuran	0.023u	0.037u	0.091u	0.099u
2,3,4,7,8-Pentachlorodibenzofuran	0.049u	0.056u	0.089u	0.19u
Pentachlorodibenzofuran (Total)	0.11	0.16	0.09u	0.32
1,2,3,4,7,8-Hexachlorodibenzofuran	0.034u	0.041u	0.17u	0.16u
1,2,3,6,7,8-Hexachlorodibenzofuran	0.031u	0.026u	0.16u	0.13u
1,2,3,7,8,9-Hexachlorodibenzofuran	0.047u	0.046u	0.24u	0.22u
2,3,4,6,7,8-Hexachlorodibenzofuran	0.033u	0.037u	0.18u	0.15u
Hexachlorodibenzofuran (Total)	0.15	0.36	0.18	0.34
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.12u	0.23u	0.4u	0.51u
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.067u	0.055u	0.3u	0.58u
Heptachlorodibenzofuran (Total)	0.12	0.5	0.76	0.51
Octachlorodibenzofuran	0.33u	0.48u	1.2u	1.5u
Avian Toxic. Equiv. Value, TEQ-98	0.28	0.34	0.62	0.98
Fish Toxic. Equiv. Value,TEQ-98	0.14	0.2	0.55	0.78
Mammalian Toxic. Equiv. Value, TEQ-98	0.15	0.23	0.52	0.87

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

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APPENDIX D

Water Quality/CTD/Water Chemistry - Metals, Extractables, Pesticides, PCBs and Dioxins

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

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

	Top	Bottom
Aluminum	86	60
Antimony	2.5u	2.5u
Arsenic	12	15
Beryllium	1.2u	1.2u
Cadmium	1.2u	1.2u
Chromium	7u	6.9u
Copper	8.4	8.4
Iron	0.1u	0.11u
Lead	2.5u	2.5u
Manganese	5.5u	5u
Nickel	2.5u	2.5u
Selenium	16u	10u
Silver	1.2u	1.2u
Thallium	2.5u	2.5u
Total Mercury	0.2u	0.2u
Zinc	13u	17u

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

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

(concentrations are reported as ug/L)

	BR top	BR 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.)

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Table D3. Water Pesticides/PCBs Analyses - Brunswick ODMDS, May 2006

(concentrations reported as ug/L)

	top	bottom
4,4'-DDD (p,p'-DDD)	0.05	0.051
4,4'-DDE (p,p'-DDE)	0.02	0.02
4,4'-DDT (p,p'-DDT)	0.076	0.051
Aldrin	0.022	0.02
alpha-BHC	0.02	0.02
alpha-Chlordane /2	0.02	0.02
beta-BHC	0.02	0.02
cis-Nonachlor /2	0.02	0.02
delta-BHC	0.02	0.02
Dieldrin	0.022	0.02
Endosulfan I (alpha)	0.02	0.02
Endosulfan II (beta)	0.05	0.051
Endosulfan Sulfate	0.05	0.051
Endrin	0.05	0.051
Endrin Ketone	0.05	0.051
gamma-BHC (Lindane)	0.02	0.02
gamma-Chlordane /2	0.02	0.02
Heptachlor	0.02	0.02
Heptachlor Epoxide	0.02	0.02
Methoxychlor	0.11	0.1
Toxaphene	2	2
trans-Nonachlor /2	0.02	0.02
PCB Congener #8	0.02	0.016
PCB Congener #18	0.02	0.016
PCB Congener #28	0.02	0.016
PCB Congener #44	0.02	0.016
PCB Congener #49	0.02	0.016
PCB Congener #52	0.02	0.016
PCB Congener #66	0.02	0.016
PCB Congener #77	0.02	0.016
PCB Congener #87	0.02	0.016
PCB Congener #101	0.02	0.016
PCB Congener #105	0.02	0.016
PCB Congener #118	0.02	0.016
PCB Congener #126	0.02	0.016
PCB Congener #128	0.02	0.016
PCB Congener #138	0.02	0.016
PCB Congener #153	0.02	0.016
PCB Congener #156	0.02	0.016
PCB Congener #169	0.02	0.016
PCB Congener #170	0.02	0.016
PCB Congener #180	0.02	0.016
PCB Congener #183	0.02	0.016
PCB Congener #184	0.02	0.016

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PCB Congener #187	0.02	0.016
PCB Congener #195	0.02	0.016
PCB Congener #206	0.02	0.016
PCB Congener #209	0.02	0.016

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

Table D4. Bottom Water Dioxin Analyses - Brunswick ODMDS, May 2006

(concentrations reported as pg/L)

2,3,7,8-Tetrachlorodibenzodioxin	0.00094u
Tetrachlorodibenzodioxin (Total)	0.00041u
1,2,3,7,8-Pentachlorodibenzodioxin	0.001u
Pentachlorodibenzodioxin (Total)	0.001u
1,2,3,4,7,8-Hexachlorodibenzodioxin	0.00042u
1,2,3,6,7,8-Hexachlorodibenzodioxin	0.00048u
1,2,3,7,8,9-Hexachlorodibenzodioxin	0.00036u
Hexachlorodibenzodioxin (Total)	0.00042u
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	0.001
Heptachlorodibenzodioxin (Total)	0.0022
Octachlorodibenzodioxin	0.0074u

2,3,7,8-Tetrachlorodibenzofuran	0.0001u
Tetrachlorodibenzofuran (Total)	0.001
1,2,3,7,8-Pentachlorodibenzofuran	0.002u
2,3,4,7,8-Pentachlorodibenzofuran	0.0021u
Pentachlorodibenzofuran (Total)	0.0045
1,2,3,4,7,8-Hexachlorodibenzofuran	0.0029
1,2,3,6,7,8-Hexachlorodibenzofuran	0.0031u
1,2,3,7,8,9-Hexachlorodibenzofuran	0.0018u
2,3,4,6,7,8-Hexachlorodibenzofuran	0.002
Hexachlorodibenzofuran (Total)	0.022
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.019
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.0074
Heptachlorodibenzofuran (Total)	0.048
Octachlorodibenzofuran	0.073

Avian Toxic. Equiv. Value, TEQ-98	57
Fish Toxic. Equiv. Value,TEQ-98	0.0046
Mammalian Toxic. Equiv. Value, TEQ-98	0.0045

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

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APPENDIX E

Benthic Data Extracted from Vittor, 2006.

Table 1. Summary of overall abundance of major benthic macroinfaunal taxonomic groups for the Brunswick ODMDS stations, May 2006.

Taxa	Total No. Taxa	% Total	Total No. Individuals	% Total
Annelida				
Oligochaeta	1	0.6	10	0.2
Polychaeta	83	48.3	2,643	59.5
Mollusca				
Bivalvia	21	12.2	109	2.5
Gastropoda	10	5.8	21	0.5
Arthropoda				
Malacostraca	40	23.3	1,326	29.8
Ostracoda	1	0.6	1	0.0
Echinodermata				
Echinoidea	1	0.6	2	0.0
Holothuroidea	1	0.6	2	0.0
Ophiuroidea	3	1.7	70	1.6
Other Taxa	11	6.4	261	5.9
Total	172		4,445	

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Table 2. Summary of abundance of major benthic macroinfaunal taxonomic groups by station for the Brunswich stations, May 2006.

Station	Taxa	Total No. Taxa	% Total	Total No. Individuals	% Total
BR01	Annelida	12	44.4	29	21.0
	Mollusca	4	14.8	19	13.8
	Arthropoda	9	33.3	81	58.7
	Echinodermata	0	0.0	0	0.0
	Other Taxa	2	7.4	9	6.5
	Total	**27**		**138**	
BR02	Annelida	44	57.1	348	71.6
	Mollusca	9	11.7	13	2.7
	Arthropoda	17	22.1	68	14.0
	Echinodermata	1	1.3	18	3.7
	Other Taxa	6	7.8	39	8.0
	Total	**77**		**486**	
BR03	Annelida	23	42.6	127	46.9
	Mollusca	9	16.7	15	5.5
	Arthropoda	17	31.5	115	42.4
	Echinodermata	1	1.9	1	0.4
	Other Taxa	4	7.4	13	4.8
	Total	**54**		**271**	
BR04	Annelida	29	56.9	387	48.0
	Mollusca	4	7.8	11	1.4
	Arthropoda	13	25.5	388	48.1
	Echinodermata	1	2.0	2	0.2
	Other Taxa	4	7.8	18	2.2
	Total	**51**		**806**	
BR05	Annelida	21	52.5	545	90.5
	Mollusca	1	2.5	3	0.5
	Arthropoda	11	27.5	39	6.5
	Echinodermata	0	0.0	0	0.0
	Other Taxa	7	17.5	15	2.5
	Total	**40**		**602**	
BR06	Annelida	14	46.7	140	66.4
	Mollusca	2	6.7	2	0.9
	Arthropoda	8	26.7	53	25.1
	Echinodermata	1	3.3	1	0.5
	Other Taxa	5	16.7	15	7.1
	Total	**30**		**211**	

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Table 2 continued:

Station	Taxa	Total No. Taxa	% Total	Total No. Individuals	% Total
BR07	Annelida	13	41.9	72	39.3
	Mollusca	5	16.1	10	5.5
	Arthropoda	9	29.0	84	45.9
	Echinodermata	1	3.2	1	0.5
	Other Taxa	3	9.7	16	8.7
	Total	**31**		**183**	
BR08	Annelida	20	40.8	156	36.0
	Mollusca	10	20.4	18	4.2
	Arthropoda	15	30.6	245	56.6
	Echinodermata	0	0.0	0	0.0
	Other Taxa	4	8.2	14	3.2
	Total	**49**		**433**	
BR09	Annelida	18	48.6	130	49.2
	Mollusca	5	13.5	9	3.4
	Arthropoda	10	27.0	112	42.4
	Echinodermata	0	0.0	0	0.0
	Other Taxa	4	10.8	13	4.9
	Total	**37**		**264**	
BR10	Annelida	23	53.5	74	34.1
	Mollusca	5	11.6	11	5.1
	Arthropoda	9	20.9	66	30.4
	Echinodermata	3	7.0	40	18.4
	Other Taxa	3	7.0	26	12.0
	Total	43		217	
BR11	Annelida	21	51.2	269	74.1
	Mollusca	4	9.8	7	1.9
	Arthropoda	11	26.8	68	18.7
	Echinodermata	1	2.4	3	0.8
	Other Taxa	4	9.8	16	4.4
	Total	41		363	
BR12	Annelida	33	62.3	376	79.8
	Mollusca	7	13.2	12	2.5
	Arthropoda	4	7.5	8	1.7
	Echinodermata	3	5.7	8	1.7
	Other Taxa	6	11.3	67	14.2
	Total	53		471	

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Table 3. Wet-weight biomass data for the Brunswick ODMDS stations, May 2006.

Station:	Biomass (g)
BR01	
Annelida	0.9952
Mollusca	0.6419
Arthropoda	0.4602
Echinodermata	0.0000
Other Taxa	0.4392
Total	2.5365
BR02	
Annelida	2.7868
Mollusca	0.5197
Arthropoda	0.7539
Echinodermata	0.4556
Other Taxa	0.4470
Total	4.9630
BR03	
Annelida	0.7455
Mollusca	0.5124
Arthropoda	0.4704
Echinodermata	0.4283
Other Taxa	0.4500
Total	2.6066
BR04	
Annelida	0.9503
Mollusca	0.4562
Arthropoda	0.5428
Echinodermata	0.4295
Other Taxa	0.7346
Total	3.1134
BR05	
Annelida	0.9524
Mollusca	0.4385
Arthropoda	0.4584
Echinodermata	0.0000
Other Taxa	0.4389
Total	2.2882
BR06	
Annelida	0.7086
Mollusca	0.4662
Arthropoda	0.4539
Echinodermata	0.4280
Other Taxa	0.4429
Total	2.4996

Station:	Biomass (g)
BR07	
Annelida	0.5601
Mollusca	0.4490
Arthropoda	0.4674
Echinodermata	0.4286
Other Taxa	0.4485
Total	2.3536
BR08	
Annelida	0.7267
Mollusca	0.4460
Arthropoda	0.5342
Echinodermata	0.0000
Other Taxa	0.4459
Total	2.1528
BR09	
Annelida	0.5889
Mollusca	0.4628
Arthropoda	0.4759
Echinodermata	0.0000
Other Taxa	0.4354
Total	1.9630
BR10	
Annelida	0.5124
Mollusca	2.6528
Arthropoda	0.4448
Echinodermata	0.4754
Other Taxa	0.5038
Total	4.5892
BR11	
Annelida	0.9531
Mollusca	0.4839
Arthropoda	0.4587
Echinodermata	0.4340
Other Taxa	0.4572
Total	2.7869
BR12	
Annelida	1.1733
Mollusca	7.4512
Arthropoda	0.4356
Echinodermata	17.2478
Other Taxa	0.6654
Total	26.9733

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Table 4. Distribution and abundance of benthic macroinfaunal taxa for the stations inside the Brunswick ODMDS site, April 2006.

Taxa	Phylum	Class	No. of Individuals	% Total	Cumulative %	Station Occurrence	% Station Occurrence
Spiophanes bombyx	Ann	Poly	617	31.95	31.95	6	100
Oxyurostylis smithi	Art	Mala	224	11.60	43.55	6	100
Protohaustorius sp. B	Art	Mala	111	5.75	49.30	5	83
Mediomastus (LPIL)	Ann	Poly	85	4.40	53.70	5	83
Tharyx acutus	Ann	Poly	69	3.57	57.28	6	100
Rhynchocoela (LPIL)	Rhy	-	67	3.47	60.75	6	100
Metatiron tropakis	Art	Mala	54	2.80	63.54	5	83
Rhepoxynius hudsoni	Art	Mala	52	2.69	66.24	5	83
Ophiuroidea (LPIL)	Ech	Ophi	45	2.33	68.57	4	67
Phoronis (LPIL)	Pho	-	45	2.33	70.90	2	33
Metatiron triocellatus	Art	Mala	34	1.76	72.66	4	67
Eudevenopus honduranus	Art	Mala	32	1.66	74.31	4	67
Owenia fusiformis	Ann	Poly	31	1.61	75.92	6	100
Phyllodoce (LPIL)	Ann	Poly	23	1.19	77.11	6	100
Metatiron (LPIL)	Art	Mala	18	0.93	78.04	4	67
Polycirrus eximius	Ann	Poly	18	0.93	78.97	4	67
Spiophanes missionensis	Ann	Poly	18	0.93	79.91	1	17
Magelona sp. H	Ann	Poly	17	0.88	80.79	1	17
Phyllodoce arenae	Ann	Poly	17	0.88	81.67	6	100
Prionospio cristata	Ann	Poly	17	0.88	82.55	4	67
Apoprionospio dayi	Ann	Poly	16	0.83	83.38	5	83
Tubulanus (LPIL)	Rhy	Anop	16	0.83	84.21	4	67
Batea catharinensis	Art	Mala	14	0.73	84.93	1	17
Mediomastus ambiseta	Ann	Poly	14	0.73	85.66	2	33
Actiniaria (LPIL)	Cni	Anth	12	0.62	86.28	6	100
Americhelidium americanum	Art	Mala	10	0.52	86.79	3	50
Spio pettiboneae	Ann	Poly	10	0.52	87.31	3	50
Magelona papillicornis	Ann	Poly	9	0.47	87.78	4	67
Cirratulidae (LPIL)	Ann	Poly	8	0.41	88.19	3	50
Nephtys picta	Ann	Poly	8	0.41	88.61	5	83
Tellina iris	Mol	Biva	8	0.41	89.02	2	33
Bivalvia (LPIL)	Mol	Biva	7	0.36	89.38	3	50
Crassinella lunulata	Mol	Biva	7	0.36	89.75	2	33
Glycera (LPIL)	Ann	Poly	7	0.36	90.11	2	33
Tellina (LPIL)	Mol	Biva	7	0.36	90.47	4	67
Tubificidae (LPIL)	Ann	Olig	7	0.36	90.83	3	50
Branchiostoma (LPIL)	Cho	Lept	6	0.31	91.14	1	17
Cyathura polita	Art	Mala	6	0.31	91.46	1	17
Phyllodoce mucosa	Ann	Poly	6	0.31	91.77	2	33
Acanthohaustorius intermedius	Art	Mala	5	0.26	92.02	2	33
Nereididae (LPIL)	Ann	Poly	5	0.26	92.28	2	33
Polydora cornuta	Ann	Poly	5	0.26	92.54	3	50
Solemya velum	Mol	Biva	5	0.26	92.80	1	17
Ampharetidae (LPIL)	Ann	Poly	4	0.21	93.01	3	50
Eumida sanguinea	Ann	Poly	4	0.21	93.22	3	50
Gastropoda (LPIL)	Mol	Gast	4	0.21	93.42	3	50
Onuphis eremita oculata	Ann	Poly	4	0.21	93.63	4	67
Polygordius (LPIL)	Ann	Poly	4	0.21	93.84	2	33
Scolelepis texana	Ann	Poly	4	0.21	94.04	3	50
Spionidae (LPIL)	Ann	Poly	4	0.21	94.25	3	50
Tellinidae (LPIL)	Mol	Biva	4	0.21	94.46	2	33
Argissa hamatipes	Art	Mala	3	0.16	94.61	1	17
Calyptraeidae (LPIL)	Mol	Gast	3	0.16	94.77	2	33

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Table 4 continued:

Taxa	Phylum	Class	No. of Individuals	% Total	Cumulative %	Station Occurrence	% Station Occurrence
Cyclaspis pustulata	Art	Mala	3	0.16	94.92	2	33
Goniadides carolinae	Ann	Poly	3	0.16	95.08	1	17
Hesionidae (LPIL)	Ann	Poly	3	0.16	95.24	1	17
Laevicardium (LPIL)	Mol	Biva	3	0.16	95.39	2	33
Paraprionospio pinnata	Ann	Poly	3	0.16	95.55	1	17
Turbellaria (LPIL)	Pla	Turb	3	0.16	95.70	2	33
Abra aequalis	Mol	Biva	2	0.10	95.81	1	17
Amphiuridae (LPIL)	Ech	Ophi	2	0.10	95.91	1	17
Ancistrosyllis hartmanae	Ann	Poly	2	0.10	96.01	2	33
Ervilia concentrica	Mol	Biva	2	0.10	96.12	1	17
Fimbriosthenelais (LPIL)	Ann	Poly	2	0.10	96.22	1	17
Glycera americana	Ann	Poly	2	0.10	96.32	1	17
Goniada littorea	Ann	Poly	2	0.10	96.43	2	33
Holothuroidea (LPIL)	Ech	Holo	2	0.10	96.53	1	17
Listriella barnardi	Art	Mala	2	0.10	96.63	1	17
Mediomastus californiensis	Ann	Poly	2	0.10	96.74	1	17
Melinna maculata	Ann	Poly	2	0.10	96.84	1	17
Moira atropos	Ech	Echi	2	0.10	96.94	1	17
Nereis micromma	Ann	Poly	2	0.10	97.05	1	17
Notomastus latericeus	Ann	Poly	2	0.10	97.15	1	17
Onuphidae (LPIL)	Ann	Poly	2	0.10	97.26	1	17
Pagurus (LPIL)	Art	Mala	2	0.10	97.36	2	33
Parametopella cypris	Art	Mala	2	0.10	97.46	1	17
Paramphinome sp. B	Ann	Poly	2	0.10	97.57	2	33
Pectinaria gouldii	Ann	Poly	2	0.10	97.67	1	17
Poecilochaetus johnsoni	Ann	Poly	2	0.10	97.77	1	17
Prionospio (LPIL)	Ann	Poly	2	0.10	97.88	2	33
Strigilla (LPIL)	Mol	Biva	2	0.10	97.98	1	17
Turbonilla (LPIL)	Mol	Gast	2	0.10	98.08	1	17
Unciola (LPIL)	Art	Mala	2	0.10	98.19	2	33
Aglaophamus verrilli	Ann	Poly	1	0.05	98.24	1	17
Aonides mayaguezensis	Ann	Poly	1	0.05	98.29	1	17
Balanoglossus (LPIL)	Hem	Ente	1	0.05	98.34	1	17
Bathyporeia (LPIL)	Art	Mala	1	0.05	98.39	1	17
Bathyporeia parkeri	Art	Mala	1	0.05	98.45	1	17
Calyptraea centralis	Mol	Gast	1	0.05	98.50	1	17
Capitella (LPIL)	Ann	Poly	1	0.05	98.55	1	17
Cardiidae (LPIL)	Mol	Biva	1	0.05	98.60	1	17
Cyclaspis varians	Art	Mala	1	0.05	98.65	1	17
Diplodonta (LPIL)	Mol	Biva	1	0.05	98.71	1	17
Dipolydora socialis	Ann	Poly	1	0.05	98.76	1	17
Edotia triloba	Art	Mala	1	0.05	98.81	1	17
Emerita talpoida	Art	Mala	1	0.05	98.86	1	17
Eusarsiella cresseyi	Art	Ostr	1	0.05	98.91	1	17
Hydrozoa (LPIL)	Cni	Hydr	1	0.05	98.96	1	17
Leitoscoloplos (LPIL)	Ann	Poly	1	0.05	99.02	1	17
Lucina (LPIL)	Mol	Biva	1	0.05	99.07	1	17
Lumbrineris latreilli	Ann	Poly	1	0.05	99.12	1	17
Lyonsia hyalina	Mol	Biva	1	0.05	99.17	1	17
Mactra fragilis	Mol	Biva	1	0.05	99.22	1	17
Microphthalmus hartmanae	Ann	Poly	1	0.05	99.27	1	17
Nassarius vibex	Mol	Gast	1	0.05	99.33	1	17
Notocirrus sp. A	Ann	Poly	1	0.05	99.38	1	17
Ophiolepis elegans	Ech	Ophi	1	0.05	99.43	1	17
Pandora (LPIL)	Mol	Biva	1	0.05	99.48	1	17
Pinnixa (LPIL)	Art	Mala	1	0.05	99.53	1	17
Polynoidae (LPIL)	Ann	Poly	1	0.05	99.59	1	17

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Table 4 continued:

Taxa	Phylum	Class	No. of Individuals	% Total	Cumulative %	Station Occurrence	% Station Occurrence
Processa (LPIL)	Art	Mala	1	0.05	99.64	1	17
Scoloplos (LPIL)	Ann	Poly	1	0.05	99.69	1	17
Sipuncula (LPIL)	Sip	-	1	0.05	99.74	1	17
Solen viridis	Mol	Biva	1	0.05	99.79	1	17
Spiochaetopterus oculatus	Ann	Poly	1	0.05	99.84	1	17
Strombiformis bilineatus	Mol	Gast	1	0.05	99.90	1	17
Tectonatica pusilla	Mol	Gast	1	0.05	99.95	1	17
Trachypenaeus (LPIL)	Art	Mala	1	0.05	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

Hem=Hemichordata
- Ente=Enteropneusta

Mol=Mollusca
- Biva=Bivalvia
- Gast=Gastropoda

Pho=Phoronida

Pla=Platyhelminthes
- Turb=Turbellaria

Rhy=Rhynchocoela
- Anop=Anopla

Sip=Sipuncula

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Table 5. Distribution and abundance of benthic macroinfaunal taxa for the stations outside the Brunswick ODMDS site, April 2006.

Taxa	Phylum	Class	No. of Individuals	% Total	Cumulative %	Station Occurrence	% Station Occurrence
Spiophanes bombyx	Ann	Poly	498	19.81	19.81	6	100
Mediomastus (LPIL)	Ann	Poly	302	12.01	31.82	4	67
Mediomastus ambiseta	Ann	Poly	207	8.23	40.06	4	67
Metatiron tropakis	Art	Mala	182	7.24	47.30	4	67
Oxyurostylis smithi	Art	Mala	177	7.04	54.34	6	100
Tharyx acutus	Ann	Poly	108	4.30	58.63	4	67
Protohaustorius sp. B	Art	Mala	86	3.42	62.05	3	50
Metatiron triocellatus	Art	Mala	79	3.14	65.19	3	50
Owenia fusiformis	Ann	Poly	56	2.23	67.42	6	100
Rhynchocoela (LPIL)	Rhy	-	56	2.23	69.65	6	100
Batea catharinensis	Art	Mala	40	1.59	71.24	2	33
Rhepoxynius hudsoni	Art	Mala	39	1.55	72.79	4	67
Phyllodoce arenae	Ann	Poly	35	1.39	74.18	3	50
Prionospio perkinsi	Ann	Poly	35	1.39	75.58	2	33
Metatiron (LPIL)	Art	Mala	34	1.35	76.93	1	17
Polycirrus eximius	Ann	Poly	25	0.99	77.92	2	33
Ophiuroidea (LPIL)	Ech	Ophi	22	0.88	78.80	4	67
Scolelepis texana	Ann	Poly	22	0.88	79.67	3	50
Cirratulidae (LPIL)	Ann	Poly	18	0.72	80.39	2	33
Polycirrus (LPIL)	Ann	Poly	17	0.68	81.07	1	17
Spiochaetopterus oculatus	Ann	Poly	17	0.68	81.74	6	100
Polygordius (LPIL)	Ann	Poly	16	0.64	82.38	4	67
Tubulanus (LPIL)	Rhy	Anop	16	0.64	83.02	4	67
Cyclaspis pustulata	Art	Mala	15	0.60	83.61	4	67
Edotia triloba	Art	Mala	15	0.60	84.21	4	67
Onuphis eremita oculata	Ann	Poly	15	0.60	84.81	5	83
Bivalvia (LPIL)	Mol	Biva	13	0.52	85.32	3	50
Americhelidium americanum	Art	Mala	12	0.48	85.80	4	67
Ampharete sp. B	Ann	Poly	12	0.48	86.28	2	33
Magelona papillicornis	Ann	Poly	12	0.48	86.75	3	50
Notomastus latericeus	Ann	Poly	10	0.40	87.15	1	17
Phoronis (LPIL)	Pho	-	10	0.40	87.55	4	67
Phoxocephalidae (LPIL)	Art	Mala	10	0.40	87.95	2	33
Phyllodoce (LPIL)	Ann	Poly	10	0.40	88.35	3	50
Prionospio cristata	Ann	Poly	10	0.40	88.74	3	50
Strigilla mirabilis	Mol	Biva	10	0.40	89.14	2	33
Tellina (LPIL)	Mol	Biva	10	0.40	89.54	5	83
Spionidae (LPIL)	Ann	Poly	9	0.36	89.90	3	50
Terebellidae (LPIL)	Ann	Poly	9	0.36	90.25	2	33
Actiniaria (LPIL)	Cni	Anth	8	0.32	90.57	3	50
Goniada littorea	Ann	Poly	8	0.32	90.89	2	33
Apoprionospio dayi	Ann	Poly	7	0.28	91.17	4	67
Eudevenopus honduranus	Art	Mala	7	0.28	91.45	3	50
Turbellaria (LPIL)	Pla	Turb	7	0.28	91.73	3	50
Aglaophamus verrilli	Ann	Poly	6	0.24	91.96	2	33
Diplodonta (LPIL)	Mol	Biva	6	0.24	92.20	2	33
Nephtys picta	Ann	Poly	6	0.24	92.44	4	67
Prionospio (LPIL)	Ann	Poly	6	0.24	92.68	2	33
Sipuncula (LPIL)	Sip	-	6	0.24	92.92	4	67
Spio pettiboneae	Ann	Poly	6	0.24	93.16	2	33
Spiophanes missionensis	Ann	Poly	6	0.24	93.40	3	50
Tellina versicolor	Mol	Biva	6	0.24	93.64	2	33
Bhawania heteroseta	Ann	Poly	5	0.20	93.83	1	17

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Table 5 continued:

Taxa	Phylum	Class	No. of Individuals	% Total	Cumulative %	Station Occurrence	% Station Occurrence
Erichthonius brasiliensis	Art	Mala	5	0.20	94.03	3	50
Magelona sp. H	Ann	Poly	5	0.20	94.23	1	17
Mooreonuphis nebulosa	Ann	Poly	5	0.20	94.43	1	17
Argissa hamatipes	Art	Mala	4	0.16	94.59	3	50
Fimbriosthenelais (LPIL)	Ann	Poly	4	0.16	94.75	3	50
Leitoscoloplos (LPIL)	Ann	Poly	4	0.16	94.91	3	50
Monocorophium tuberculatum	Art	Mala	4	0.16	95.07	1	17
Pectinaria gouldii	Ann	Poly	4	0.16	95.23	2	33
Pinnixa (LPIL)	Art	Mala	4	0.16	95.39	3	50
Polydora cornuta	Ann	Poly	4	0.16	95.54	3	50
Sigalionidae (LPIL)	Ann	Poly	4	0.16	95.70	1	17
Spiophanes (LPIL)	Ann	Poly	4	0.16	95.86	1	17
Amphilochidae (LPIL)	Art	Mala	3	0.12	95.98	2	33
Cyclaspis varians	Art	Mala	3	0.12	96.10	3	50
Elasmopus levis	Art	Mala	3	0.12	96.22	1	17
Fimbriosthenelais sp. A	Ann	Poly	3	0.12	96.34	2	33
Lucinidae (LPIL)	Mol	Biva	3	0.12	96.46	1	17
Nephtyidae (LPIL)	Ann	Poly	3	0.12	96.58	2	33
Phyllodoce mucosa	Ann	Poly	3	0.12	96.70	1	17
Tellina iris	Mol	Biva	3	0.12	96.82	2	33
Tubificidae (LPIL)	Ann	Olig	3	0.12	96.94	1	17
Acanthohaustorius (LPIL)	Art	Mala	2	0.08	97.02	1	17
Ampharetidae (LPIL)	Ann	Poly	2	0.08	97.10	2	33
Aricidea (LPIL)	Ann	Poly	2	0.08	97.18	1	17
Bathyporeia parkeri	Art	Mala	2	0.08	97.26	2	33
Branchiostoma (LPIL)	Cho	Lept	2	0.08	97.33	1	17
Capitellidae (LPIL)	Ann	Poly	2	0.08	97.41	1	17
Dipolydora socialis	Ann	Poly	2	0.08	97.49	1	17
Euceramus praelongus	Art	Mala	2	0.08	97.57	1	17
Gastropoda (LPIL)	Mol	Gast	2	0.08	97.65	2	33
Glycera (LPIL)	Ann	Poly	2	0.08	97.73	2	33
Lineidae (LPIL)	Rhy	Anop	2	0.08	97.81	1	17
Listriella barnardi	Art	Mala	2	0.08	97.89	2	33
Maldanidae (LPIL)	Ann	Poly	2	0.08	97.97	2	33
Phascolion strombi	Sip	-	2	0.08	98.05	2	33
Phyllodocidae (LPIL)	Ann	Poly	2	0.08	98.13	2	33
Spio (LPIL)	Ann	Poly	2	0.08	98.21	1	17
Unciola (LPIL)	Art	Mala	2	0.08	98.29	1	17
Abra aequalis	Mol	Biva	1	0.04	98.33	1	17
Acanthohaustorius intermedius	Art	Mala	1	0.04	98.37	1	17
Americamysis bahia	Art	Mala	1	0.04	98.41	1	17
Ampelisca (LPIL)	Art	Mala	1	0.04	98.45	1	17
Apoprionospio (LPIL)	Ann	Poly	1	0.04	98.49	1	17
Apseudes sp. A	Art	Mala	1	0.04	98.53	1	17
Armandia maculata	Ann	Poly	1	0.04	98.57	1	17
Bathyporeia (LPIL)	Art	Mala	1	0.04	98.61	1	17
Calyptraeidae (LPIL)	Mol	Gast	1	0.04	98.65	1	17
Clymenella torquata	Ann	Poly	1	0.04	98.69	1	17
Corophiidae (LPIL)	Art	Mala	1	0.04	98.73	1	17
Eumida sanguinea	Ann	Poly	1	0.04	98.77	1	17
Glycera sp. E	Ann	Poly	1	0.04	98.81	1	17
Glyceridae (LPIL)	Ann	Poly	1	0.04	98.85	1	17
Haustoriidae (LPIL)	Art	Mala	1	0.04	98.89	1	17
Hesionidae (LPIL)	Ann	Poly	1	0.04	98.93	1	17
Lyonsia hyalina	Mol	Biva	1	0.04	98.97	1	17

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Table 5 continued:

Taxa	Phylum	Class	No. of Individuals	% Total	Cumulative %	Station Occurrence	% Station Occurrence
Magelona pettiboneae	Ann	Poly	1	0.04	99.01	1	17
Marginellidae (LPIL)	Mol	Gast	1	0.04	99.05	1	17
Melinna maculata	Ann	Poly	1	0.04	99.09	1	17
Mesanthura (LPIL)	Art	Mala	1	0.04	99.12	1	17
Monticellina dorsobranchialis	Ann	Poly	1	0.04	99.16	1	17
Nephtys simoni	Ann	Poly	1	0.04	99.20	1	17
Nereididae (LPIL)	Ann	Poly	1	0.04	99.24	1	17
Nereis acuminata	Ann	Poly	1	0.04	99.28	1	17
Nereis micromma	Ann	Poly	1	0.04	99.32	1	17
Notomastus (LPIL)	Ann	Poly	1	0.04	99.36	1	17
Oliva sayana	Mol	Gast	1	0.04	99.40	1	17
Pagurus (LPIL)	Art	Mala	1	0.04	99.44	1	17
Parametopella cypris	Art	Mala	1	0.04	99.48	1	17
Paramphinome sp. B	Ann	Poly	1	0.04	99.52	1	17
Parapionosyllis longicirrata	Ann	Poly	1	0.04	99.56	1	17
Parougia caeca	Ann	Poly	1	0.04	99.60	1	17
Periclimenes (LPIL)	Art	Mala	1	0.04	99.64	1	17
Pettiboneia duofurca	Ann	Poly	1	0.04	99.68	1	17
Processa hemphilli	Art	Mala	1	0.04	99.72	1	17
Sabellaria vulgaris	Ann	Poly	1	0.04	99.76	1	17
Semelidae (LPIL)	Mol	Biva	1	0.04	99.80	1	17
Solemya velum	Mol	Biva	1	0.04	99.84	1	17
Strombiformis bilineatus	Mol	Gast	1	0.04	99.88	1	17
Syllidae (LPIL)	Ann	Poly	1	0.04	99.92	1	17
Tectonatica pusilla	Mol	Gast	1	0.04	99.96	1	17
Terebra concava	Mol	Gast	1	0.04	100.00	1	17

Taxa Key

Ann=Annelida
Olig=Oligochaeta
Poly=Polychaeta
Art=Arthropoda
Mala=Malacostraca
Cho=Chordata
Lept=Leptocardia
Cni=Cnidaria
Anth=Anthozoa
Ech=Echinodermata
Ophi=Ophiuroidea
Mol=Mollusca
Biva=Bivalvia
Gast=Gastropoda
Pho=Phoronida
Pla=Platyhelminthes
Turb=Turbellaria
Rhy=Rhynchocoela
Anop=Anopla
Sip=Sipuncula

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Figure 3. Abundance of major macroinvertebrate taxa groups for the Brunswick ODMDS stations, 2006.

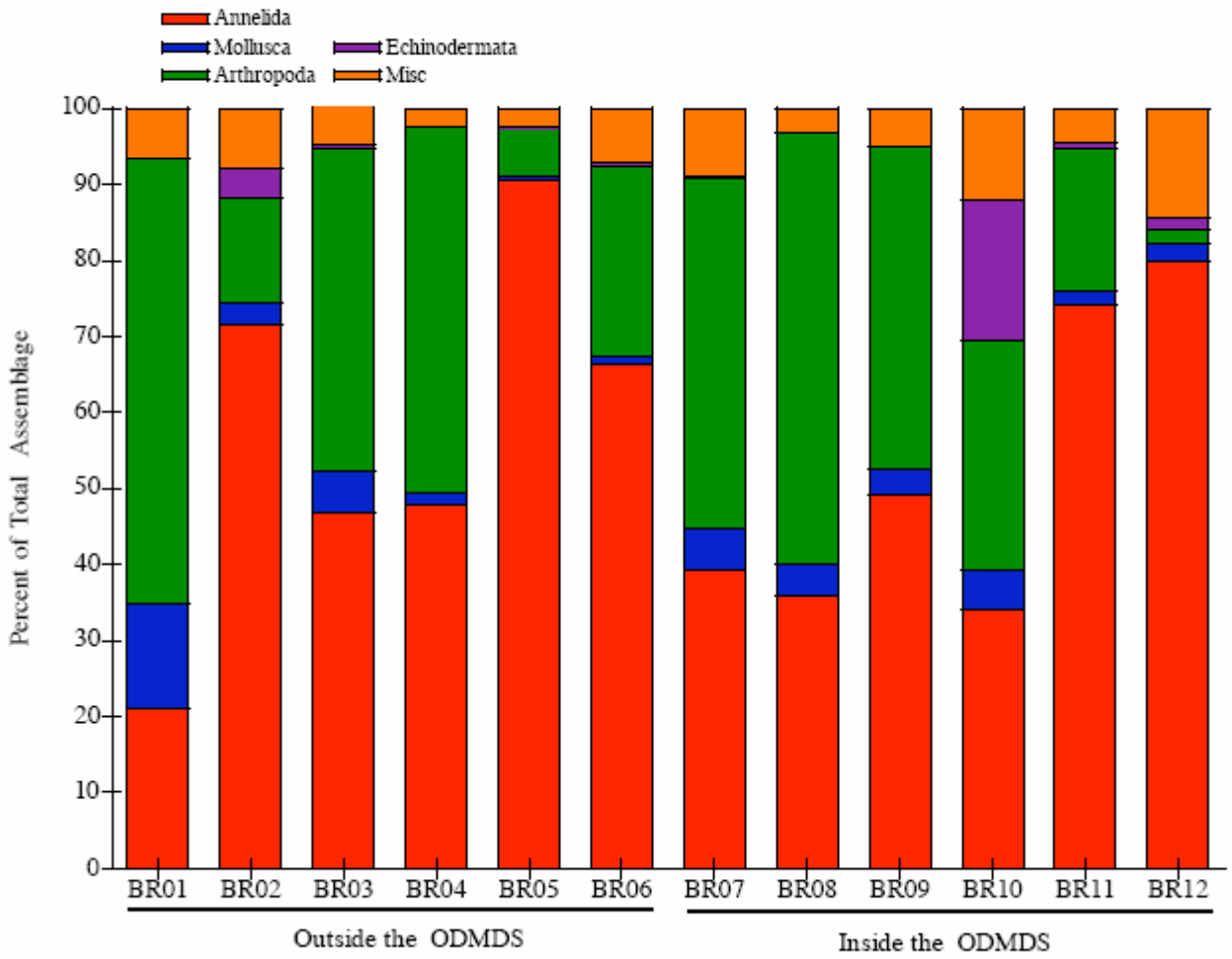

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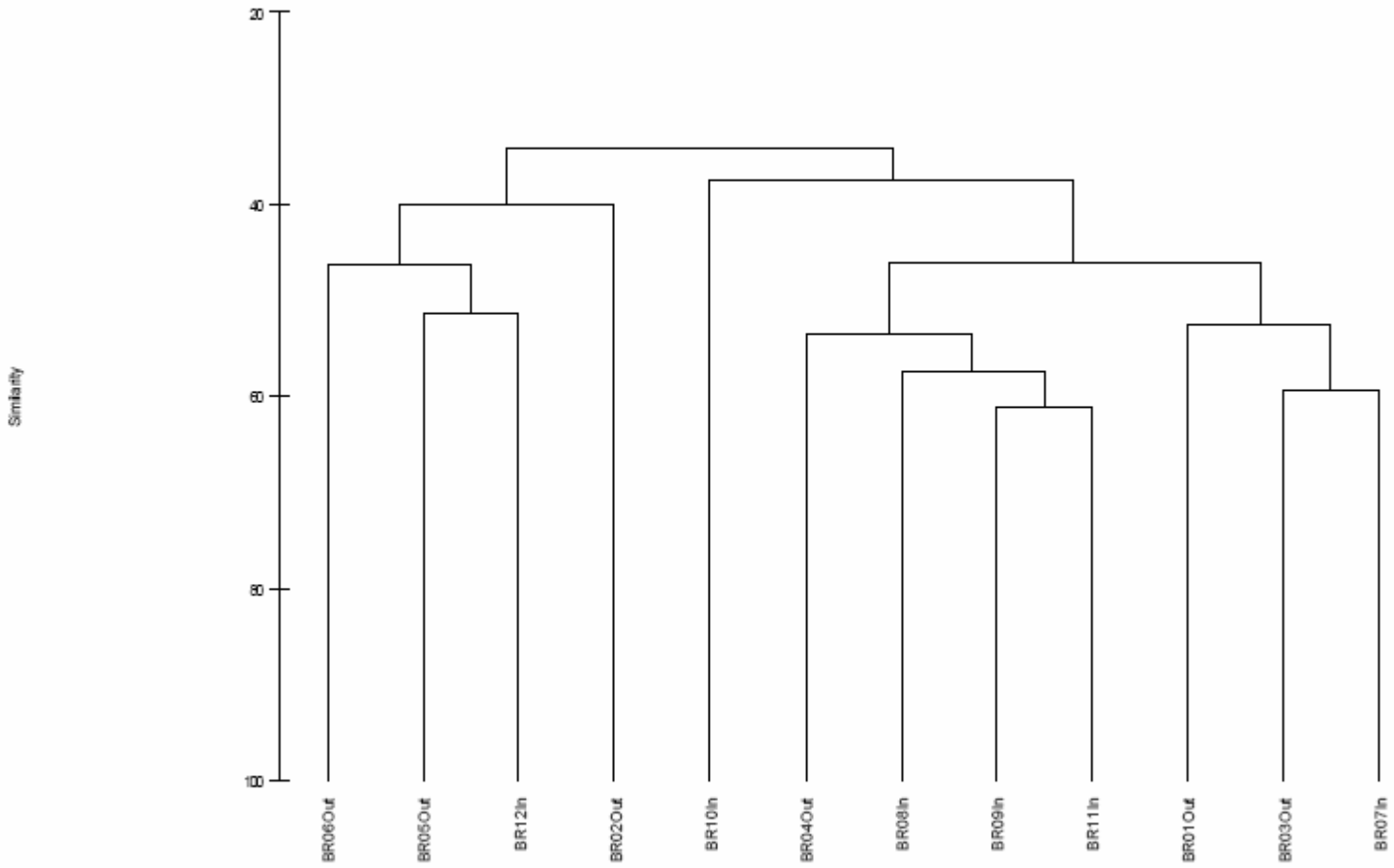
Figure 10. Cluster analysis of the Brunswick ODMDS stations, 2006.



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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

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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

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PCB Congener	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

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