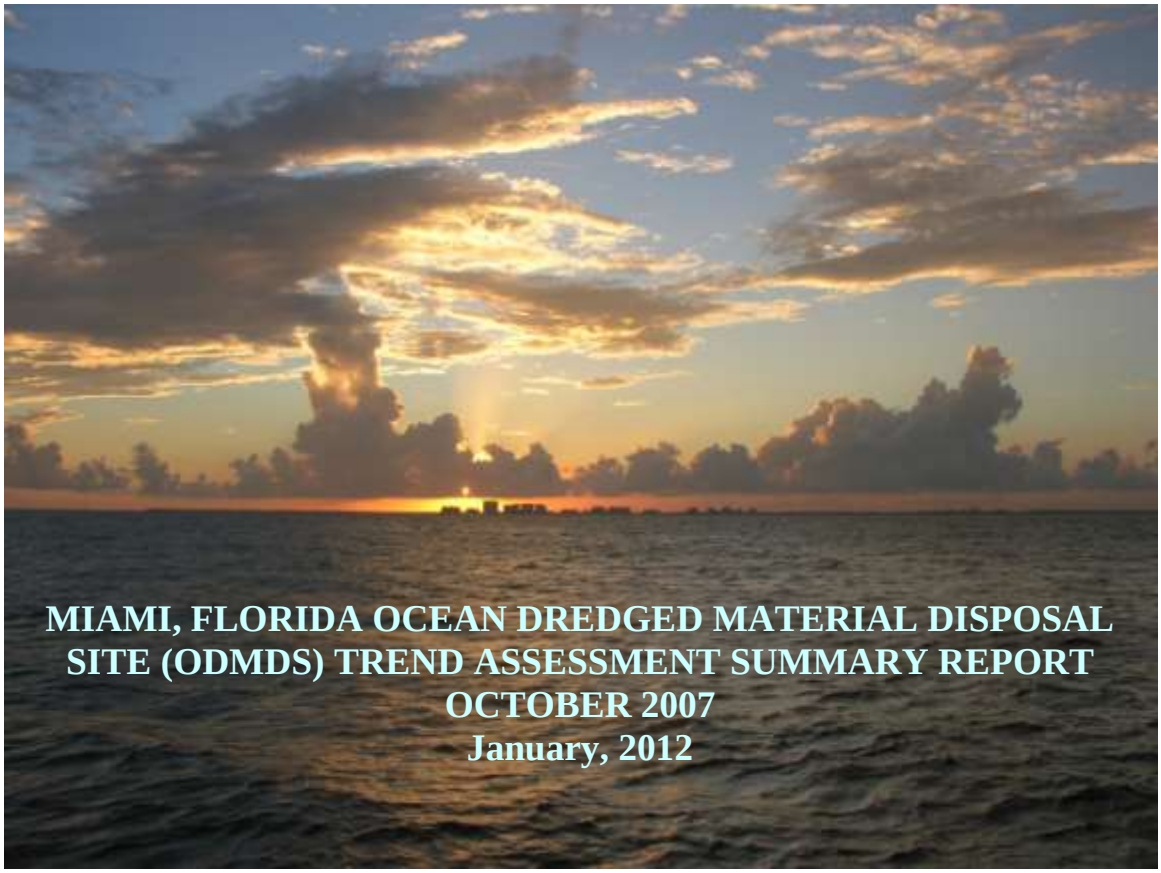
United States Environmental Protection Agency

Region 4

Water Protection Division

Wetlands Coastal and Oceans Branch

Atlanta, Georgia



MIAMI, FLORIDA OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS) TREND ASSESSMENT SUMMARY REPORT OCTOBER 2007

January, 2012

REPORT REFERENCE

This report consists of an excerpt from the full study report *Miami Ocean Dredged Material Disposal Site (ODMDS) and South Florida Reference Evaluation (SFLARE) Final Report; Revision 1: April 3, 2009* by the EPA Region 4 Science and Ecosystem Support Division. The full study report includes appendixes with complete data results and the results of additional oceanographic studies conducted in concert with the 2007 Trend Assessment Study but unrelated to the Miami ODMDS. A copy of the full report is available upon request.

ACKNOWLEDGEMENTS

Samples were collected October 4-7, 2007 from the Miami and Port Everglades Ocean Dredged Material Disposal Sites (Christopher McArthur, Site Manager, Mel Parsons, Chief Scientist). Sample tracking and custody and particle size analyses were performed by Phyllis Meyer. Water Quality profiling and sampling were led by Mel Parsons. Sediment sampling was led by Morris Flexner, candidate Chief Scientist. On-board sample processing of the invertebrate samples, chemical samples and the sediment particle size samples were conducted by Doug Johnson, Don Norris, Jennifer Derby**,** Don Fortson, Doug Jager and Chanda Littles, respectively.

TABLE OF CONTENTS

LIST OF TABLES – APPENDIX A

LIST OF FIGURES

MIAMI, FLORIDA OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS) TREND ASSESSMENT SUMMARY REPORT OCTOBER 2007

1.0 INTRODUCTION

At the request of the US-EPA R4, Coastal Section, the R4 Science and Ecosystem Support Division (SESD), Ecological Assessment Branch (EAB), in collaboration with R4 Coastal Section personnel conducted a status and trends study of the Miami Ocean Dredged Material Disposal Site (ODMDS) in order to characterize the chemical, physical and biological characteristics within and surrounding these disposal sites.

2.0 BACKGROUND INFORMATION

EPA designated the Miami ODMDS in 1995. The ODMDS is used for the disposal of new work and maintenance material from the Miami Harbor Civil Works Navigation Project and from a few other very small projects (e.g. USCG and NOAA). A Site Management and Monitoring Plan was developed for the site at designation and is currently under revision. Comments received so far have indicated a need for a status and trends survey at the ODMDS as a follow-up to the 2006 Sediment Profile Imaging survey and the 1986 baseline study. A component of all EPA Region 4 monitoring strategies is the routine (approximately 10 year) assessment of the status and trends at the ODMDS. This includes monitoring for any changes in the physical, chemical and biological characteristics of the seafloor in and around the ODMDS as well as any changes in the properties of the water column. The last status and trends survey to have been completed at the Miami ODMDS was in 1986 which was the baseline for site designation. It was conducted by Conservation Consultants, Inc. A survey of the sediments following disposal of uncharacterized material in the late 1990's was conducted by the US-EPA Atlanta Water Management Division (WMD) and Athens Science and Ecosystem Support division (SESD) in 2000 (US-EPA 2001). Only the physical and chemical properties of the sediments were evaluated during this study. Additional sediment and water quality data are needed to reassess the status and trends at this site since the 1986 baseline study.

3.0 OBJECTIVES

The objective of the project was to characterize the grain size, chemistry and biology of the benthos within and outside of the Miami ODMDS, as well as identification of any anomalies which may be present within the water column. Over time, the individual surveys will allow for observation of status and trends.

4.0 SURVEY/SAMPLING METHODOLOGIES

4.1 Station Locations

Eighteen stations in and around the Miami ODMDS (Figure 1), were sampled for sedimentological, macroinvertebrate and chemistry samples utilizing the 0.1 m^2 deep ocean Van Veen Grab. Surface and bottom water samples were collected at five of the eighteen sediment stations.

Actual sampling station locations were determined by Differential Global Positioning System (DGPS) on board the OSV BOLD. Samples were collected within a 100 meter radius of the Ship's bridge GPS location for the listed station coordinates. A GPS unit was installed on the stern of the Ship in order to determine, as accurately as possible the exact location where a sample was collected. This latitude and longitude was then used as the location for the sediment chemistry sampling collected via the 0.1 m^2 Van Veen Grab.

All sampling procedures and sample preservation for analyses were conducted according to the Science and Ecosystem Support Division (SESD), Ecological Assessment Branch (EAB) Operating Procedures listed in Section 5.2 of this report.

4.2 Sampling Methods

4.2.1 Sediment Sampling

Sediment samples collected during the survey were analyzed for sediment particle size distribution (PSD), sediment chemistry and benthic macroinvertebrate identification. Sediment chemistry included analysis for PCBs, pesticides, semi-volatile organics, metals, and organo-tins. With the exception of organo-tins, sediment chemistry and PSD analysis were performed by the SESD laboratory in Athens, Georgia. Organo-tins were analyzed by Columbia Analytical Laboratory in Kelso, WA. Benthic macroinvertebrate identification was performed by Barry Vittor and Assoc. in Mobile, AL.

Sediment samples, analyzed for macroinvertebrate species identification, PSD and sediment chemistry, were collected from the BOLD utilizing the 0.1 m^2 deep water Vanveen Grab (supplied by the OSV Bold). Each Vanveen Grab was partitioned at each site for macroinvertebrates, PSD and sediment chemistry. Once on board, the sample was deposited into a large stainless steel pan and carefully aliquoted into #35 screened (0.5 mm) sieve buckets. The sample was washed through the screen until all of the particles smaller than 0.5 mm passed through the screen. The sample retained on the screen after sieving was carefully washed into a cloth sample bag. This was repeated until all of the material collected by the grab had been sieved. Once all material was sieved, the sample bag was properly labeled and placed into a five gallon bucket containing a 10 % seawater formalin solution. Sample bags and buckets were labeled both internally and externally and stored for transfer to contract lab facilities for taxonomic identification.

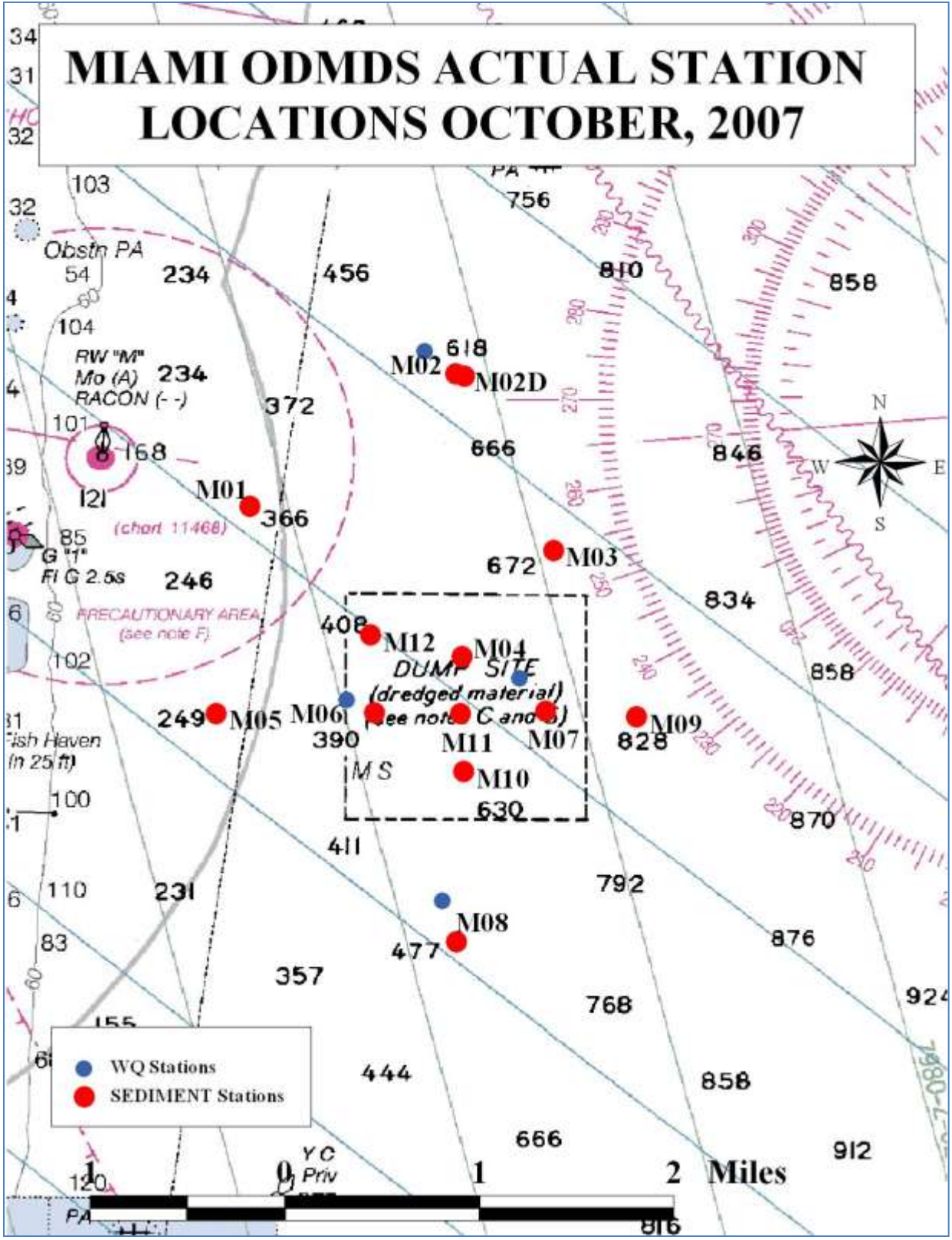


FIGURE 1 – Miami ODMDS Station Locations

Note: Stations with blue dot symbols are water quality sampling sites

One eight ounce container was analyzed for PCBs, pesticides and semi-volatile organics, one eight ounce container was analyzed for metals and one was analyzed for organo-tins. Two whirl-paks were analyzed for particle size distribution. One whirl-pak for PSD was measured via a laser particle size analyzer for particle size classes 2 mm or less by SESD and the other whirl-pak was analyzed by the wet sieve method by Vittor & Associates. At stations M06 and M08, on the western edge and due south of the ODMDS, respectively, a few calcareous rocks were present in the Van Veen grab sample and removed from the grab prior to the particle size sample collection at these stations. At stations M11 and M12 within the ODMDS, large pieces of calcareous lime rock were contained within the grab sample. At station M11, two pieces of rock greater than 10 cm were removed from the benthic sample and three pieces of rock greater than 15 cm were removed from the particle size sample. All large pieces of rock and rubble were removed from these samples prior to the collection of the particle size sample. Wet sieve determinations from these sites were conducted by Vittor & Associates with the larger material removed at each of these sites.

Sediment samples for chemistry and particle size distribution (PSD) were collected from half of the Vanveen grab. The benthic sample was obtained from the remaining half of the grab. Pre-cleaned stainless steel spoons were used for this task. At one station, M02, a duplicate sample was collected for QA purposes. The samples from each location were then homogenized and aliquoted into five eight ounce glass containers, and two whirl-pak containers. One eight-ounce container was analyzed for PCBs, one was analyzed for pesticides and semi-volatile organics, one was analyzed for metals and one was analyzed for organo-tins. The two whirl-paks were analyzed for particle size to associate with sediment chemistry. The eight ounce containers were stored at 4^{o}C and the whirl-pak samples were frozen.

Benthic macroinvertebrate samples were collected utilizing half of the 0.1 m^2 Van Veen Grab. The sample was split from the same grab as sediment chemistry and particle size, from an area within the grab that was 30 cm x 14 cm x 10 cm deep (0.04 m^2). Once on board, the sample was deposited into a large stainless steel pans and aliquoted into #35 screened (0.5 mm) sieve buckets. The sample was washed through the screen until all of the particles smaller than 0.5 mm passed through the screen. The sample retained on the screen after sieving was carefully washed into a sample bag. This was repeated until all of the material subsampled from the grab had been sieved. The sample retained sometimes filled more than one sample bag. Once all material was sieved, the sample bags were properly labeled and placed in a five gallon bucket containing a 10% seawater formalin solution. Sample bags and buckets were labeled both internally and externally and stored for transfer to contract lab facilities for taxonomic identification.

All sample handling and labeling complied with the requirements of SESD Operating Procedure for Sample and Evidence Management (USEPA 2007h).

4.2.2 Water Sampling

Water samples were collected and physicochemical parameters measured by means of the Ship's Conductivity, Temperature, and Depth (CTD) rosette water collection system. Besides conductivity, temperature and depth, the CTD also measures salinity, dissolved oxygen, and light transmissivity. Ship's personnel were responsible for maintaining calibration of the instrument and insuring that it is in good working order prior to the survey. Samples were collected at the surface and bottom in the vicinity of stations M02, M06, M07, M08 (Figure 1). In addition, a water column profile to measure temperature, salinity, dissolved oxygen, light transmittance and depth was conducted at Miami station M05 (Figure 1). Water samples were analyzed for the same suite of chemical parameters as the sediment samples. Due to the short holding times for water samples being analyzed for semi-volatile organics, (7 days), all water samples were collected on the last day of the survey.

5.0 Data Management

5.1 Documentation and Records

Field log books were maintained according to SESD OP for Field Records, SESDPROC-010-R1 (USEPA, 2007a) by each crew for the duration of the field survey. All log books have been maintained by the project leader. Upon completion of the final report, the log books and associated project records will be stored in the SESD Records Center. All data generated for this field investigation, whether hand-recorded or recorded and stored in an electronic data logger, have been recorded, stored and managed according to the following procedures:

SESD Operating Procedure for Control of Records (USEPA, 2007k)

Copies of the final report will be provided to the EPA Region 4 Water Management Division – Wetlands, Coastal and Watersheds Branch for distribution to the US Army Corps of Engineers (COE) and other interested parties. A copy of the final report will also be maintained in the SESD Records Center. Upon completion of all analyses and data reviews, the data will be stored electronically in the Region 4 Data Archival and Retrieval System (DART).

5.2 Quality Assurance and Quality Control

Quality control procedures were used in the field to ensure that reliable data were obtained. A duplicate sample was collected at station M02 for all sampled sediment chemistry parameters in the study. Matrix-spike, matrix duplicate samples for the pesticides, PCBs and PCPs in water were collected at station M07. A duplicate sample was collected at station M08 for all sampled water chemistry parameters in the study. Preservative blanks for each kit used during processing were analyzed. All sampling and measurement activities were conducted in accordance with the SESD field branches quality management system. All samples/sample locations were prescribed by the Water Management Division to meet the field investigation purposes and objectives for management of the Miami ODMDS.

The results of all QC sampling results for all water samples were reported at levels either below the reporting limit or within a few one-hundreths of the reporting limit for all MSMSD samples collected at station M07 and the results of all duplicate samples from station M08-07-CWTD were either identical to or very similar to the results reported from station M08-07-CWT for pesticides, semi-volatiles and pcb congeners. The method blank for total metals was below the reporting limit for all metals, the tributyltin duplicate at station M08 reported similar either identical or similar values for all tributyltins. The QA/QC rinse blank reported levels below the reporting limit for all pesticides, semi-volatiles and pcb congeners.

The results of all QC sampling results for all sediment samples were reported at levels either below the reporting limit or within a few one-hundreths of the reporting limit for all duplicate samples collected at station M02-07D-SD and the results of all duplicate samples were either identical to or very similar to the results reported from station M02-07-SD for pesticides/TOC, semi-volatiles and total metals and particle size distribution (PSD). The MS and MSD samples for tributyltins were equivalent. The one exception for QC were the results from station M02-07D-SD for pcb congeners. The results at this duplicate station were several times higher for 17 out of 26 of the listed congeners. The duplicate sediment sample at station M02 was collected on 10/05/07, the day following the original collection. Although the coordinates for each collection at M02 were very close to each other, the differences detected are indicative of the inherent variability of contaminant levels that occur in marine sediment.

All sample handling, processing, and preservation was according to EPA/SESD SOPs as follows:

Analytical Support Branch Laboratory Operations and Quality Assurance Manual, US Environmental Protection Agency, Region 4, Science and Ecosystem Support Division, Analytical Support Branch, Athens, GA.

SESD Operating Procedures for Sediment Sampling (SESDPROC-200-R0)

SESD Operating Procedures for Surface Water Sampling (SESDPROC-201-R0)

SESD Operating Procedures for Marine Macroinvertebrate Sampling (SESDPROC-511-R0)

SESD Operating Procedure for Tissue Sample Handling and Processing (SESDPROC-602-Draft)

SESD Operating Procedures for Sample and Evidence Management (SESDPROC-005-R0)

SESD Operating Procedure for Field Records (SESDPROC-010-R0)

SESD Operating Procedure for Field Sampling Quality Control (SESDPROC-011-R0)

SESD Operating Procedure for Packaging, Marking, Labeling and Shipping of Environmental Samples (SESDPROC-206-R0)

EPA 2000. Diving Safety Manual, Version 1.1. Office of Administration and Resources Management, Safety, Health and Environmental Management Division, Washington, DC.

5.3 Data Validation/Verification

All data were determined to fall within EAB tolerances, and therefore none were flagged when used in water quality and/or grain size analyses. Hand-recorded data were transcribed to spreadsheet or other electronic format for EAB analysis. Transcriptions were independently verified for accuracy. This report includes tables of water quality sampling and sediment sampling results (Appendix A).

6.0 Project Management

Data collection was managed through the Ecological Assessment Branch (EAB) with guidance from the Region 4 Water Management Division (WMD). The project leader and candidate Chief Scientist from EAB was Morris Flexner. Mel Parsons was the EAB Chief Scientist and mentor for the project. Chris McArthur was a crew chief responsible for sample collection, processing and study logistics. Phyllis Meyer was the task lead for sample labeling, tracking and chain-of-custody procedures. Crew assignments are presented in Section 10 of this report.

7.0 Project Schedule

Field work for this project was conducted during the week of October 1, 2007. Monitoring efforts for this survey were concluded on Friday morning, October 12, 2007 (Table 2).

8.0 Results and Discussion

8.1 Miami ODMDS Water Quality Results including Oxygen, Salinity, Temperature, Turbidity and Depth Profiles

The results of the water quality profiles are summarized in the station specific plots of oxygen saturation (mg/l), salinity (psu), temperature (°C) and seapoint turbidity (FTU) with respect to depth (m) below. In general, the range of values provided at the five stations below demonstrate adequate mixing within the Miami ODMDS's water column.

Seapoint turbidity ranged from 0 to 25 formazin turbidity units (FTU), while dissolved oxygen (DO) readings ranged from 6.25 to 9.0 mg/l (Figures 2-6). Temperature and salinity also indicated that the waters within (stations M06 & M07) and around (station M02, M05 & M08) the disposal site are well-mixed above 60m, with established thermoclines ranging from 60 to 140 m. Temperatures ranged from 10 to 39.75 °C; salinities ranged from 35.9 to 36.6 practical salinity units (PSU) (Figures 2-6). Ocean water has a salinity of approximately 35 psu. Depth ranged from 70 m at station M05 to 225 m at station M07. A depth profile (Figure 7) from a previous OSV Bold survey,

indicates the steepness and depth of the sites on the eastern edge of the ODMDS, including the deepest station of this survey, M07.

Chemical analyses of the water samples collected as part of this study showed all analytes to be at or below the detection limit for pesticides (Table 4), semi-volatiles (Table 5), polychlorinated biphenyls (PCBs) (Table 6) and tributyl tins (Table 8). For total metals (Table 7) there were limited detections for arsenic, copper, lead and zinc, with none of these metals detected above 2.0 µg/l, which was well below the marine acute and chronic ambient water quality criteria (Buchman, 1999).

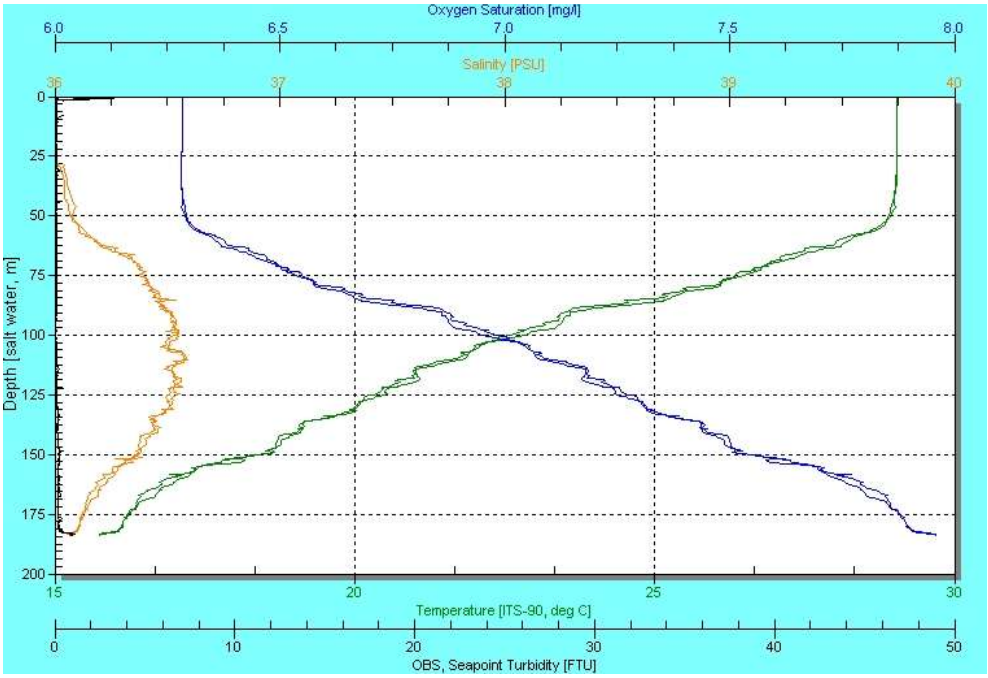


Figure 4. Oxygen, Salinity, Temp. and Turbidity Profiles, Station M02

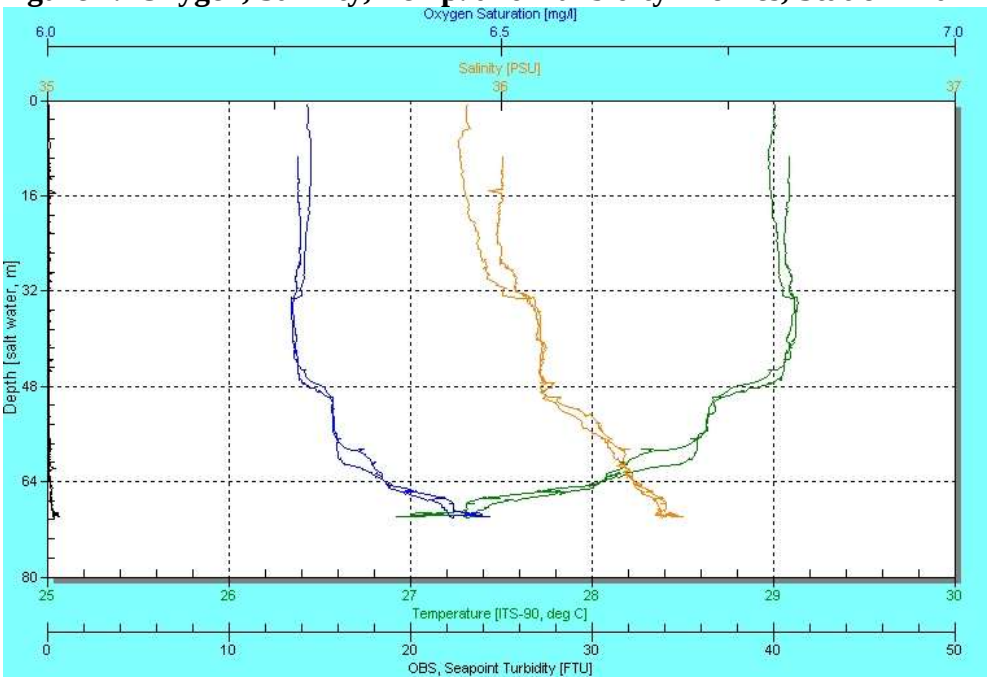


Figure 5. Oxygen, Salinity, Temp. and Turbidity Profiles, Station M05

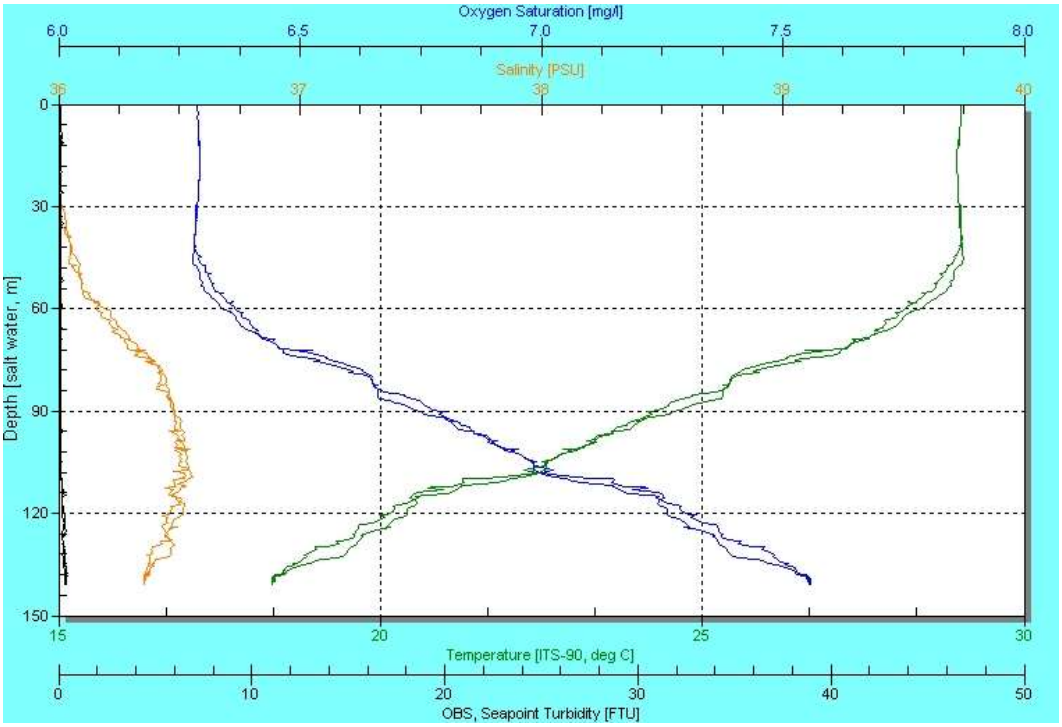


Figure 6. Oxygen, Salinity, Temp. and Turbidity Profiles, Station M06

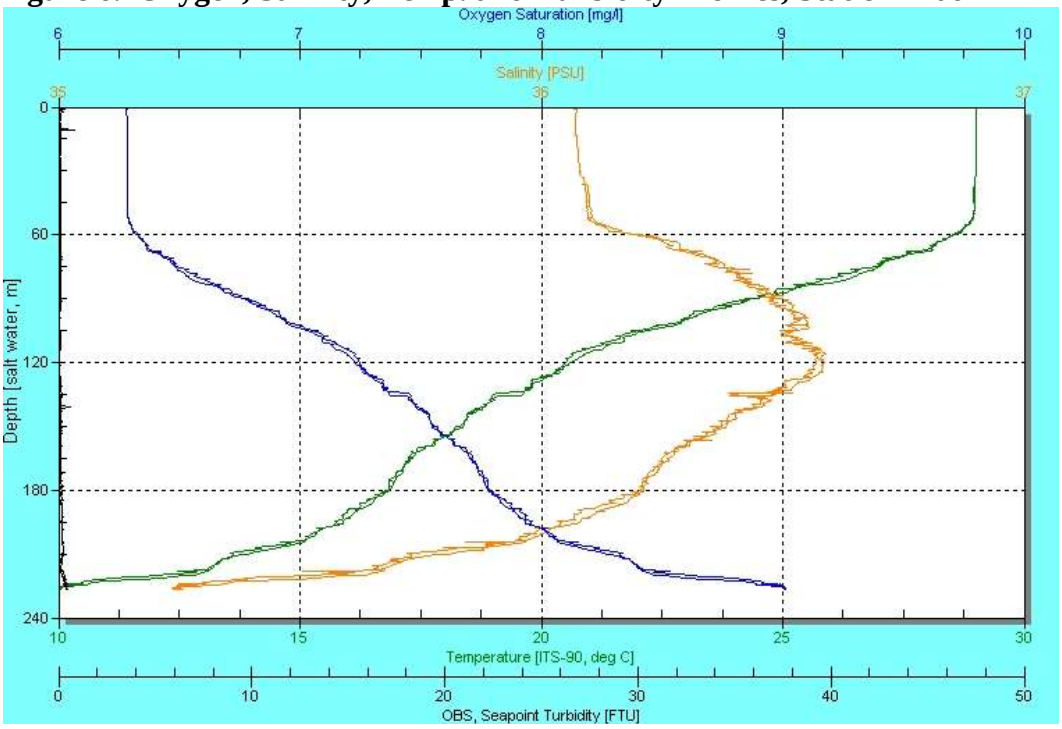


Figure 7. Oxygen, Salinity, Temp. and Turbidity Profiles, Station M07

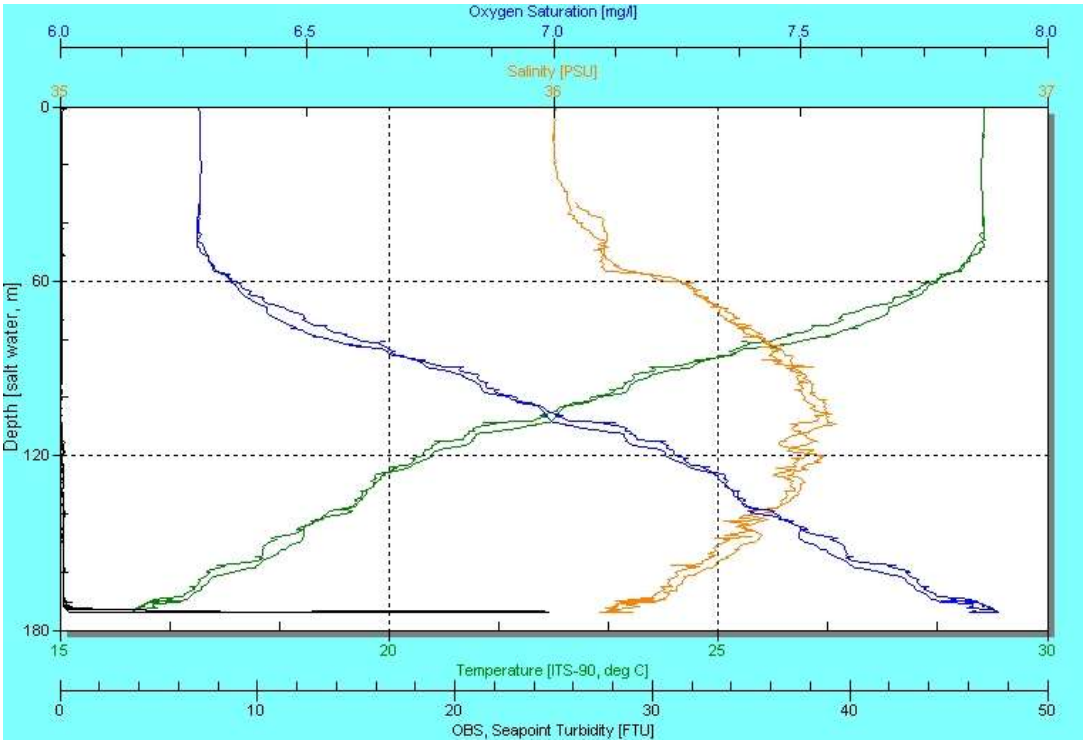


Figure 8. Oxygen, Salinity, Temp. and Turbidity Profiles, Station M08.

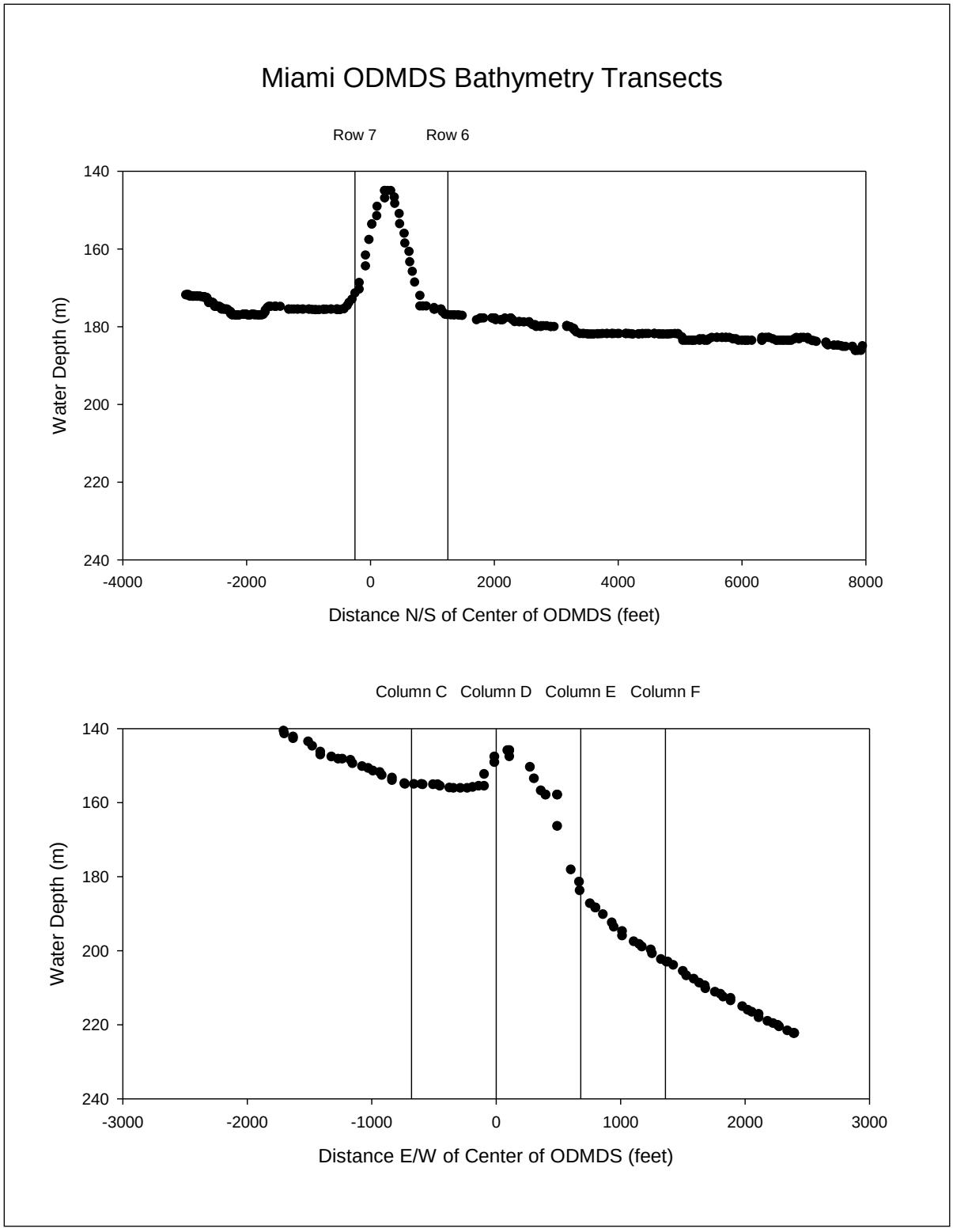


Figure 9. Depth Profile of the Miami ODMDS (m), OSV Bold Survey, 2006.

8.2 Seafloor Sampling

8.2.1 Sediment Particle Size

The summary results of the sediment particle size analyses are provided in Table 4. In general, all stations were found to be predominantly clayey silt or clayey sand. The one exception was station M08 which was silty sand. The two notable exceptions were station M11 and M12 inside the ODMDS which contained 6 and 18% gravel, respectively. The mean median particle sizes or D_{50s} (µm) that were analyzed with a Coulter Laser for material less than 2 mm were 69.7 outside and 47.3 inside the Miami ODMDS. Therefore, the laser analysis determined that the median particle size was very fine sand outside the Miami ODMDS and silt inside the ODMDS.

8.2.2 Sediment Chemistry

The sediment chemistry showed all contaminants to be below the minimum reporting limits (MRLs) for pesticides (Table 12, Appendix C) with the notable exception of several of the semi-volatile compounds, particularly at stations located inside the Miami ODMDS (M04, M07, M10 & M11). The highest recorded semi-volatile compound was 82 µg/kg dry weight of pyrene at station M04 inside the Miami ODMDS (Table 13). Nine metals, namely aluminum, arsenic, chromium, copper, iron, lead, manganese, mercury and zinc were measured both inside and outside the Miami ODMDS above the MRLs. Copper was reported above the NOAA Threshold Effects Level (TEL) of 18.7 ppm at stations M04(23 ppm), M07(22 ppm), M09 (24 ppm) and M10 (21 ppm) and above the Effects Range Low (ERL) of 34 ppm at station M11 (49 ppm) (Buchman, 1999, Table 11). Lead was reported above the TEL of 30.2 ppm at station M04 (34) as well.

Most of the metals transported by rivers to the ocean are tightly bound in the aluminosilicate solid phases (Windom, 1988). When dissolved metals come in contact with saline water, they adsorb to particulate matter and are removed from the water column to bottom sediments (Windom, 1988). Therefore, metals are concentrated in the estuarine bottom sediments, not in the water column (Windom, 1988). Because of its high natural abundance and the relatively small inputs from anthropogenic sources, aluminum has been used to normalize metal data as an aid to interpretation of results. Levels of As, Cr, Cu, Pb and Zn were plotted against Al to assess the linear relationship between AL and these metals both inside and outside the ODMDS. The best linear relationship was determined between Cr and Al, with $R^2 = 0.66$; the worst being Cu vs. Al, $R^2 = 0.40$.

Because the average concentrations for stations from within the Miami ODMDS were similar to the average concentration for stations from outside the site, for all metals, a test for statistical difference between these two treatments was not deemed necessary.

Tri-n-butyltin, Di-n-butyltin and n-Butyltin were detected at stations both inside and outside the Miami ODMDS (Table 12). The highest recorded value of tri-n-butyltin was 65 µg/kg dry weight inside the ODMDS at station M12. Di-n-butyltin was detected at 4 out of 6 stations inside the ODMDS. The highest recorded value of di-n-butyltin was 29 µg/kg dry weight inside the ODMDS at station M12. N-Butyltin was detected at stations M11 and M12 inside the ODMDS with 4.6 µg/kg dry weight as the highest recorded value of n-Butyltin, also at station M12.

Several polychlorinated biphenyl (PCB) congeners were detected in sediment at four stations inside the Miami ODMDS and at two stations outside the ODMDS (Table 13). Sixteen of the 26 PCB congeners were detected in sediment (Table 13). The highest recorded congener value was PCB congener #180, with a value of 16,000 ng/kg dry weight at station M07 inside the ODMDS. The arithmetic mean of all PCB congeners from stations outside of the Miami ODMDS was 115.4 ng/kg, whereas the arithmetic mean of all of the PCB congeners from inside the Miami ODMDS was 1399.6 ng/kg, dry weight. All non-detected values were averaged as ½ of the minimum MRL provided by the SESD analytical services branch (ASB) laboratory. Thus, PCB congener values are approximately twelve times greater inside the ODMDS than outside the ODMDS. All of the twenty-six pcb congeners detected in sediment that were totaled by station exceeded the 21.55 ppb dry weight NOAA TEL and over half of the stations exceeded the NOAA TEL of 188.79 (Buchman, 1999, NOAA 1989, Table 14).

8.2.3 Benthic Macroinvertebrate Infauna

The benthic infauna data is detailed and summarized in "Miami, Florida ODMDS 2007 Benthic Community Assessment" (Vittor, 2008). Polychaetes were the most numerous inside the ODMDS representing 64.5% of the total assemblage and were followed in abundance by malacostracans (25.2%) and bivalves (11.1%). Polychaetes also ranked first in the number of taxa (64.4%) inside the ODMDS. Polychaetes were also the most numerous organisms present outside the ODMDS representing 46.9% of the total assemblage and were followed again by malacostracans (38.7%) and bivalves (7.4%). Polychaetes were also ranked first in the number of taxa (58.6%) outside the ODMDS.

The dominant taxon collected from the 6 stations inside the ODMDS was the amphipod, *Ampelisca agassizi*, representing 20.5% of the total number of individuals (Table 19, Appendix C). Other dominant taxa collected included the bivalve, *Dacrydium* (LPIL), and the polychaetes, *Terebellides* sp. A, *Levinsenia reducta*, and Ampharetidae (LPIL) representing 7.3%, 7.0%, and 6.5% of the total assemblage, respectively (Table 19). The most widely distributed taxa were the polychaetes, *Terebellides* sp. A and *Prionospio* (LPIL), each being found at 83% of the stations (Table 17). The dominant taxon collected from the 6 stations outside the ODMDS was also the amphipod, *A. agassizi*, representing 32.5% of the total number of individuals (Table 18). Other dominant taxa collected outside the ODMDS were the polychaete taxa, *Maldanidae (*LPIL*)* and *Prionospio (*LPIL*)*, representing 6.8% and 6.2% of the total assemblage,

respectively. The polychaetes Maldanidae (LPIL), *Prionospio* (LPIL), and Aricidea (LPIL) were found at 100% of the stations.

Mean densities ranged from 425 organisms/m^2 at station M11 to 7475 organisms/m^2 at station M03. Although densities averaged 4050 outside the ODMDS compared to 2617 inside the ODMDS, there was not a significant difference in densities between stations inside vs. outside the ODMDS (Vittor, 2008).

The number of taxa ranged from 14 taxa/station at station M11 to 53 taxa/station at station M09. Again, although taxa richness averaged 42 outside the ODMDS compared to 29 inside the ODMDS, there was not a significant difference in taxa richness between stations inside the ODMDS vs. the outside (Vittor, 2008).

The results of cluster, ANOSIM and SIMPER analyses are discussed in detail within Vittor, 2008. The ANOSIM (Analysis of Similarities) test was calculated to assess assemblage differences between samples within and outside the ODMDS using the Bray-Curtis similarity matrix. Subsequently, the SIMPER test was used to identify which taxa accounted for any observed differences between assemblage groups (Vittor, 2008). The ANOSIM and SIMPER tests were calculated using PRIMER (Clarke and Gorley, 2006). In summary, these results indicate that assemblages inside and outside the ODMDS are similar. Table 22 lists the infaunal community parameters by station and reflects the fact that station M11 has the lowest total taxa and lowest number of individuals of all of the Miami ODMDS stations. This decrease in species diversity could in part be due to the fact that this site is located in the middle of the ODMDS where there were large amounts of rubble.

9.0 CONCLUSIONS

When comparing the various study parameters between stations located inside and outside the Miami ODMDS, a few differences can be found. The percent gravel inside the ODMDS is higher than outside the ODMDS (4.18% vs. 0.47%) (Table 4). The percent sand is lower inside the ODMDS than on the outside (33% vs. 49%). The percent silt/clay is also higher inside the ODMDS than it is on the outside (63% vs. 51%).

There does not appear to be a substantial difference between the total metals detected inside and outside of the Miami ODMDS, although several metals inside the ODMDS were consistently higher than those outside the site. However, more semi-volatile compounds were detected at stations inside the ODMDS. Tri-butyltin values were also higher inside the ODMDS. Finally, the mean value of PCB congeners was approximately 12 times higher inside the ODMDS vs. the outside. Although there was higher taxa richness, diversity and density outside the ODMDS, there was not a significant difference between the outside and inside stations. Overall, the differences that were detected between the inside and outside of the Miami ODMDS may warrant future study to determine whether the measured differences are adversely effecting the chemical, physical and biological integrity of this designated area.

10.0 SCIENTIFIC PARTY

	Name	Survey Responsibility	Organization
1)	Mel Parsons	Chief Scientist	EPA/Athens
2	Phyllis Meyer	Sample Handling/Tracking	EPA/Athens
3)	Morris Flexner	CS Candidate/Sample Handling	EPA/Athens
4)	Chris McArthur	Crew Chief/Sample Handling	EPA/Atlanta
5)	Don Norris	Sample Handling	EPA/Athens
6)	Doug Johnson	Sample Handling	EPA/Atlanta
7)	Jennifer Derby	Sample Handling	EPA/Atlanta
8)	Don Fortson	Sample Handling	EPA/Athens
9)	Doug Jager	Sample Handling	EPA/Athens
10)	Chanda Littles	Sample Handling	EPA/Atlanta

11.0 REFERENCES

ASTM D-422.1994. Standard Test Method for Particle Size Analysis of Soils. American Society for Testing and Materials. Pennsylvania.

Buchman, M.F., 1999. NOAA Screening Quick Reference Tables, NOAA HAZMAT Report 99-1, Seattle, WA, Coastal Protection and Restoration Division, National Oceanic and Atmospheric Administration, 12 pages.

Clarke, K.R. and R.N. Gorley. 2006. PRIMER 6 (Plymouth Routines in Multivariate Ecological Research). Plymouth Marine Laboratory, Plymouth, United Kingdom.

NOAA. 1989. A Summary of Data on Tissue Contamination from the First Three Years (1986-1988) of the Mussel Watch Project. NOAA Tech. Mem. NOS OMA 49, Rockville, MD August 1989.

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

USEPA 2007. *Analytical Support Branch Laboratory Operations and Quality Assurance Manual*, US Environmental Protection Agency, Region 4, Science and Ecosystem Support Division, Analytical Support Branch, Athens, GA.

USEPA/USACE 2008. *Southeast Regional Implementation Manual (SERIM) for Requirements and Procedures for Evaluation of the Ocean Disposal of Dredged Material in Southeastern U.S. Atlantic and Gulf Coast Waters*. EPA 904-B-08-001. US EPA Region 4 and US ACOE, South Atlantic Division, Atlanta, GA. August 2008, 447 pgs.

USEPA 2007a. SESD Operating Procedure for Field Records (SESDPROC-010-R0).

USEPA 2007b. SESD Operating Procedure for Field Sampling Quality Control (SESDPROC-011-R0).

USEPA 2007c. SESD Operating Procedure for, Global Positioning System (GPS) (SESDPROC-110-R0)

USEPA 2007d. SESD Operating Procedures for Marine Macroinvertebrate Sampling (SESDPROC-511-R0)

USEPA 2007e. SESD Operating Procedure for Packaging, Marking, Labeling and Shipping of Environmental Samples (SESDPROC-206-R0).

USEPA 2007f. SESD Operating Procedures for Sediment Sampling (SESDPROC-200-R0)

USEPA 2007g. SESD Operating Procedures for Surface Water Sampling (SESDPROC-201-R0)

USEPA 2007h. SESD Operating Procedures for Sample and Evidence Management (SESDPROC-005-R0).

USEPA 2007i. SESD Operating Procedure for Tissue Sample Handling and Processing (SESDPROC-602-Draft).

USEPA 2007j. Operating Procedure for Equipment and Supply Management, SESDPROC-108-R2, Region 4, SESD, Athens, Georgia.

USEPA 2001. Collins, Gary W., Pruitt, Bruce A. Sediment Survey: Miami Ocean Dredged Material Disposal Site. Region 4 WMD, Atlanta, Georgia; SESD, Athens Georgia.

USEPA 2001. EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5. EPA/240/B-01/003

USEPA 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process, QA/G4. EPA/240/B-06/001.

USEPA 2007k. Operating Procedure for Control of Records, SESDPROC-002-R1, Region 4, SESD, Athens, Georgia.

USEPA 2007l. Quality Management Plan, SESDPLAN-001-R0, Region 4, SESD, Athens, Georgia.

USEPA 2007m. Operating Procedure for Packing, Marking, Labeling, and Shipping of Environmental and Waste Samples, SESDPROC-209-R0, Region 4, SESD, Athens, Georgia.

USEPA 2007n. Operating Procedure for Corrective Action Associated with External Complaints and Quality System Assessments, SESDPROC-009-R0, Region 4, SESD, Athens, Georgia.

Vittor. 2008. Miami, Florida ODMDS 2007 Benthic Community Assessment. Barry A. Vittor & Associates, Inc., Mobile, Alabama.

Windom, H.L. 1988. A guide to the interpretation of metal concentrations in estuarine sediments. S. J. Schropp, editor. Skidaway Institute of Oceanography, Savannah, GA April 1988.

APPENDIX A -DATA TABLES

Table 1. Miami ODMDS and Vicinity Station Locations

STATION #	LATITUDE	LONGITUDE
COE01	25° 46.9903'	80° 03.3557'
COE02	25° 45.9952'	80° 03.4028'
COE02***	25° 46.0217'	80° 03.4243'
COE03	25° 45.6986'	80° 03.6892'
M01	25° 45.9178'	80° 04.3137'
M02	25° 46.5100'	80° 03.3971'
M02D - Sed. Chem. Dupe	25° 46.4972'	80° 03.3579'
M02*	25° 46.4172'	80° 03.3588'
M03	25° 45.7211'	80° 02.9598'
M04	25° 45.2446'	80° 03.3660'
M05	25° 44.9930'	80° 04.4650'
M05**	25° 44.9956'	80° 04.4475'
M06	25° 44.9933'	80° 03.7602'
M06*	25° 44.8661'	80° 03.6306'
M07	25° 45.0020'	80° 02.9947'
M07*	25° 44.8097'	80° 02.8432'
M08	25° 43.9720'	80° 03.3924'
M08*	25° 43.9259'	80° 03.2939'
M09	25° 44.9765'	80° 02.5880'
M010	25° 44.7343'	80° 03.3586'
M011	25° 44.9907'	80° 03.3732'
M012	25° 45.3430'	80° 03.7761'

*** Water Quality Sampling – Top and bottom.**
**** Water Quality Profile**
***** Water Quality Sampling – 4 depths**

Table 2. Schedule of Operations

OCTOBER 3, 2007	OCTOBER 4, 2007	OCTOBER 5, 2007	OCTOBER 6, 2007	OCTOBER 7, 2007
Mobilization for Survey @ Coast Guard Base, Miami FL	Begin Sediment Sampling @ Miami ODMDS	Sediment Sampling @ Miami ODMDS	Begin Sediment Sampling at Pt. Everglades ODMDS. Tissue Sampling for SFLARE	Tissue Sampling for SFLARE. WQ sampling at Pt. Everglades and Miami ODMDS
OCTOBER 8, 2007	**OCTOBER 9, 2007**	**OCTOBER 10, 2007**	**OCTOBER 11, 2007**	**OCTOBER 12, 2007**
De-mobilization for sampling ops	Sidescan and dive ops	Dive ops	Dive ops & ROVdeployment	De-mobilization

Table 3. Sediment characteristics for the Miami, FL ODMDS stations, October 2007.

Station	% Gravel	% Sand	% Silt	% Clay	% Silt+Clay	USACE Description	Median Particle Size (phi)	Sorting Coefficient
M01-07	1.25	51.98	24.82	21.95	46.77	Clayey Sand	3.870	3.495
M02-07	0.06	53.79	25.61	20.54	46.15	Clayey Sand	3.857	3.362
M03-07	0.65	41.31	32.99	25.05	58.04	Clayey Sand	5.056	3.236
M04-07	1.03	24.73	45.45	28.79	74.24	Clayey Silt	5.693	3.111
M05-07	0.54	70.43	9.72	19.31	29.03	Silty Sand	3.072	3.303
M06-07	0.29	25.45	50.10	24.16	74.26	Clayey Silt	5.575	2.666
M07-07	0.13	28.00	50.07	21.80	71.87	Clayey Silt	5.432	2.823
M08-07	0.30	38.47	41.99	19.23	61.22	Sandy Silt	4.865	3.081
M09-07	0.03	34.81	44.89	20.26	65.15	Clayey Silt	5.033	2.681
M10-07	0.20	58.69	20.36	20.74	41.10	Clayey Sand	3.599	3.547
M11-07	17.51	21.09	17.21	44.19	61.40	**	5.965	7.284
M12-07	5.93	39.91	15.35	38.81	54.16	**	4.218	6.361

Too much gravel for textural descriptions

Vittor & Associates, Miami Florida ODMDS 2007 Benthic Community Assessment

Table 4. Water Quality Sampling (Pesticides) – all values are reported in µg/l

CHEMICAL NAME:	M02-07-CWB 10/07/2007	M02-07-CWT 10/07/2007	M06-07-CWB 10/07/2007	M06-07-CWT 10/07/2007	M07-07-CWB 10/07/2007	M07-07-CWT 10/07/2007	M07-07-MS 10/07/2007	M07-07-MSMSDT 10/07/2007	M08-07-CWB 10/07/2007	M08-07-CWT 10/07/2007	M08-07-CWTD 10/07/2007
4,4'-DDD (p,p'-DDD)	0.038 U	0.04 U	0.039 U	0.039 U	0.04 U	0.039 U	0.042 U	0.041 U	0.042 U	0.041 U	0.04 U
4,4'-DDE (p,p'-DDE)	0.019 U	0.02 U	0.02 U	0.019 U	0.02 U	0.02 U	0.021 U	0.021 U	0.021 U	0.021 U	0.02 U
4,4'-DDT (p,p'-DDT)	0.048 U	0.05 U	0.049 U	0.049 U	0.05 U	0.049 U	0.053 U	0.052 U	0.052 U	0.052 U	0.051 U
Aldrin	0.019 U	0.02 U	0.02 U	0.019 U	0.02 U	0.02 U	0.021 U	0.021 U	0.021 U	0.021 U	0.02 U
alpha-BHC	0.0096 U	0.01 U	0.0098 U	0.0097 U	0.01 U	0.0098 U	0.011 U	0.01 U	0.01 U	0.01 U	0.01 U
alpha-Chlordane	0.019 U	0.02 U	0.02 U	0.019 U	0.02 U	0.02 U	0.021 U	0.021 U	0.021 U	0.021 U	0.02 U
beta-BHC	0.019 U	0.02 U	0.02 U	0.019 U	0.02 U	0.02 U	0.021 U	0.021 U	0.021 U	0.021 U	0.02 U
delta-BHC	0.019 U	0.02 U	0.02 U	0.019 U	0.02 U	0.02 U	0.021 U	0.021 U	0.021 U	0.021 U	0.02 U
Dieldrin	0.019 U	0.02 U	0.02 U	0.019 U	0.02 U	0.02 U	0.021 U	0.021 U	0.021 U	0.021 U	0.02 U
Endosulfan I (alpha)	0.019 U	0.02 U	0.02 U	0.019 U	0.02 U	0.02 U	0.021 U	0.021 U	0.021 U	0.021 U	0.02 U
Endosulfan II (beta)	0.038 U	0.04 U	0.039 U	0.039 U	0.04 U	0.039 U	0.042 U	0.041 U	0.042 U	0.041 U	0.04 U
Endosulfan Sulfate	0.048 U	0.05 U	0.049 U	0.049 U	0.05 U	0.049 U	0.053 U	0.052 U	0.052 U	0.052 U	0.051 U
Endrin	0.038 U	0.04 U	0.039 U	0.039 U	0.04 U	0.039 U	0.042 U	0.041 U	0.042 U	0.041 U	0.04 U
Endrin aldehyde	0.048 U	0.05 U	0.049 U	0.049 U	0.05 U	0.049 U	0.053 U	0.052 U	0.052 U	0.052 U	0.051 U
Endrin ketone	0.048 U	0.05 U	0.049 U	0.049 U	0.05 U	0.049 U	0.053 U	0.052 U	0.052 U	0.052 U	0.051 U
gamma-BHC (Lindane)	0.0096 U	0.01 U	0.0098 U	0.0097 U	0.01 U	0.0098 U	0.011 U	0.01 U	0.01 U	0.01 U	0.01 U
gamma-Chlordane	0.019 U	0.02 U	0.02 U	0.019 U	0.02 U	0.02 U	0.021 U	0.021 U	0.021 U	0.021 U	0.02 U
Heptachlor	0.014 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.016 U	0.015 U	0.016 U	0.015 U	0.015 U
Heptachlor epoxide	0.019 U	0.02 U	0.02 U	0.019 U	0.02 U	0.02 U	0.021 U	0.021 U	0.021 U	0.021 U	0.02 U
Methoxychlor	0.096 U	0.1 U	0.098 U	0.097 U	0.1 U	0.098 U	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U
Toxaphene	1.9 U	2 U	2 U	1.9 U	2 U	2 U	2.1 U	2.1 U	2.1 U	2.1 U	2 U
Toxaphene	1.9 U	2 U	2 U	1.9 U	2 U	2 U	2.1 U	2.1 U	2.1 U	2.1 U	2 U

CWB – Water samples collected via Seabird CTD array off of ocean bottom at 180, 137, 220 & 170 m, respectively for stations M02,M06,M07 & M08.

CWT- Water samples collected via Seabird CTD array at 10m from the top of the ocean surface.

MS – The matrix spike sample was collected at station M07 at 10 m from the top of the ocean surface.

MSMSDT – The matrix spike, matrix duplicate sample was collected at station M07 at 10 m from the top of the ocean surface.

U – The analyte was not detected at or above the reporting limit.

Data provided by the Science and Ecosystem Support Division (SESD), Analytical Services Branch (ASB) Laboratory, Athens, GA.

Table 5. Water Quality Sampling (Semi-Volatiles) - all values are reported in µg/l

CHEMICAL NAME:	M02-07-CWB 10/07/2007	M02-07-CWT 10/07/2007	M06-07-CWB 10/07/2007	M06-07-CWT 10/07/2007	M07-07-CWB 10/07/2007	M07-07-CWT 10/07/2007	M07-07-MS 10/07/2007	M07-07-MSMSDT 10/07/2007	M08-07-CWB 10/07/2007	M08-07-CWT 10/07/2007	M08-07-CWTD 10/07/2007
2-Methylnaphthalene	1.9 U	2 U	1.9 U	1.9 U	2.1 U	2 U	2 U	2.1 U	2 U	2 U	2 U
Acenaphthene	1.9 U	2 U	1.9 U	1.9 U	2.1 U	2 U	2 U	2.1 U	2 U	2 U	2 U
Acenaphthylene	1.9 U	2 U	1.9 U	1.9 U	2.1 U	2 U	2 U	2.1 U	2 U	2 U	2 U
Anthracene	1.9 U	2 U	1.9 U	1.9 U	2.1 U	2 U	2 U	2.1 U	2 U	2 U	2 U
Benzo(a)anthracene	1.9 U	2 U	1.9 U	1.9 U	2.1 U	2 U	2 U	2.1 U	2 U	2 U	2 U
Benzo(a)pyrene	1.9 U	2 U	1.9 U	1.9 U	2.1 U	2 U	2 U	2.1 U	2 U	2 U	2 U
Benzo(b)fluoranthene	1.9 U	2 U	1.9 U	1.9 U	2.1 U	2 U	2 U	2.1 U	2 U	2 U	2 U
Benzo(g,h,i)perylene	1.9 U	2 U	1.9 U	1.9 U	2.1 U	2 U	2 U	2.1 U	2 U	2 U	2 U
Benzo(k)fluoranthene	1.9 U	2 U	1.9 U	1.9 U	2.1 U	2 U	2 U	2.1 U	2 U	2 U	2 U
Chrysene	1.9 U	2 U	1.9 U	1.9 U	2.1 U	2 U	2 U	2.1 U	2 U	2 U	2 U
Dibenzo(a,h)anthracene	1.9 U	2 U	1.9 U	1.9 U	2.1 U	2 U	2 U	2.1 U	2 U	2 U	2 U
Fluoranthene	1.9 U	2 U	1.9 U	1.9 U	2.1 U	2 U	2 U	2.1 U	2 U	2 U	2 U
Fluorene	1.9 U	2 U	1.9 U	1.9 U	2.1 U	2 U	2 U	2.1 U	2 U	2 U	2 U
Indeno (1,2,3-cd) pyrene	1.9 U	2 U	1.9 U	1.9 U	2.1 U	2 U	2 U	2.1 U	2 U	2 U	2 U
Naphthalene	1.9 U	2 U	1.9 U	1.9 U	2.1 U	2 U	2 U	2.1 U	2 U	2 U	2 U
Pentachlorophenol	9.7 U	10 U	9.7 U	9.6 U	10 U	9.8 U	10 U	11 U	9.8 U	9.8 U	9.8 U
Phenanthrene	1.9 U	2 U	1.9 U	1.9 U	2.1 U	2 U	2 U	2.1 U	2 U	2 U	2 U
Pyrene	1.9 U	2 U	1.9 U	1.9 U	2.1 U	2 U	2 U	2.1 U	2 U	2 U	2 U

CWB – Water samples collected via Seabird CTD array off of ocean bottom at 180, 137, 220 & 170 m, respectively for stations M02,M06,M07 & M08.
CWT- Water samples collected via Seabird CTD array at 10m from the top of the ocean surface.
MS – The matrix spike sample was collected at station M07 at 10 m from the top of the ocean surface.
MSMSDT – The matrix spike, matrix duplicate sample was collected at station M07 at 10 m from the top of the ocean surface.
U – The analyte was not detected at or above the reporting limit.
Data provided by the SESD, ASB Laboratory, Athens, GA.

Table 6. Water Quality Sampling (PCB Congeners, #18 - #169), Stations M02, M06, M07 & M08; units=pg/l; samples collected 10/07/07.

Station	PCB Congener #8	PCB Congener #18	PCB Congener #28	PCB Congener #44	PCB Congener #49	PCB Congener #52	PCB Congener #66	PCB Congener #77	PCB Congener #87
M02-07-CWT	500 U	500 U	500 U	500 U	500 U	500 U,J,QR-1	500 U,J,QR-1	500 U	500 U
M02-07-CWB	500 U	500 U	500 U	500 U	500 U	500 U,J,QR-1	500 U,J,QR-1	500 U	500 U
M06-07-CWT	500 U	500 U	500 U	500 U	500 U	500 U,J,QR-1	500 U,J,QR-1	500 U	500 U
M06-07-CWB	500 U	500 U	500 U	500 U	500 U	500 U,J,QR-1	500 U,J,QR-1	500 U	500 U
M07-07-CWT	500 U	500 U	500 U	500 U	500 U	500 U,J,QR-1	500 U,J,QR-1	500 U	500 U
M07-07-CWB	500 U	500 U	500 U	500 U	500 U	500 U,J,QR-1	500 U,J,QR-1	500 U	500 U
M07-07-MS	500 U,J,QS-3	500 U,J,QS-3	500 U	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QR-1	500 U	500 U	500 U
M07-07-MSMSDT	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QR-1, QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3
M08-07-CWT	500 U,J,QS-3	500 U,J,QS-3	500 U	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QR-1	500 U	500 U	500 U
M08-07-CWTD	500 U,J,QS-3	500 U,J,QS-3	500 U	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QR-1	500 U	500 U	500 U
M08-07-CWB	500 U,J,QS-3	500 U,J,QS-3	500	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QR-1, QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3
QA-CTD	500 U	500 U,J,QS-3	500 U	500 U	500 U	500 U,J,QR-1	500 U	500 U	500 U
Station	PCB Congener #101	PCB Congener #105	PCB Congener #118	PCB Congener #126	PCB Congener #128	PCB Congener #138	PCB Congener #153	PCB Congener #156	PCB Congener #169
M02-07-CWT	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M02-07-CWB	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M06-07-CWT	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M06-07-CWB	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M07-07-CWT	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M07-07-CWB	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M07-07-MS	500 U,J,QR-1	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M07-07-MSMSDT	500 U,J,QR-1	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3
M08-07-CWT	500 U,J,QR-1	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M08-07-CWTD	500 U,J,QR-1	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M08-07-CWB	500 U,J,QR-1	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3
QA-CTD	500 U,J,QR-1	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U

CWB – Water samples collected via Seabird CTD array off of ocean bottom at 180, 137, 220 & 170 m, respectively for stations M02,M06,M07 & M08.
CWT- Water samples collected via Seabird CTD array at 10m from the top of the ocean surface.
MS – The matrix spike sample was collected at station M07 at 10 m from the top of the ocean surface.
MSMSDT – The matrix spike, matrix duplicate sample was collected at station M07 at 10 m from the top of the ocean surface.
U – The analyte was not detected at or above the reporting limit.
J - The identification of the analyte is acceptable; the reported value is an estimate.
QR-1 – MRL verification recovery less than lower control limits.
QS-3 – Surrogate recovery is lower than established control limits.
Data provided by the SESD, ASB Laboratory, Athens, GA.

Table 6, Continued. Water Quality Sampling (PCB Congeners, #170 - #209), Stations M02, M06, M07 & M08; units=pg/l; samples collected 10/07/07.

Station	PCB Congener #170	PCB Congener #180	PCB Congener #183	PCB Congener #184	PCB Congener #187	PCB Congener #195	PCB Congener #206	PCB Congener #209
M02-07-CWT	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M02-07-CWB	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M06-07-CWT	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M06-07-CWB	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M07-07-CWT	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M07-07-CWB	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M07-07-MS	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M07-07-MSMSDT	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3
M08-07-CWT	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M08-07-CWTD	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
M08-07-CWB	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3	500 U,J,QS-3
QA-CTD	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U

CWB – Water samples collected via Seabird CTD array off of ocean bottom at 180, 137, 220 & 170 m, respectively for stations M02,M06,M07 & M08.
CWT- Water samples collected via Seabird CTD array at 10m from the top of the ocean surface.
MS – The matrix spike sample was collected at station M07 at 10 m from the top of the ocean surface.
MSMSDT – The matrix spike, matrix duplicate sample was collected at station M07 at 10 m from the top of the ocean surface.
U – The analyte was not detected at or above the reporting limit.
J - The identification of the analyte is acceptable; the reported value is an estimate.
QS-3 – Surrogate recovery is lower than established control limits.
Data provided by the SESD, ASB Laboratory, Athens, GA.

Table 7. Water Quality Sampling (Total Metals) – all values are reported in µg/l except Total Mercury, which is reported in ng/l.

		M02-07-CWT		M02-07-CWB		M06-07-CWT		M06-07-CWB		M07-07-CWT		M07-07-CWB		M08-07-CWT		M08-07-CWB		K0709348-MB	
CHEMICAL_NAME	Units	10/07/2007		10/07/2007		10/07/2007		10/07/2007		10/07/2007		10/07/2007		10/07/2007		10/07/2007		10/25/07	
Arsenic	µg/l	1.140		1.530		1.160		1.540		1.150		1.590		1.16		1.52		0.020	U
Cadmium	µg/l	0.009	U	0.016	B	0.009	U	0.009	B	0.009	U	0.037		0.009	U	0.013	B	0.006	U
Chromium	µg/l	0.270	B	0.270	B	0.150	B	0.180	B	0.180	B	0.200	B	0.150	B	0.280	B	0.030	U
Copper	µg/l	0.177		0.330		0.155		0.253		0.132	B	0.120	B	0.191		0.105	B	0.003	B
Lead	µg/l	0.116		0.033		0.046		0.062		0.056		0.074		0.042		0.056		0.004	B
Mercury, Total	ng/l	1.600	B	1.600	B	1.700	B	1.500	B	1.600	B	1.600	B	1.700	B	1.700	B	0.200	B
Nickel	µg/l	0.270	B	0.290	B	0.240	B	0.240	B	0.220	B	0.350		0.230	B	0.270	B	0.030	U
Selenium	µg/l	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Silver	µg/l	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.004	U
Zinc	µg/l	0.280	B	2.000		0.850		0.400	B	0.450	B	0.550	B	1.280		0.350	B	0.050	B

CWB – Water samples collected via Seabird CTD array off of ocean bottom at 180, 137, 220 & 170 m, respectively for stations M02,M06,M07 & M08.
CWT- Water samples collected via Seabird CTD array at 10m from the top of the ocean surface.
B – The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U – The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
Data provided by Columbia Analytical Services (CAS) Inc. Laboratory, Kelso, WA.
K0709348-MB is the method blank sample run by CAS.

Table 8. Water Quality Sampling (Tri-butyltin) – all values are reported in µg/l, except for Tri-n-propyltin, which is reported in %.

		M02-07-CWT	M02-07-CWB	M06-07-CWT	M06-07-CWB	M07-07-CWT	M07-07-CWB	M08-07-CWT	M08-07-CWTD	M08-07-CWB
CHEMICAL_NAME	Units	10/07/2007	10/07/2007	10/07/2007	10/07/2007	10/07/2007	10/07/2007	10/07/2007	10/07/2007	10/07/07
Tetra-n-butyltin	µg/l	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U	0.022 U
Tri-n-butyltin	µg/l	0.041 U	0.041 U	0.041 U	0.041 U	0.041 U	0.041 U	0.041 U	0.041 U	0.041 U
Di-n-butyltin	µg/l	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U
n-Butyltin	µg/l	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011 U
Tri-n-propyltin	%	73	72	65	65	61	70	62	69	71

CWB – Water samples collected via Seabird CTD array off of ocean bottom at 180, 137, 220 & 170 m, respectively for stations M02,M06,M07 & M08.
CWT- Water samples collected via the Seabird CTD array at 10m from the top of the ocean surface.
CWTD – Duplicate water sample collected via the Seabird CTD array at 10m from the top of the ocean surface.
U – The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
Data provided by Columbia Analytical Services (CAS) Inc. Laboratory, Kelso, WA.

Table 9. Sediment Chemistry (Pesticides & TOC), Stations M01-M06
Note: all values are reported in µg/kg dry weight, except for TOC which is reported in mg/kg dry weight

	STATION:	M01-07-SD	M02-07D-SD	M02-07-SD	M03-07-SD	M04-07-SD	M05-07-SD	M06-07-SD
CHEMICAL_NAME	Units	10/04/2007	10/05/2007	10/04/2007	10/04/2007	10/04/2007	10/04/2007	10/04/2007
Total Organic Carbon	mg/kg dry	49000 J,QM-3	31000	32000	44000	49000	52000	49000
4,4'-DDD (p,p'-DDD)	ug/kg dry	1 U	1.1 U	0.96 U	1.1 U	1.2 U	0.93 U	1.2 U
4,4'-DDE (p,p'-DDE)	ug/kg dry	0.54 U	0.55 U	0.5 U	0.57 U	0.61 U,J,Q-6	0.48 U	0.64 U
4,4'-DDT (p,p'-DDT)	ug/kg dry	1.4 U	1.4 U	1.3 U	1.4 U	1.6 U	1.2 U	1.6 U
Aldrin	ug/kg dry	0.54 U	0.68 U,D-4	0.5 U	0.57 U	0.61 U	0.48 U	0.64 U
alpha-BHC	ug/kg dry	0.27 U	0.27 U	0.24 U	0.28 U	0.3 U	0.24 U	0.31 U
alpha-Chlordane	ug/kg dry	0.54 U	0.55 U	0.5 U	0.57 U	0.61 U	0.48 U	0.64 U
beta-BHC	ug/kg dry	0.54 U	0.55 U	0.5 U	0.57 U	0.61 U	0.48 U	0.64 U
delta-BHC	ug/kg dry	0.54 U	0.55 U	0.5 U	0.57 U	0.61 U	0.48 U	0.64 U
Dieldrin	ug/kg dry	0.54 U	0.55 U	0.5 U	0.57 U	0.61 U	0.48 U	0.64 U
Endosulfan I (alpha)	ug/kg dry	0.54 U	0.55 U	0.5 U	0.57 U	0.61 U	0.48 U	0.64 U
Endosulfan II (beta)	ug/kg dry	1 U	1.1 U	0.96 U	1.1 U	1.2 U	0.93 U	1.2 U
Endosulfan Sulfate	ug/kg dry	1.4 U	1.4 U	1.3 U	1.4 U	1.6 U	1.2 U	1.6 U
Endrin	ug/kg dry	1 U	1.1 U	0.96 U	1.1 U	1.2 U,J,Q-6	0.93 U	1.2 U
Endrin aldehyde	ug/kg dry	1.4 U	1.4 U	1.3 U	1.4 U	1.6 U	1.2 U	1.6 U
Endrin ketone	ug/kg dry	1.4 U	1.4 U	1.3 U	1.4 U	1.6 U	1.2 U	1.6 U
gamma-BHC (Lindane)	ug/kg dry	0.27 U	0.27 U	0.24 U	0.28 U	0.3 U	0.24 U	0.31 U
gamma-Chlordane	ug/kg dry	0.54 U	0.55 U	0.5 U	0.57 U	0.61 U,J,Q-6	0.48 U	0.64 U
Heptachlor	ug/kg dry	0.4 U	0.41 U	0.37 U	0.43 U	0.46 U	0.36 U	0.48 U
Heptachlor epoxide	ug/kg dry	0.54 U	0.55 U	0.5 U	0.57 U	0.61 U	0.48 U	0.64 U
Methoxychlor	ug/kg dry	2.7 U	2.7 U	2.4 U	2.8 U	3 U	2.4 U	3.1 U
Toxaphene	ug/kg dry	54 U	55 U	50 U	57 U	61 U	48 U	64 U

U – The analyte was not detected at or above the reporting limit.
D-4 – MRL elevated due to interferences.
J- The identification of the analyte is acceptable; the reported value is an estimate.
Q-6 – Appropriate QC not prepared and/or analyzed with this sample.

Table 9. Sediment Chemistry (Pesticides & TOC), Stations M07-M12, continued.
Note: all values are reported in µg/kg dry weight, except for TOC which is reported in mg/kg dry weight

	STATION:	M07-07-SD	M08-07-SD	M09-07-SD	M10-07-SD	M11-07-SD	M12-07-SD
CHEMICAL_NAME	Units	10/04/2007	10/04/2007	10/04/2007	10/04/2007	10/04/2007	10/04/2007
Total Organic Carbon	mg/kg dry	48000	30000	51000	26000	40000	37000
4,4'-DDD (p,p'-DDD)	ug/kg dry	1.3 U	1.1 U	1.1 U	0.92 U	1.1 U	1 U
4,4'-DDE (p,p'-DDE)	ug/kg dry	2.1 J,N	0.55 U	0.58 U	1.1 J,N	1.7 J,N	0.54 U
4,4'-DDT (p,p'-DDT)	ug/kg dry	1.7 U	1.4 U	1.5 U	1.2 U	1.4 U	1.4 U
Aldrin	ug/kg dry	0.66 U	0.55 U	0.58 U	0.47 U	0.56 U	0.54 U
alpha-BHC	ug/kg dry	0.33 U	0.27 U	0.29 U	0.23 U	0.28 U	0.26 U
alpha-Chlordane	ug/kg dry	0.66 U	0.55 U	0.58 U	0.47 U	0.56 U	0.54 U
beta-BHC	ug/kg dry	0.66 U	0.55 U	0.58 U	0.47 U	0.56 U	0.54 U
delta-BHC	ug/kg dry	0.66 U	0.55 U	0.58 U	0.47 U	0.56 U	0.54 U
Dieldrin	ug/kg dry	0.66 U	0.55 U	0.58 U	0.47 U	0.56 U	0.54 U
Endosulfan I (alpha)	ug/kg dry	0.66 U	0.55 U	0.58 U	0.47 U	0.56 U	0.54 U
Endosulfan II (beta)	ug/kg dry	1.3 U	1.1 U	1.1 U	0.92 U	1.1 U	1 U
Endosulfan Sulfate	ug/kg dry	1.7 U	1.4 U	1.5 U	1.2 U	1.4 U	1.4 U
Endrin	ug/kg dry	1.3 U	1.1 U	1.1 U	0.92 U	1.1 U	1 U
Endrin aldehyde	ug/kg dry	1.7 U	1.4 U	1.5 U	1.2 U	1.4 U	1.4 U
Endrin ketone	ug/kg dry	1.7 U	1.4 U	1.5 U	1.2 U	1.4 U	1.4 U
gamma-BHC (Lindane)	ug/kg dry	0.33 U	0.27 U	0.29 U	0.23 U	0.28 U	0.26 U
gamma-Chlordane	ug/kg dry	0.66 U	0.55 U	0.58 U	0.47 U	0.56 U	0.54 U
Heptachlor	ug/kg dry	0.49 U	0.41 U	0.43 U	0.35 U	0.42 U	0.4 U
Heptachlor epoxide	ug/kg dry	0.66 U	0.55 U	0.58 U	0.47 U	0.56 U	0.54 U
Methoxychlor	ug/kg dry	3.3 U	2.7 U	2.9 U	2.3 U	2.8 U	2.6 U
Toxaphene	ug/kg dry	66 U	55 U	58 U	47 U	56 U	54 U

U – The analyte was not detected at or above the reporting limit .
J- The identification of the analyte is acceptable; the reported value is an estimate.
N – There is presumptive evidence that the analyte is present; the analyte is reported as a tentative identification.

Table 10. Sediment Chemistry (Semi-volatiles), Stations M01-M06
Note: all values are reported in µg/kg dry weight

CHEMICAL_NAME	Units	M01-07-SD 10/04/2007	M02-07D-SD 10/05/2007	M02-07-SD 10/04/2007	M03-07-SD 10/04/2007	M04-07-SD 10/04/2007	M05-07-SD 10/04/2007	M06-07-SD 10/04/2007
2-Methylnaphthalene	ug/kg dry	34 U	34 U	31 U	35 U	38 U	30 U	40 U
Acenaphthene	ug/kg dry	17 U	17 U	15 U	18 U	19 U	15 U	20 U
Acenaphthylene	ug/kg dry	17 U	17 U	15 U	18 U	19 U	15 U	20 U
Anthracene	ug/kg dry	17 U	17 U	15 U	18 U	19 U	15 U	20 U
Benzo(a)anthracene	ug/kg dry	17 U	17 U	15 U	18 U	41	15 U	20 U
Benzo(a)pyrene	ug/kg dry	17 U	38	33	18 U	71	15 U	20 U
Benzo(b)fluoranthene	ug/kg dry	17 U	17 U	15 U	18 U	43	15 U	20 U
Benzo(g,h,i)perylene	ug/kg dry	17 U	17 U	15 U	18 U	35	15 U	20 U
Benzo(k)fluoranthene	ug/kg dry	17 U	17 U	15 U	18 U	53	15 U	20 U
Chrysene	ug/kg dry	17 U	17 U	15 U	18 U	38	15 U	20 U
Dibenzo(a,h)anthracene	ug/kg dry	17 U	17 U	15 U	18 U	19 U	15 U	20 U
Fluoranthene	ug/kg dry	17 U	13 J,Q-2	15 U	18 U	69	15 U	20 U
Fluorene	ug/kg dry	17 U	17 U	15 U	18 U	19 U	15 U	20 U
Indeno (1,2,3-cd) pyrene	ug/kg dry	17 U	17 U	15 U	18 U	28	15 U	20 U
Naphthalene	ug/kg dry	34 U	34 U	31 U	35 U	38 U	30 U	40 U
Pentachlorophenol	ug/kg dry	170 U	170 U	150 U	180 U	190 U	150 U	200 U
Phenanthrene	ug/kg dry	17 U	17 U	15 U	18 U	28	15 U	20 U
Pyrene	ug/kg dry	34 U	13 J,Q-2	31 U	35 U	82	30 U	40 U

U – The analyte was not detected at or above the reporting limit .
J- The identification of the analyte is acceptable; the reported value is an estimate.
Q-2 – Result greater than MDL but less than MRL.

Table 10. Sediment Chemistry (Semi-volatiles), Stations M07-M12, continued.
Note: all values are reported in µg/kg dry weight

CHEMICAL_NAME	Units	M07-07-SD 10/04/2007	M08-07-SD 10/04/2007	M09-07-SD 10/04/2007	M10-07-SD 10/04/2007	M11-07-SD 10/04/2007	M12-07-SD 10/04/2007
2-Methylnaphthalene	ug/kg dry	41 U	34 U	36 U	29 U	35 U	33 U
Acenaphthene	ug/kg dry	20 U	17 U	18 U	15 U	18 U	17 U
Acenaphthylene	ug/kg dry	20 U	17 U	18 U	15 U	18 U	17 U
Anthracene	ug/kg dry	20 U	17 U	18 U	15 U	18 U	17 U
Benzo(a)anthracene	ug/kg dry	39	17 U	18 U	19	33	17 U
Benzo(a)pyrene	ug/kg dry	69	17 U	18 U	45	61	17 U
Benzo(b)fluoranthene	ug/kg dry	46	17 U	18 U	28	37	17 U
Benzo(g,h,i)perylene	ug/kg dry	33	17 U	18 U	21	26	17 U
Benzo(k)fluoranthene	ug/kg dry	42	17 U	18 U	17	27	17 U
Chrysene	ug/kg dry	37	17 U	18 U	17	33	17 U
Dibenzo(a,h)anthracene	ug/kg dry	20 U	17 U	18 U	15 U	18 U	17 U
Fluoranthene	ug/kg dry	58	17 U	18 U	27	48	17 U
Fluorene	ug/kg dry	20 U	17 U	18 U	15 U	18 U	17 U
Indeno (1,2,3-cd) pyrene	ug/kg dry	20 U	17 U	18 U	14 J,Q-2	16 J,Q-2	17 U
Naphthalene	ug/kg dry	41 U	34 U	36 U	29 U	35 U	33 U
Pentachlorophenol	ug/kg dry	200 U	170 U	180 U	150 U	180 U	170 U
Phenanthrene	ug/kg dry	16 J,Q-2	17 U	18 U	15 U	14 J,Q-2	17 U
Pyrene	ug/kg dry	62	34 U	36 U	27 J,Q-2	63	33 U

U – The analyte was not detected at or above the reporting limit .
J- The identification of the analyte is acceptable; the reported value is an estimate.
Q-2 – Result greater than MDL but less than MRL.

Table 11. Sediment Chemistry (Total Metals), Stations M01-M05 - all values are reported in mg/kg dry weight, except for % solids, which is in %.

CHEMICAL_NAME	Units	M01-07-SD 10/04/2007	M02-07D-SD 10/05/2007	M02-07-SD 10/04/2007	M03-07-SD 10/04/2007	M04-07-SD 10/04/2007	M05-07-SD 10/04/2007
% Solids	%	55	55	59	54	49	62
Aluminum	mg/kg dry	590	970	910	1200	1600	450
Arsenic	mg/kg dry	0.87	2	1.4	1.1	5.2	0.93
Beryllium	mg/kg dry	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Cadmium	mg/kg dry	0.25 U,J,CR,QC-5	0.25 U,J,CR,QC-5	0.25 U,J,CR,QC-5	0.25 U,J,CR,QC-5	0.27 J,CR,QC-5	0.25 U,J,CR,QC-5
Chromium	mg/kg dry	7.1	8.8	7.9	9.6	19	7.4
Copper	mg/kg dry	1.9	5.4	6.1	3.4	23	1.3
Iron	mg/kg dry	630	1700	1300	1300	5700	570
Lead	mg/kg dry	2	5.4	3	2.9	34	1.7
Manganese	mg/kg dry	25	30	25	39	29	22
Mercury	mg/kg dry	0.020 U,Adjusted	0.035 Adjusted	0.031 Adjusted	0.034 Adjusted	0.16 Adjusted	0.028 Adjusted
Nickel	mg/kg dry	2 U	0.5 U	0.75 U	0.5 U	0.65 U	2.3 U
Selenium	mg/kg dry	0.98 U	1 U	0.99 U	0.99 U	0.99 U	1 U
Silver	mg/kg dry	0.25 U	0.25 U	0.25 U	0.25 U	0.6	0.25 U
Zinc	mg/kg dry	3.3	8.1	5.1	5.3	42	2.8

Adjusted – Table was revised to adjust mercury results in solid samples. Samples were originally reported with a correction for moisture that was not warranted since the analysis was performed on the dried sample. The previous mercury results in solid samples have been replaced with these results.
U – The analyte was not detected at or above the reporting limit .
J- The identification of the analyte is acceptable; the reported value is an estimate.
CR – Calibration verification recovery result for Cd is 89.7%. Lower acceptance limit is 90%.
QC – 5 – Calibration check standard less than method control limits.

Table 11. Sediment Chemistry (Total Metals), Stations M06-M12 cont., - all values are reported in mg/kg dry weight, except for % solids, which is in %.

CHEMICAL_NAME	Units	M06-07-SD 10/04/2007		M07-07-SD 10/04/2007		M08-07-SD 10/04/2007		M09-07-SD 10/04/2007		M10-07-SD 10/04/2007		M11-07-SD 10/04/2007	
% Solids	%	47		43		57		52		60		64	
Aluminum	mg/kg dry	1100		1400		1100		1400		830		1400	
Arsenic	mg/kg dry	1.5		4.5		1.6		0.96		2.4		4.1	
Beryllium	mg/kg dry	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Cadmium	mg/kg dry	0.25	U,J,CR,QC-5	0.29	J,CR,QC-5	0.25	U,J,CR,QC-5	0.25	U,J,CR,QC-5	0.25	U,J,CR,QC-5	0.25	U,J,CR,QC-5
Chromium	mg/kg dry	10		17		8.7		10		9.1		17	
Copper	mg/kg dry	4.5		22		3.6		24		21		49	
Iron	mg/kg dry	1500		5100		1400		1400		2400		4800	
Lead	mg/kg dry	4		26		2.7		9		10		28	
Manganese	mg/kg dry	33		37		27		43		17		25	
Mercury	mg/kg dry	0.033	Adjusted	0.045	Adjusted	0.028	Adjusted	0.021	Adjusted	0.038	Adjusted	0.084	J,QM-3,QM-4
Nickel	mg/kg dry	0.5	U	0.49	U	0.5	U	0.6		1.2	U	1.2	U
Selenium	mg/kg dry	1	U	0.98	U	0.99	U	1	U	0.99	U	0.99	U
Silver	mg/kg dry	0.25	U	0.4		0.25	U	0.25	U	0.25	U	0.54	
Zinc	mg/kg dry	6.5		36		5.2		11		15		47	

CHEMICAL_NAME	Units	M12-07-SD 10/04/2007	
Aluminum	mg/kg dry	910	
Arsenic	mg/kg dry	1.1	
Beryllium	mg/kg dry	0.25	U
Cadmium	mg/kg dry	0.25	U,J,CR,QC-5
Chromium	mg/kg dry	8	
Copper	mg/kg dry	3.3	
Iron	mg/kg dry	1200	
Lead	mg/kg dry	2.7	
Manganese	mg/kg dry	26	
Mercury	mg/kg dry	0.024	Adjusted
Nickel	mg/kg dry	1.5	U
Selenium	mg/kg dry	1	U
Silver	mg/kg dry	0.25	U
Zinc	mg/kg dry	4.6	

<u>Adjusted</u> – Table was revised to adjust mercury results in solid samples. Samples were originally reported with a correction for moisture that was not warranted since the analysis was performed on the dried sample. The previous mercury results in solid samples have been replaced with these results.

U – The analyte was not detected at or above the reporting limit .

J- The identification of the analyte is acceptable; the reported value is an estimate.

CR – Calibration verification recovery result for Cd is 89.7%. Lower acceptance limit is 90%.

QC – 5 – Calibration check standard less than method control limits.

QM-3 – Matrix spike precision outside method control limits.

QM -4 – Matrix precision outside method control limits.

Table 12. Sediment Chemistry (Tri-butyltin) - Stations M01-M12 - all values are reported in µg/kg dry weight, except for Tri-n-propyltin & % solids, which are in %.

		M01-07-SD		M02-07-SD		M03-07-SD		M04-07-SD		M05-07-SD		M06-07-SD		M07-07-SD		M08-07-SD		M09-07-SD	
CHEMICAL_NAME	Units	10/07/2007		10/07/2007		10/07/2007		10/07/2007		10/07/2007		10/07/2007		10/07/2007		10/07/2007		10/07/07	
% Solids	%	54.3		59.1		53.6		48.6		62.8		45.8		44.4		54.0		50.3	
Tetra-n-butyltin	µg/kg	0.13	U	0.12	U	0.14	U	0.52	Ui	0.12	U	0.16	U	0.37	JP	0.13	U	0.14	U
Tri-n-butyltin	µg/kg	0.11	U	3.6		0.54	J	35		0.090	U	8.4		27		2.0		2.0	
Di-n-butyltin	µg/kg	0.22	Ui	0.57	J	0.053	U	3.9		0.045	U	0.53	J	4.4		0.78	J	0.86	J
n-Butyltin	µg/kg	0.56	U	0.051	U	0.056	U	1.0	J	0.048	U	0.066	U	1.3	J	0.34	JP	0.35	J
Tri-n-propyltin	%	53		53		53		49		52		47		50		49		36	

		M10-07-SD		M11-07-SD		M12-07-SD		M03-07-MS1		M03-07-DMS1	
CHEMICAL_NAME	Units	10/07/2007		10/07/2007		10/07/2007		10/07/2007		10/07/2007	
% Solids	%	63.0		55.1		54.4		53.6		53.6	
Tetra-n-butyltin	µg/kg	0.43	JP	0.13	U	0.13	U	31.1		34.2	
Tri-n-butyltin	µg/kg	29		25		65		26.5		28.1	
Di-n-butyltin	µg/kg	3.4		4.2		29		20.5		20.4	
n-Butyltin	µg/kg	1.3	J	2.0		4.6		12.7		11.0	
Tri-n-propyltin	%	62		65		50		55		56	

U – The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i – The MRL/MDL has been elevated due to a chromatographic interference.
J –The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
P – The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
MS-1 – The matrix spike sample was collected at station M03.
DMS-1 – The duplicate matrix spike sample was also collected at station M03.

Table 13. Sediment Chemistry (PCB Congeners, #18 - #169), Stations M01-M12; units=ng/kg dry weight; samples collected 10/04-05/07.

Station	PCB Congener #8	PCB Congener #18	PCB Congener #28	PCB Congener #44	PCB Congener #49	PCB Congener #52	PCB Congener #66	PCB Congener #77	PCB Congener #87
M01-07-SD	27 U,J,QS-3	27 U,J,QS-3	27 U	32 J,QS-3	42 J,QS-3	50	27 U	27 U	53
M02-07-SD	24 U,J,QS-3	27 J,QS-3	24 U	36 J,QS-3	200 J,QS-3	92	48	24 U	45
M02-07D-SD	55 J,QS-3	180 J,QS-3	73	150 J,QS-3	1100 J,QS-3	520	180	33	420
M03-07-SD	28 U,J,QS-3	28 U,J,QS-3	28 U	32 J,QS-3	260 J,QS-3	84	45	28 U	55
M04-07-SD	180 J,QS-3	700 J,QS-3	420 J,QS-3	1200 J,QS-3	3200 J,QS-3	2700 J,QS-3	1300 J,QS-3	120 J,QS-3	1400 J,QS-3
M05-07-SD	23 U,J,QS-3	23 U,J,QS-3	23 U	23 U,J,QS-3	23 U,J,QS-3	23 U	23 U	23 U	23 U
M06-07-SD	28 U,J,QS-3	50 J,QS-3	28 U	68 J,QS-3	1100 J,QS-3	180	140	28 U	97
M07-07-SD	220	880 J,QS-3	520	1000 J,QS-3	7700 J,QS-3	3200	1500	110	1300
M08-07-SD	27 U,J,QS-3	27 U,J,QS-3	27 U	46 J,QS-3	100 J,QS-3	84	40	27 U	93
M09-07-SD	27 U,J,QS-3	27 U,J,QS-3	27 U	27 U,J,QS-3	38 J,QS-3	27 U,J,QS-3	27 U,J,QS-3	27 U,J,QS-3	27 U,J,QS-3
M10-07-SD	72	270	170	300	1600	960	410	33	450
M11-07-SD	150 J,QS-3	680 J,QS-3	480 J,QS-3	1200 J,QS-3	2500 J,QS-3	2500 J,QS-3	1400 J,QS-3	120 J,QS-3	1400 J,QS-3
M12-07-SD	25 U	55 J,QS-3	27	31	400	97	47	25 U	46

Station	PCB Congener #101	PCB Congener #105	PCB Congener #118	PCB Congener #126	PCB Congener #128	PCB Congener #138	PCB Congener #153	PCB Congener #156	PCB Congener #169
M01-07-SD	81	37	97	27 U	31	140	110	27 U	27 U
M02-07-SD	120	44	140	24 U	49	250	250	24 U	24 U
M02-07D-SD	840	390	960	27 U	560	2600	1800	240	27 U
M03-07-SD	150	32	110	28 U	64	470	420	34	28 U
M04-07-SD	3500 J,QS-3	1300 J,QS-3	4400 J,QS-3	30 U,J,QS-3	1300 J,QS-3	6300 J,QS-3	5200 J,QS-3	490 J,QS-3	30 U,J,QS-3
M05-07-SD	23 U	23 U	23 U	23 U	23 U	29	25	23 U	23 U
M06-07-SD	450	93	360	28 U	240	2600	3900	180	28 U
M07-07-SD	4700	1300	4100	33 U	1700	14000	15000	850	33 U
M08-07-SD	170	74	210	27 U	68	290	240	30	27 U
M09-07-SD	34	27 U,J,QS-3	35 J,QS-3	27 U	27 U,J,QS-3	81 J,QS-3	77 J,QS-3	27 U,J,QS-3	27 U
M10-07-SD	1300	410	1300	23 U	430	2100	2100	170	23 U
M11-07-SD	3900 J,QS-3	1300 J,QS-3	4100 J,QS-3	26 U,J,QS-3	1200 J,QS-3	6100 J,QS-3	4500 J,QS-3	410 J,QS-3	26 U,J,QS-3
M12-07-SD	160	43	140	25 U	55	330	360	25 U	25 U

U – The analyte was not detected at or above the reporting limit.

J - The identification of the analyte is acceptable; the reported value is an estimate.

QS-3 – Surrogate recovery is lower than established control limits.

Table 13. Continued. Sediment Chemistry (PCB Congeners, #170 - #209), Stations M01-M12

Station	PCB Congener #170	PCB Congener #180	PCB Congener #183	PCB Congener #184	PCB Congener #187	PCB Congener #195	PCB Congener #206	PCB Congener #209
M01-07-SD	27	59	27 U	27 U	58	27 U	31	30 U, B-2
M02-07-SD	74	140	43	24 U	110	24 U	25	24 U
M02-07D-SD	540	910	260	27 U	580	63	77	32 U,B-2
M03-07-SD	170	290	79	28 U	180	28 U	41	60 U,B-2
M04-07-SD	1400 J,QS-3	2400 J,QS-3	890 J,QS-3	30 U,J,QS-3	2100 J,QS-3	180 J,QS-3	200 J,QS-3	110 U,J,QS-3,B-2
M05-07-SD	23 U	23 U	23 U	23 U	23 U	23 U	23 U	160
M06-07-SD	2400	5300	1400	28	4100	580	440	87 U,B-2
M07-07-SD	6600	16000	3500	49	8800	1300	900	110 U,B-2
M08-07-SD	59	110	34	27 U	85	27 U	27 U	27 U
M09-07-SD	27 U,J,QS-3	47 J,QS-3	27 U,J,QS-3	27 U,J,QS-3	36 J,OS-3	27 U	27 U,J,QS-3	27 U,J,QS-3
M10-07-SD	530	1100	350	23 U	990	97	680	210
M11-07-SD	1300 J,QS-3	2200 J,QS-3	810 J,QS-3	26 U,J,QS-3	2000 J,QS-3	180 J,QS-3	920 J,QS-3	200 J,QS-3
M12-07-SD	97	150	56	25 U	190	25 U	25 U	44 U,B-2

U – The analyte was not detected at or above the reporting limit .
J- The identification of the analyte is acceptable; the reported value is an estimate.
QS-3 – Surrogate recovery is lower than established control limits.
B-2 – Reporting level elevated due to trace amounts of analyte present in the method blank.

N.B. – The arithmetic mean of all PCB congeners from stations outside of the Miami ODMDS was 115.4 ng/kg, standard deviation =281.6, variance =79295, whereas the arithmetic mean of all of the PCB congeners from inside the Miami ODMDS was 1399.6 ng/kg, standard deviation =2522, variance = 6360297. All non-detected values were averaged as ½ of the minimum reporting limit (MRL) provided.

Table 14. Total PCB Congeners (26) by station (µg/kg or ppb), NOAA PCB Congeners [2*∑(18 congeners)](NOAA, 1989), Threshold Effects Level (TEL) and Probable Effects Level (PEL) for Total PCBs in marine sediment. Numbers in bold exceed the NOAA Screening Quick Reference Table (SQUIRT) TELs.

Station	Tot. PCBs*	NOAA PCBs*	TEL	PEL
M01-07-SD	1.0385	1.725	21.55	188.79
M02-07-SD	1.813	2.93	21.55	188.79
M02-07D-SD	12.5875	20.988	21.55	188.79
M03-07-SD	2.686	4.404	21.55	188.79
M04-07-SD	**41.08**	**69.78**	21.55	188.79
M05-07-SD	0.5245	0.842	21.55	188.79
M06-07-SD	**23.8335**	**41.973**	21.55	188.79
M07-07-SD	**95.317**	**163.55**	21.55	188.79
M08-07-SD	1.895	3.168	21.55	188.79
M09-07-SD	0.807	1.214	21.55	188.79
M10-07-SD	16.0665	**26.858**	21.55	188.79
M11-07-SD	**39.628**	**68.62**	21.55	188.79
M12-07-SD	2.406	3.683	21.55	188.79

*Calculations were performed consistent with the Southeast Regional Implementation Manual (SERIM), page 66, August 2008. Where an analyte was not detected at or above the reporting limit (U), one half of the reported value was used in the calculation. When a U was reported with the J data qualifier (the reported value is an estimate), the estimated value was used in the calculation (no half substitutions).

Table 15. Summary of assemblage parameters for the Miami, Florida ODMDS stations, October 2007.

Station	Total No. Taxa	Total No. Individuals	Density (no/m2)	H' Shannon (log e)	d Diversity (log 2)	J' Pielou Evenness	D Margalef Richness
Inside the ODMDS							
M04-07	24	60	1500.0	2.92	4.22	0.92	5.62
M06-07	49	146	3650.0	3.58	5.16	0.92	9.63
M07-07	32	263	6575.0	2.11	3.05	0.61	5.56
M10-07	25	34	850.0	3.13	4.51	0.97	6.81
M11-07	14	17	425.0	2.51	3.62	0.95	4.59
M12-07	30	108	2700.0	2.57	3.71	0.76	6.19
Mean	29		2616.7	2.80		0.85	
Outside the ODMDS							
M01-07	51	121	3025.0	3.56	5.14	0.91	10.43
M02-07	26	77	1925.0	2.79	4.02	0.85	5.76
M03-07	42	299	7475.0	1.91	2.75	0.51	7.19
M05-07	50	117	2925.0	3.49	5.03	0.89	10.29
M08-07	30	65	1625.0	2.88	4.16	0.85	6.95
M09-07	53	293	7325.0	2.53	3.64	0.64	9.15
Mean	42		4050.0	2.86		0.77	

Table 16. Summary of overall abundance of major benthic macroinfaunal groups for stations inside the ODMDS (stns. 4, 6, 7, 10-12), October 2007

Taxa	Total No. Taxa	% Total	Total No. Individuals	% Total
Annelida				
Oligochaeta	1	1.0	4	0.6
Polychaeta	67	64.4	342	54.5
Mollusca				
Aplacophora	1	1.0	8	1.3
Bivalvia	8	7.7	70	11.1
Gastropoda	1	1.0	1	0.2
Scaphopoda	1	1.0	4	0.6
Arthropoda				
Malacostraca	14	13.5	158	25.2
Ostracoda	1	1.0	1	0.2
Other Taxa	10	9.6	40	6.4
Total	**104**		**628**	

Table 17. Summary of overall abundance of major benthic macroinfaunal groups for stations outside the ODMDS (stns. 1, 2, 3, 5, 8, and 9), October 2007.

Taxa	Total No. Taxa	% Total	Total No. Individuals	% Total
Annelida				
Oligochaeta	1	0.7	6	0.6
Polychaeta	85	58.6	456	46.9
Mollusca				
Aplacophora	1	0.7	9	0.9
Bivalvia	15	10.3	72	7.4
Gastropoda	5	3.4	5	0.5
Scaphopoda	2	1.4	3	0.3
Arthropoda				
Malacostraca	19	13.1	376	38.7
Ostracoda	6	4.1	11	1.1
Echinodermata				
Echinoidea	1	0.7	1	0.1
Holothuroidea	1	0.7	1	0.1
Ophiuroidea	2	1.4	5	0.5
Other Taxa	7	4.8	27	2.8
Total	**145**		**972**	

Table 18. Wet-weight biomass of major benthic macroinfaunal taxonomic groups for the Miami, Florida ODMDS stations, October 2007.

Station		Biomass (g)	Station		Biomass (g)
M01-07	**Annelida**	0.0351	**M07-07**	**Annelida**	0.1427
	Mollusca	0.1403		**Mollusca**	0.0128
	Arthropoda	0.0753		**Arthropoda**	0.0879
	Echinodermata	0.0171		**Echinodermata**	0.0058
	Other Taxa	0.0022		**Other Taxa**	0.0196
	Total	0.2700		**Total**	0.2688
M02-07	**Annelida**	0.0680	**M08-07**	**Annelida**	0.0306
	Mollusca	0.0005		**Mollusca**	0.2565
	Arthropoda	0.0041		**Arthropoda**	0.0112
	Echinodermata	0.0000		**Echinodermata**	0.0000
	Other Taxa	0.0860		**Other Taxa**	0.0018
	Total	0.1586		**Total**	0.3001
M03-07	**Annelida**	0.0415	**M09-07**	**Annelida**	0.1212
	Mollusca	0.1680		**Mollusca**	0.0288
	Arthropoda	0.0761		**Arthropoda**	1.9531
	Echinodermata	0.0027		**Echinodermata**	0.0007
	Other Taxa	0.0081		**Other Taxa**	2.4877
	Total	0.2964		**Total**	4.5915
M04-07	**Annelida**	0.0616	**M10-07**	**Annelida**	0.0462
	Mollusca	0.0036		**Mollusca**	0.0285
	Arthropoda	0.0001		**Arthropoda**	0.0004
	Echinodermata	0.0000		**Echinodermata**	0.0000
	Other Taxa	0.0002		**Other Taxa**	0.0149
	Total	0.0655		**Total**	0.0900
M05-07	**Annelida**	0.0267	**M11-07**	**Annelida**	0.0541
	Mollusca	0.0212		**Mollusca**	0.0000
	Arthropoda	0.0335		**Arthropoda**	0.0290
	Echinodermata	0.0102		**Echinodermata**	0.0011
	Other Taxa	0.0002		**Other Taxa**	0.0000
	Total	0.0918		**Total**	0.0842
M06-07	**Annelida**	0.1158	**M12-07**	**Annelida**	0.1813
	Mollusca	0.4395		**Mollusca**	0.0031
	Arthropoda	0.0569		**Arthropoda**	0.0007
	Echinodermata	0.0885		**Echinodermata**	0.1047
	Other Taxa	0.1511		**Other Taxa**	0.0139
	Total	0.8518		**Total**	0.3037