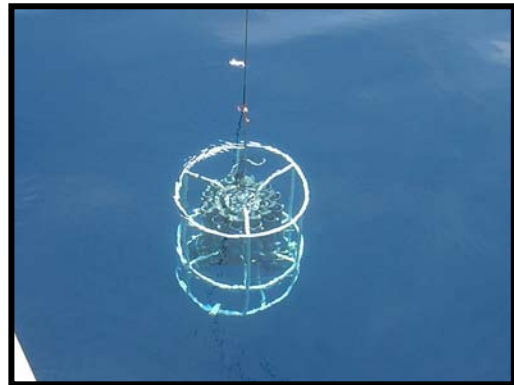


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# Cruise Report: Spring 2007 Survey of Ecological Conditions along the continental shelf off Florida from Anclote Key to West Palm Beach

NOAA Ship NANCY FOSTER NF-07-08-NCCOS

(May 15 - May 28, 2007)



NOAA Technical Memorandum NOS NCCOS 69

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# Cruise Report: Spring 2007 Survey of Ecological Conditions along the continental shelf off Florida from Anclote Key to West Palm Beach

NOAA Ship NANCY FOSTER Cruise NF-07-08-NCCOS  
(May 15 - May 28, 2007)

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219 Fort Johnson Road  
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NOAA Technical Memorandum NOS NCCOS 69

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United States Department of  
Commerce

National Oceanic and  
Atmospheric Administration

National Ocean Service

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Administrator

John (Jack) H. Dunnigan  
Assistant Administrator

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## Summary

This cruise report is a summary of a field survey conducted in coastal-ocean waters off Florida from Anclote Key to West Palm Beach and from approximately 1 nautical mile (nm) offshore seaward to the shelf break (100 m). The survey was conducted May 15 - May 28, 2007 on NOAA Ship NANCY FOSTER Cruise NF-07-08-NCCOS. Multiple indicators of ecological condition were sampled synoptically at each of 50 stations throughout the region including 10 stations within the Florida Keys National Marine Sanctuary (FKNMS) using a random probabilistic sampling design. Samples were collected for the analysis of benthic community structure and composition; concentrations of chemical contaminants (metals, pesticides, PAHs, PCBs, PBDEs) in sediments and target demersal biota; nutrient and chlorophyll levels in the water column; and other basic habitat characteristics such as depth, salinity, temperature, dissolved oxygen, pH, sediment grain size, and organic carbon content. The overall purpose of the survey was to collect data to assess the status of ecological condition in coastal-ocean waters of the region, based on these various indicators, and to provide this information as a baseline for determining how environmental conditions may be changing with time. The results will be of value in helping to broaden our understanding of the status of ecological resources and their controlling factors, including impacts of potential ecosystem stressors, in such strategic coastal areas.

This was a multi-disciplinary partnership effort conducted by scientists from the following organizations:

- NOAA, National Ocean Service (NOS), National Centers for Coastal Ocean Science (NCCOS), Center for Coastal Environmental Health and Biomolecular Research (CCEHBR), Charleston, SC.
- U.S. Environmental Protection Agency (EPA), National Health and Environmental Effects Research Laboratory (NHEERL), Gulf Ecology Division (GED), Gulf Breeze, FL.
- U.S. Geological Survey (USGS), National Wetlands Research Center, Gulf Breeze Project Office, Gulf Breeze, FL.
- Florida Fish and Wildlife Conservation Commission (FWC), Fish and Wildlife Research Institute (FWRI), St. Petersburg, FL.
- South Carolina Department of Natural Resources (SCDNR), Marine Resources Research Institute (MRRI), Charleston, SC.
- NOAA, Oceanic and Atmospheric Research (OAR), Atlantic Oceanographic and Meteorological Laboratory (AOML), Miami, FL.
- NOAA, Office of Marine and Aviation Operations (OMAO), NOAA ship Nancy Foster.

**Additional copies of this cruise report can be obtained by contacting:**

NOAA, Center for Coastal Environmental Health and Biomolecular Research, 219 Fort Johnson Road, Charleston, South Carolina, 29412, Telephone: 843/762-8511. Attention: Cynthia Cooksey.

## 1.0 Introduction

This survey is part of a series of studies being conducted by the National Oceanic and Atmospheric Administration (NOAA), U.S. Environmental Protection Agency (EPA), and partnering states to assess condition of aquatic resources throughout coastal-ocean waters of the U.S. using multiple indicators of ecological condition. The scope and design of these studies are similar to those used in the coastal component of EPA's Environmental Monitoring and Assessment Program (EMAP) and more recent National Coastal Assessment Program, which have focused mostly on estuaries and inland waters. The present work extends these prior efforts to coastal-ocean waters, approximately 1 nautical mile offshore seaward to the shelf break (100 m), throughout various coastal regions including sites in NOAA's National Marine Sanctuaries. Surveys of benthic fauna and other multiple indicators of ecological condition — including basic habitat characteristics such as depth, salinity, temperature, dissolved oxygen, pH, sediment grain size and organic content; nutrient and chlorophyll levels in the water column; chemical contaminants in sediments and biota — are conducted in these waters over a series of random stations using a probabilistic sampling design. Accordingly, the resulting data can be used to make estimates of the spatial extent of the region's health with respect to the various measured indicators, and to provide this information as a baseline for determining how environmental conditions may be changing with time. Where applicable the surveys also have included sites within sanctuaries in order to provide opportunities for comparing conditions within these protected areas to the surrounding coastal-ocean ecosystem. Thus far such efforts have included a survey of shelf waters along the U.S. west coast, from the Straits of Juan de Fuca, WA to Channel Islands, CA (summer 2003, NOAA Ship McARTHUR II Cruise AR-03-01-NC); a survey of shelf waters of the South Atlantic Bight from Cape Hatteras, NC to West Palm Beach, FL (summer 2004, NOAA Ship NANCY FOSTER Cruise NF-04-08-CL); and a survey of shelf waters of the mid-Atlantic Bight (MAB) from Cape Hatteras to Cape Cod, MA (spring 2006, NOAA Ship NANCY FOSTER Cruise NF-06-06-NCCOS).

The present survey extends this work to shelf waters of the West Indian zoogeographic province, from West Palm Beach, Florida where the prior summer 04 survey left off to Anclote Key, Florida in eastern Gulf of Mexico (Fig. 1). As in the prior shelf surveys, the cross-shelf boundaries will be approximately 1 nautical mile from shore seaward to the shelf break at 100 m. The West Indian province is a component of two recognized Large Marine Ecosystems (LMEs) within the U.S.: the Southeast U.S. Continental Shelf and the Gulf of Mexico. Also, this region includes the Florida Keys National Marine Sanctuary (FKNMS), stretching from the Dry Tortugas to Key Biscayne and encompassing North America's only living coral barrier reef and the third longest barrier reef in the world. As in the prior surveys, synoptic sampling of multiple ecological indicators was conducted at each of 50 random stations throughout these waters. The consistent and synoptic sampling of the different biological and environmental variables across these stations will provide an opportunity for learning more about the spatial patterns of these resources and processes controlling their distributions. As mentioned above, by incorporating a random probabilistic station design, the resulting data also can be used to make estimates of the spatial extent of the region's health with respect to the

various measured indicators, and to provide this information as a baseline for determining how environmental conditions may be changing in the future. This is the first such baseline for the near-coastal (shelf) waters of the West Indian zoogeographic region. The following report provides a brief summary of the scope and preliminary results of the supporting field work conducted May 15 - May 28, 2007 on NOAA Ship NANCY FOSTER Cruise NF-07-08-NCCOS.

## **2.0 Scientific Approach**

Samples were collected on NOAA Ship NANCY FOSTER Cruise NF07-08-NCCOS, 15-28 May 2007, at 50 random stations along the U.S. continental shelf off Florida (~10-100 m) from Anclote Key to West Palm Beach (Figure 1, Table 1). At each station, samples were obtained for characterization of the following core indicators (Table 2): (1) community structure and composition of benthic macroinfauna (> 0.5 mm); (2) concentration of chemical contaminants in sediments (metals, pesticides, PCBs, PAHs, PBDEs); (3) sediment toxicity testing (Microtox assay); and (4) general habitat conditions (water depth, dissolved oxygen, conductivity, temperature, chlorophyll a, total suspended solids, water-column nutrients, % silt-clay versus sand content of sediment, organic-carbon content of sediment). Where possible, samples of demersal fish species were collected by hook and line for analysis of chemical contaminant body burdens and visual evidence of pathological disorders. Satellite-tracked, surface-current drifters also were deployed at three stations (4, 6, and 12) at the request of NOAA/OAR's Atlantic Oceanographic and Meteorological Laboratory in Miami (drifter movements can be tracked presently at <http://www.aoml.noaa.gov/sfros/drifters>).

Sediment sampling was conducted using a 0.04 m<sup>2</sup> Young-modified Van Veen grab. Samples for benthic macro-infaunal analysis were collected in triplicate, live-sieved onboard through a 0.5 mm screen, and preserved separately in 10% buffered formalin with Rose Bengal stain. Samples for the analysis of sediment toxicity, sediment contaminants, % silt-clay, % water, and % TOC were sub-sampled from composited surface sediment (upper 3-5 cm) taken from additional grabs (typically two) independent of the macro-infaunal grabs. The grab frame also was equipped with a digital camera, strobe, and bottom-triggered shutter release to capture pictures of the undisturbed ocean floor and any epifaunal species present at the sediment surface just prior to the grab's contact with the bottom.

A CTD was used to acquire continuous profiles of conductivity, temperature, pH, dissolved oxygen, and depth as it was lowered and raised through the water column. The unit also was equipped with 12 Niskin bottles to acquire discrete water samples at three designated water depths (near surface, mid-water and near-bottom) for analysis of nutrients, total suspended solids, and chlorophyll.

### 3.0 Preliminary Results

A total of 50 stations were sampled throughout the study region (Figure 1, Table 1). Appendix A provides a complete log of all sampling activities conducted during the cruise including fish collections.

Water depths at the 50 stations averaged 35 m and ranged from 7 – 83 m. Bottom-water physical characteristics were fairly consistent across the region for salinity (PSU) which ranged from 35.7 to 37.0, and DO which ranged from 6.4 mg/L to 7.5 mg/L. Bottom-water temperature had a moderate range of 18.9°C to 27.4°C with warmer temperatures occurring at the shallower stations. This temperature range is narrower than temperature ranges observed in bottom water conditions in the South Atlantic Bight in 2004, 6.4 °C to 23.7 °C. Bottom water quality measurements for depth, temperature, salinity and DO at each station are presented in Table 3. Water-column profiles (Appendix B) show the following general trends: shallower stations had a well mixed water column, while deeper stations exhibited some stratification with warmer water overlaying cooler, deeper water.

The addition of a digital camera to capture pictures of the undisturbed ocean floor and any epifaunal species present at the sediment surface just prior to the grab's contact with the bottom has added an exciting new component to our surveys. Figure 2 provides examples of the variety of bottom types encountered across the region ranging from coarse sand to fine sand with varying degrees of algal and sponge covering. Figure 3 provides examples of some of the macrofauna that were captured by the camera including a pinfish (*Lagodon rhomboides*), various unidentified fish species, a flame box crab (*Calappa flammea*), and a sea cucumber (Holothuroidea). Photos will be processed to determine species composition of visible biota and percent cover.

Bottom-water physical characteristics were similar for sites located within the Florida Keys National Marine Sanctuary and sites located outside the Sanctuary (Fig. 4). Mean water depth was slightly lower inside the FKNMS boundaries as compared to the remainder of the shelf, 30 m and 36 m respectively. Mean bottom water temperatures were slightly lower inside the FKNMS boundaries as compared to the remainder of the shelf, 23.2 °C and 26.8 °C respectively

Data for other biological and abiotic environmental variables listed in Table 2 will be available once the processing of these samples has been completed.

### 4.0 Acknowledgements

Funding for this project is provided through NOAA/NOS/NCCOS/CCEHBR (field sampling supplies and equipment; sample processing), EPA/NHEERL/GED (sample design), and NOAA/OAR/AOML (water sample processing). All members of the field crew (Table 4) are commended for their high level of technical expertise, teamwork and dedication to getting the required sampling completed. Special appreciation also is extended to the officers and crew of the NOAA ship NANCY FOSTER for the superb job performed on NF-07-08-NCCOS.

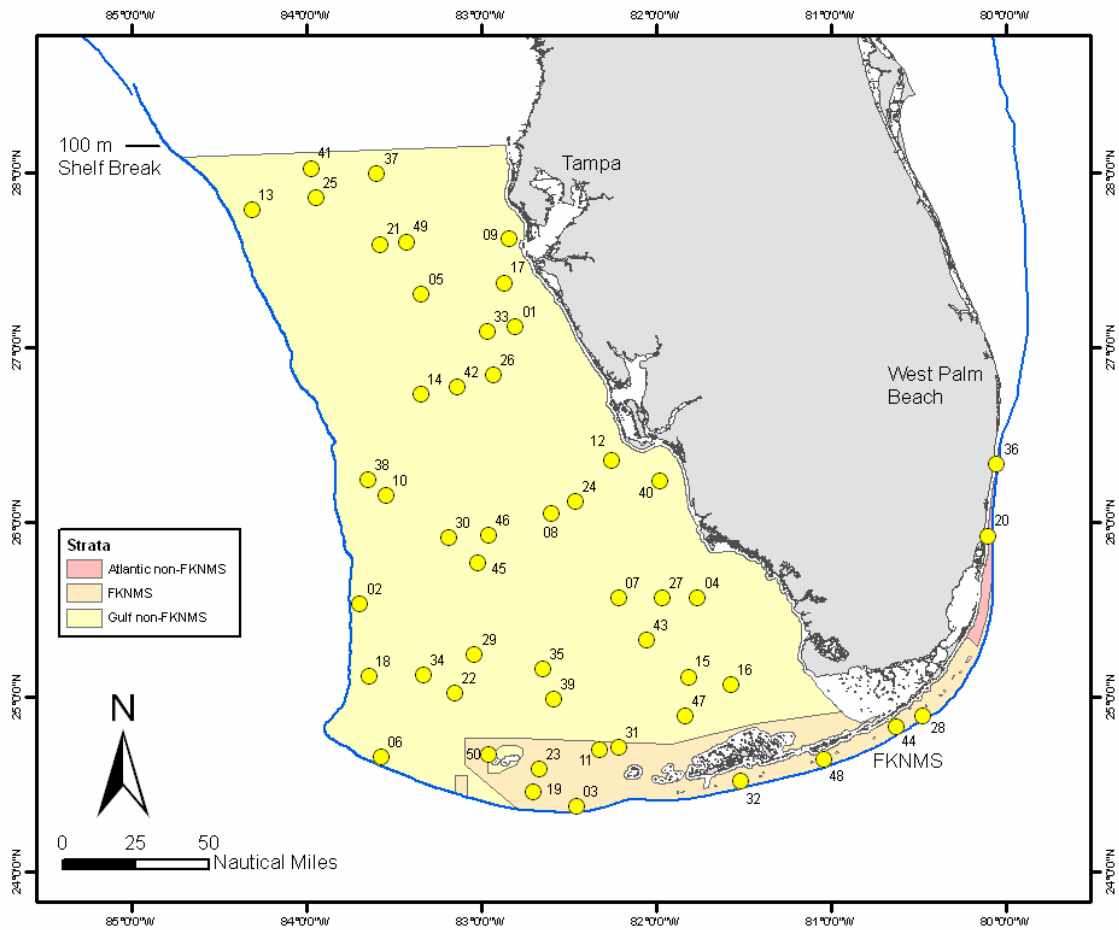


Figure 1. Overall study area and sampling sites for 2007 survey of ecological conditions along the continental shelf off Florida from Anclote Key to West Palm Beach (NOAA Ship Nancy Foster Cruise NF-07-08-NCCOS). Yellow circles indicate sampling stations, blue line indicates 100 m shelf break.



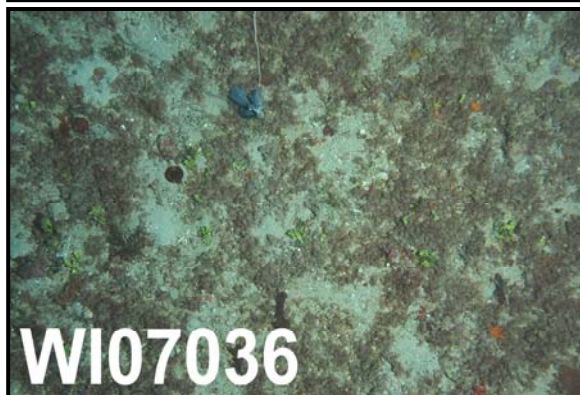


Figure 2. Examples of different bottom types encountered throughout the West Indian Province during the 2007 survey.

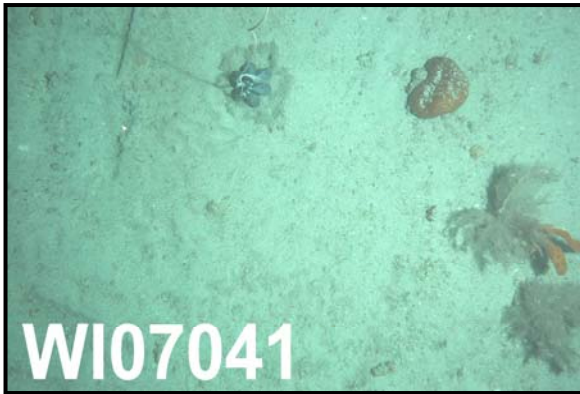


Figure 2. Continued.

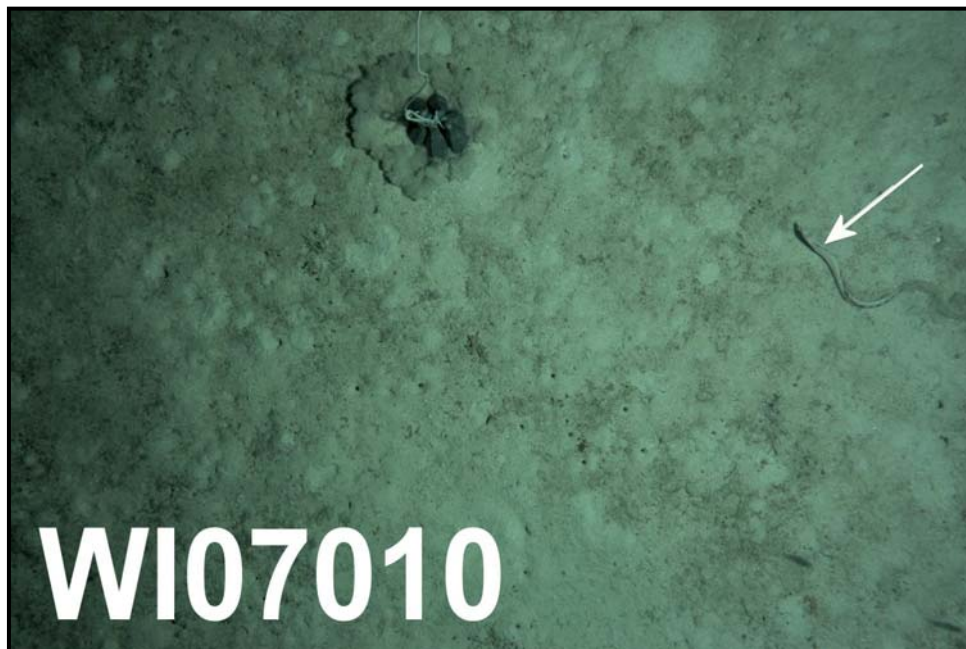


Figure 3. Examples of different macrofauna encountered throughout the West Indian Province during the 2007 survey. WI07024 – Pinfish (*Lagodon rhomboides*); WI07010 – unidentified eel.

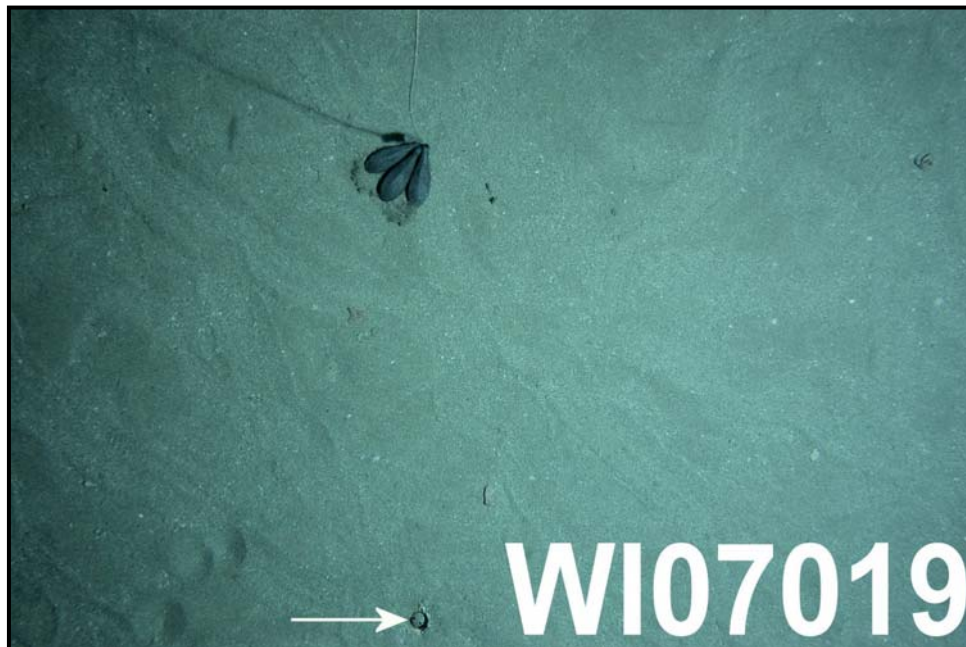


Figure 3. Continued. WI07003 – unidentified fish; WI07019 – unidentified fish looking up from burrow.

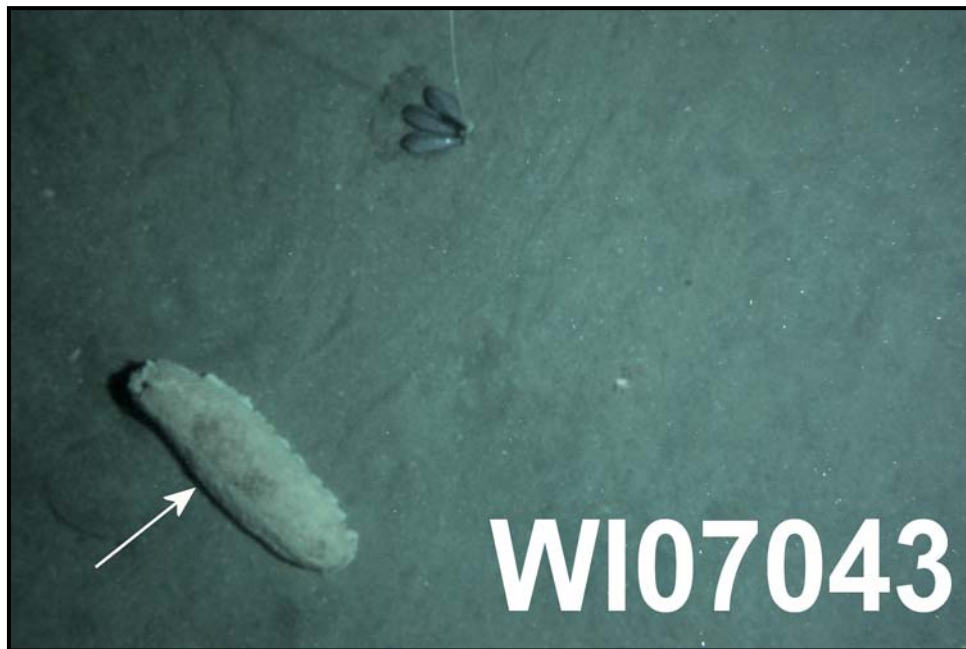


Figure 3. Continued. WI07037 – flame box crab (*Calappa flammea*); WI07043 – unidentified sea cucumber (Holothuroidea).

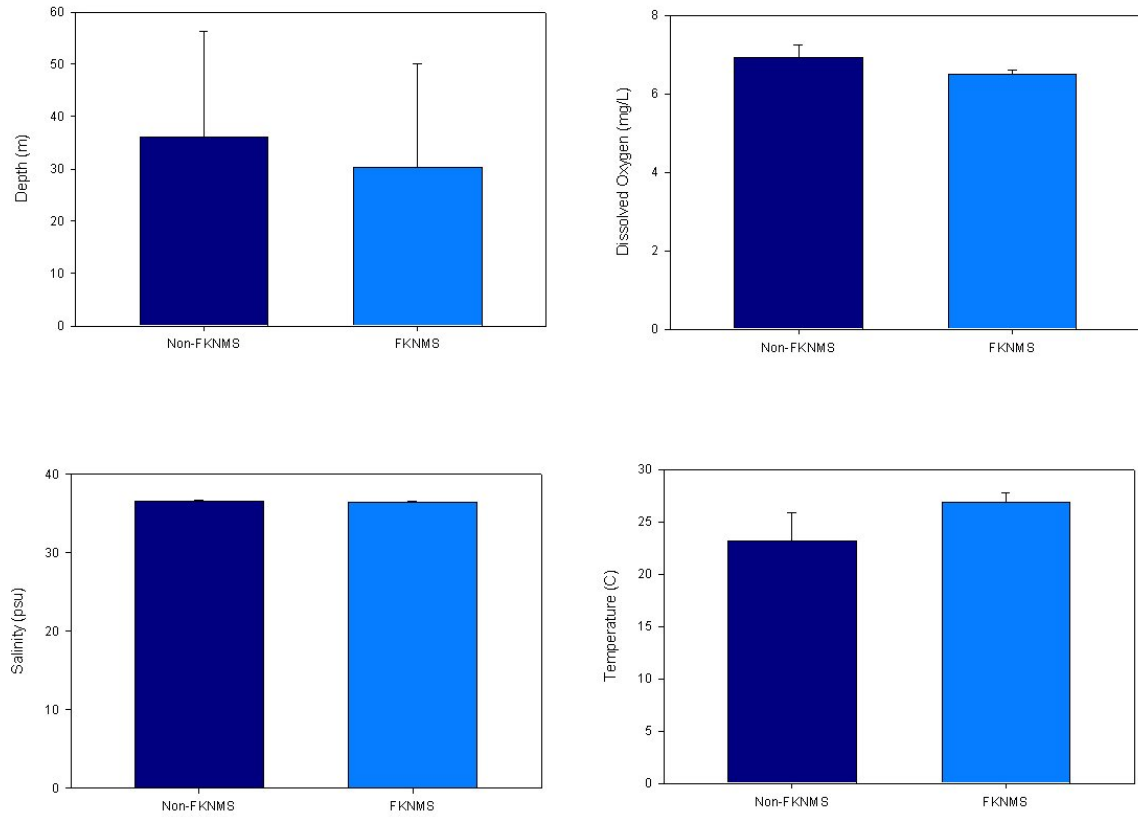


Figure 4. Comparison of mean bottom water quality parameters between stations located within and outside the Florida Keys National Marine Sanctuary.

Table 1. Locations of stations successfully sampled in the West Indian Province during the 2007 spring survey.

Station ID	Latitude - Decimal Degrees	Longitude - Decimal Degrees	Station Depth (m)
WI07001	27.12087	-82.80398	19.9
WI07002	25.53472	-83.69460	80.5
WI07003	24.37048	-82.45630	25.8
WI07004	25.56550	-81.76083	10.9
WI07005	27.30783	-83.34252	33.8
WI07006	24.65420	-83.57270	59.6
WI07007	25.56667	-82.21350	23.8
WI07008	26.05083	-82.59855	28.8
WI07009	27.62707	-82.84247	7.0
WI07010	26.15245	-83.54550	61.6
WI07011	24.70000	-82.32333	16.9
WI07012	26.35412	-82.25788	9.9
WI07013	27.79247	-84.31427	65.6
WI07014	26.73098	-83.34502	48.7
WI07015	25.11470	-81.81415	13.9
WI07016	25.06673	-81.56967	7.9
WI07017	27.37243	-82.86783	12.9
WI07018	25.11575	-83.64058	72.5
WI07019	24.45742	-82.70073	18.9
WI07020	25.92218	-80.09922	10.9
WI07021	27.59380	-83.58323	40.7
WI07022	25.02147	-83.15103	56.6
WI07023	24.58415	-82.66878	20.9
WI07024	26.12163	-82.46075	21.9
WI07025	27.85867	-83.94977	47.7
WI07026	26.84597	-82.93068	31.8
WI07027	25.56405	-81.96623	15.9
WI07028	24.88888	-80.47110	83.4
WI07029	25.24372	-83.03883	54.6
WI07030	25.91242	-83.18495	52.6
WI07031	24.71000	-82.21083	17.9
WI07032	24.51718	-81.51578	25.8
WI07033	27.09465	-82.96653	22.8
WI07034	25.12393	-83.33477	60.6
WI07035	25.16000	-82.64817	36.8
WI07036	26.33537	-80.04880	51.7
WI07037	27.99618	-83.59837	30.8
WI07038	26.24477	-83.65077	62.6
WI07039	24.98422	-82.58475	32.8
WI07040	26.23585	-81.97513	8.9
WI07041	28.02810	-83.97695	45.7
WI07042	26.77330	-83.14097	40.7
WI07043	25.32350	-82.05418	17.9
WI07044	24.83147	-80.62205	38.7
WI07045	25.76993	-83.02347	48.7
WI07046	25.92475	-82.95797	42.7
WI07047	24.88825	-81.83235	12.9
WI07048	24.63923	-81.03970	22.9
WI07049	27.60757	-83.43165	34.8
WI07050	24.67230	-82.96003	31.8

Table 2. Summary of types of field samples collected at the 2007 West Indian Province stations.

Parameters	# of Replicates	Container	Sample Size	Preservation
Infauna	2	1000 ml Polypropylene jar	All material retained on 0.5mm sieve	10% Buffered Formalin in the field
Infauna	1	1000ml jar	All material retained on 0.5mm sieve	Ethanol
Metal Contaminants	1 (composited sediment)	250 ml HDPE jar	2/3 full	frozen
Organic Contaminants	1 (composited sediment)	500 ml I-Chem glass jar	2/3 full	frozen
TOC	1 (composited sediment)	125 ml Polypropylene jar	2/3 full	frozen
% Silt/Clay & % Moisture	1 (composited sediment)	500 ml HDPE jar	2/3 full	frozen
Microtox	1 (surficial sediment scooped from surface)	125 ml Glass jar	2/3 Full	Refrigerate
Water Column (Temp., D.O., pH, Sal.)	1	N/A	Profile	N/A
Total Suspended Solids	3 (water column - surface, mid, bottom)	47 mm preweighed filter pads	TSS retained on filter pad	frozen
Nutrients	3 (water column - surface, mid, bottom)	60 ml HDPE containers	2/3 full	frozen
Chlorophyll a	3 (water column - surface, mid, bottom)	25 mm filter pads	cells retained on pad	frozen
Fish Tissue	--	ziplock bag	5-6 specimens from up to 3 species	frozen



Table 3. Water quality measurements as measured near bottom with a SeaBird CTD during the 2007 survey of ecological conditions of the West Indian Province.

Station ID	Depth (m)	Bottom Temperature (°C)	Bottom Salinity (PSU)	Bottom Dissolved Oxygen (mg/L)
WI07001	19.9	22.2	36.4	7.0
WI07002	80.5	21.2	36.5	7.2
WI07003	25.8	26.9	36.4	6.5
WI07004	10.9	26.7	36.7	6.5
WI07005	33.8	20.7	36.5	7.2
WI07006	59.6	20.5	36.5	7.3
WI07007	23.8	25.8	37.0	6.6
WI07008	28.8	24.8	36.8	6.7
WI07009	7.0	25.1	35.7	6.7
WI07010	61.6	20.1	36.5	7.3
WI07011	16.9	27.2	36.6	6.5
WI07012	9.9	25.7	36.3	6.6
WI07013	65.6	18.9	36.4	7.5
WI07014	48.7	20.5	36.6	7.3
WI07015	13.9	26.8	36.9	6.5
WI07016	7.9	27.3	36.5	6.4
WI07017	12.9	23.2	36.2	6.9
WI07018	72.5	22.2	36.6	7.0
WI07019	18.9	27.2	36.4	6.5
WI07020	10.9	26.4	36.3	6.5
WI07021	40.7	20.3	36.4	7.3
WI07022	56.6	20.8	36.5	7.2
WI07023	20.9	27.1	36.4	6.5
WI07024	21.9	25.1	36.8	6.7
WI07025	47.7	20.2	36.5	7.3
WI07026	31.8	23.2	36.6	6.9
WI07027	15.9	26.0	36.8	6.6
WI07028	83.4	24.2	36.5	6.8
WI07029	54.6	20.4	36.5	7.3
WI07030	52.6	21.2	36.6	7.2
WI07031	17.9	27.4	36.8	6.4
WI07032	25.8	27.3	36.3	6.4
WI07033	22.8	23.0	36.6	6.9
WI07034	60.6	21.1	36.5	7.2
WI07035	36.8	25.5	36.2	6.7
WI07036	51.7	27.1	36.3	6.5
WI07037	30.8	21.2	36.5	7.2
WI07038	62.6	20.8	36.5	7.2
WI07039	32.8	26.0	36.4	6.6
WI07040	8.9	25.8	36.4	6.6
WI07041	45.7	19.7	36.4	7.4
WI07042	40.7	22.3	36.6	7.0
WI07043	17.9	26.4	37.0	6.5
WI07044	38.7	26.9	36.2	6.5
WI07045	48.7	22.7	36.7	7.0
WI07046	42.7	24.2	36.7	6.8
WI07047	12.9	27.0	36.9	6.5
WI07048	22.9	27.1	36.3	6.5
WI07049	34.8	20.9	36.5	7.2
WI07050	31.8	27.0	36.4	6.5

Table 4. Scientific crew for 2007 survey of ecological conditions of the West Indian Province continental shelf. \* - indicates Chief Scientist.

Name	Affiliation
Jeff Hyland *	NOAA/NOS/NCCOS/CCEHBR
JD Dubick	NOAA/NOS/NCCOS/CCEHBR
Scott Cross	NOAA/NOS/NCCOS/CCEHBR
Sylvia Galloway	NOAA/NOS/NCCOS/CCEHBR
Anna Greene	NOAA/NOS/NCCOS/CCEHBR
Tom Heitmuller	USGS/NWRC
Laura Kracker	NOAA/NOS/NCCOS/CCEHBR
Stephanie Rexing	NOAA/NOS/NCCOS/CCEHBR
Betty Wenner	SCDNR/MRRI
Blaine West	NOAA/NOS/NCCOS/CCEHBR
Matt Watkins	FWC/FWRI

Appendix A  
Sample Collection Summary

Appendix A. Summary of samples collected on NOAA Ship NANCY FOSTER Cruise NF-07-08-NCCOS. + indicates stations within the FKNMS. Scientific names of fish listed are provided at end of table.

Day	Stations Sampled	Station Location (Decimal Minutes)	Samples Collected						
			CTD Profile (T, S, pH, D)	Water Sample (Nutrients, Chlorophyll, TSS): Surface, Mid, & Bottom	Infauna Grabs (# Reps)	Bottom Photo (From Grab Camera)	Sediment Chemistry Composite (for metals, organics, TOC, grain size, Microtox)	Angling (# Fish)**	Other
0 (May 15)	Tampa	Scientists arrive at ship, 1700, & begin mobilization	-	-	-	-	-	-	
1 (May 16,)	Tampa	Mobilization 0800-1200; Depart Tampa 1200 to Station 009	-	-	-	-	-	-	
	009	27° 37.624' N 082° 50.548' W	1	3 (S, M, B)	3	Yes	1	0	
	037	27° 59.771' N 083° 35.902' W	1	3 (S, M, B)	3	Yes	1	0	
2 (May 17)	041	28° 01.686' N 083° 58.617' W	1	3 (S, M, B)	3	Yes	1	1 red porgy	
	013	27° 47.548' N 084° 18.856' W	1	3 (S, M, B)	3	Yes	1	1 sandperch	
	025	27° 51.520' N 083° 56.986' W	1	3 (S, M, B)	3	Yes	1	6 vermilion snapper, 1 sandperch, 1 red grouper	
	021	27° 35.628' N 083° 34.994' W	1	3 (S, M, B)	3	Yes	1	1 bank seabass	
	049	27° 36.454' N 083° 25.899' W	1	3 (S, M, B)	3	Yes	1	0	
3 (May 18)	005	27° 18.470' N 083° 20.551' W	1	3 (S, M, B)	3	Yes	1	1 vermilion snapper, 1 white grunt, 1 lane snapper	
	017	27° 22.346' N 082° 52.070' W	1	3 (S, M, B)	3	Yes	1	6 sandperch, 3 pinfish, 2 tomtate	
	001	27° 07.252' N 082° 48.239' W	1	3 (S, M, B)	3	Yes	1	1 pinfish, 4	

Day	Stations Sampled	Station Location (Decimal Minutes)	Samples Collected							
			CTD Profile (T, S, pH, D)	Water Sample (Nutrients, Chlorophyll, TSS): Surface, Mid, & Bottom	Infauna Grabs (# Reps)	Bottom Photo (From Grab Camera)	Sediment Chemistry Composite (for metals, organics, TOC, grain size, Microtox)	Angling (# Fish)**	Other	
									sandperch, 1 lizardfish, 8 tomtate	
	033	27° 05.679' N 082° 57.992' W	1	3 (S, M, B)	3	Yes	1	4 sandperch		
	026	26° 50.758' N 082° 55.841' W	1	3 (S, M, B)	3	Yes	1	0		
	042	26° 46.398' N 083° 08.458' W	1	3 (S, M, B)	3	Yes	1	1 vermilion snapper, 2 tomtate, 3 red grouper		
	014	26° 43.859' N 083° 20.701' W	1	3 (S, M, B)	3	Yes	1	0		
4 (May 19)	038	26° 14.686' N 083° 39.046' W	1	3 (S, M, B)	3	Yes	1	0		
	010	26° 09.147' N 083° 32.730' W	1	3 (S, M, B)	3	Yes	1	1 dusky flounder		
	030	25° 54.745' N 083° 11.097' W	1	3 (S, M, B)	3	Yes	1	3 sandperch, 3 dusky flounder		
	045	25° 46.196' N 083° 01.408' W	1	3 (S, M, B)	3	Yes	1	3 sandperch, 4 vermilion snapper, 1 littlehead porgy		
	046	25° 55.485' N 082° 57.478' W	1	3 (S, M, B)	3	Yes	1	0		
	008	26° 03.050' N 082° 35.913' W	1	3 (S, M, B)	3	Yes	1	5 sandperch		
	024	26° 07.298' N 082° 27.645' W	1	3 (S, M, B)	3	Yes	1	1 sandperch		
5 (May 20)	012	26° 21.247' N 082° 15.473' W	1	3 (S, M, B)	3	Yes	1	0		Surface-current drifter (#67977) deployed
	040	26° 14.151' N 081° 58.508' W	1	3 (S, M, B)	3	Yes	1	1 pigfish, 1		

Day	Stations Sampled	Station Location (Decimal Minutes)	Samples Collected						
			CTD Profile (T, S, pH, D)	Water Sample (Nutrients, Chlorophyll, TSS): Surface, Mid, & Bottom	Infauna Grabs (# Reps)	Bottom Photo (From Grab Camera)	Sediment Chemistry Composite (for metals, organics, TOC, grain size, Microtox)	Angling (# Fish)**	Other
								sandperch, 1 lane snapper, 1 pinfish, 1 red grouper	
	007	25° 34.000' N 082° 12.810' W	1	3 (S, M, B)	3	Yes	1	4 sandperch	
	027	25° 33.843' N 081° 57.974' W	1	3 (S, M, B)	3	Yes	1	2 blue runner, 2 sandperch	
	004*	25° 33.930' N 081° 45.650' W	1	3 (S, M, B)	3	Yes	1	1 blue runner, 3 pigfish, 1 sandperch, 1 tomate	Surface-current drifter (#67978) deployed
	016*	25° 04.004' N 081° 34.180' W	1	3 (S, M, B)	3	Yes	1	5 blue runner, 1 pigfish, 3 lane snapper	
6 (May 21)	047*	24° 53.295' N 081° 49.941' W	1	3 (S, M, B)	3	Yes	1	1 sandperch, 1 white grunt	
	015	25° 06.882' N 081° 48.849' W	1	3 (S, M, B)	3	Yes	1	0	
	043	25° 19.410' N 082° 03.251' W	1	3 (S, M, B)	3	Yes	1	1 sandperch, 2 pinfish	
	039	24° 59.053' N 082° 35.085' W	1	3 (S, M, B)	3	Yes	1	0	
	035	25° 09.600' N 082° 38.890' W	1	3 (S, M, B)	3	Yes	1	5 sandperch	
	029	25° 14.623' N 083° 02.330' W	1	3 (S, M, B)	3	Yes	1	1 sandperch, 1 dusky flounder, 1 lane snapper	
	022	25° 01.288' N 083° 09.062' W	1	3 (S, M, B)	3	Yes	1	1 sandperch, 1 dusky	

Day	Stations Sampled	Station Location (Decimal Minutes)	Samples Collected						
			CTD Profile (T, S, pH, D)	Water Sample (Nutrients, Chlorophyll, TSS): Surface, Mid, & Bottom	Infauna Grabs (# Reps)	Bottom Photo (From Grab Camera)	Sediment Chemistry Composite (for metals, organics, TOC, grain size, Microtox)	Angling (# Fish)**	Other
								flounder, 1 pinfish	
	034	25° 07.436' N 083° 20.086' W	1	3 (S, M, B)	3	Yes	1	0	
7 (May 22)	002	25° 32.083' N 083° 41.676' W	1	3 (S, M, B)	3	Yes	1	0	
	018	25° 06.945' N 083° 38.435' W	1	3 (S, M, B)	3	Yes	1	5 saddle bass	
	006	24° 39.252' N 083° 34.362' W	1	3 (S, M, B)	3	Yes	1	0	Surface-current drifter (#67979) deployed
	050 <sup>+</sup>	24° 40.338' N 082° 57.602' W	1	3 (S, M, B)	3	Yes	1	1 blue runner, 3 sandperch	
	019 <sup>+</sup>	24° 27.445' N 082° 42.044' W	1	3 (S, M, B)	3	Yes	1	1 blue runner	
8 (May 23)	023 <sup>+</sup>	24° 35.049' N 082° 40.127' W	1	3 (S, M, B)	3	Yes	1	2 lane snapper, 5 jolthead porgy, 4 bluestriped grunt	
	011 <sup>+*</sup>	24° 42.000' N 082° 19.400' W	1	3 (S, M, B)	3	Yes	1	3 blue runner	
	031 <sup>+*</sup>	24° 42.600' N 082° 12.650' W	1	3 (S, M, B)	3	Yes	1	1 blue runner	
	003 <sup>+</sup>	24° 22.229' N 082° 27.378' W	1	3 (S, M, B)	3	Yes	1	0	
9 (May 24)	032 <sup>+</sup>	24° 31.031' N 081° 30.947' W	1	3 (S, M, B)	3	Yes	1	5 lane snapper, 3 tomtate	
	048 <sup>+</sup>	24° 38.354' N 081° 02.382' W	1	3 (S, M, B)	3	Yes	1	0	
	044 <sup>+</sup>	24° 49.888' N 080° 37.323' W	1	3 (S, M, B)	3	Yes	1	1 blue runner	
	028 <sup>+</sup>	24° 53.333' N 080° 28.266' W	1	3 (S, M, B)	3	Yes	1	1 blackline tilefish	
	Miami	AR Port of Miami (2330) for	-	-	-	-	-	-	

Day	Stations Sampled	Station Location (Decimal Minutes)	Samples Collected						
			CTD Profile (T, S, pH, D)	Water Sample (Nutrients, Chlorophyll, TSS): Surface, Mid, & Bottom	Infauna Grabs (# Reps)	Bottom Photo (From Grab Camera)	Sediment Chemistry Composite (for metals, organics, TOC, grain size, Microtox)	Angling (# Fish)**	Other
		port call							
10 (May 25)	Miami	In port (weather day)	-	-	-	-	-	-	
11 (May 26)	Miami	DP Miami 0700	-	-	-	-	-	-	
	020	25° 55.331' N 080° 05.953' W	1	3 (S, M, B)	3	Yes	1	0	
	036	26° 20.122' N 080° 02.928' W	1	3 (S, M, B)	3	Yes	1	1 gray triggerfish	
	Transit to Savannah	Begin transit at 1415	-	-	-	-	-	-	
12 (May 27)	Transit to Savannah	In transit	-	-	-	-	-	-	
	Savannah	AR Savannah, 31° 58.042' N 080° 24.602' W, at 2000	-	-	-	-	-	-	
13 (May 28)	Savannah	Demobilization	-	-	-	-	-	-	

\*Station is located within FKNMS

\*Station moved from original coordinates to avoid unsafe (shallow) or restricted areas.



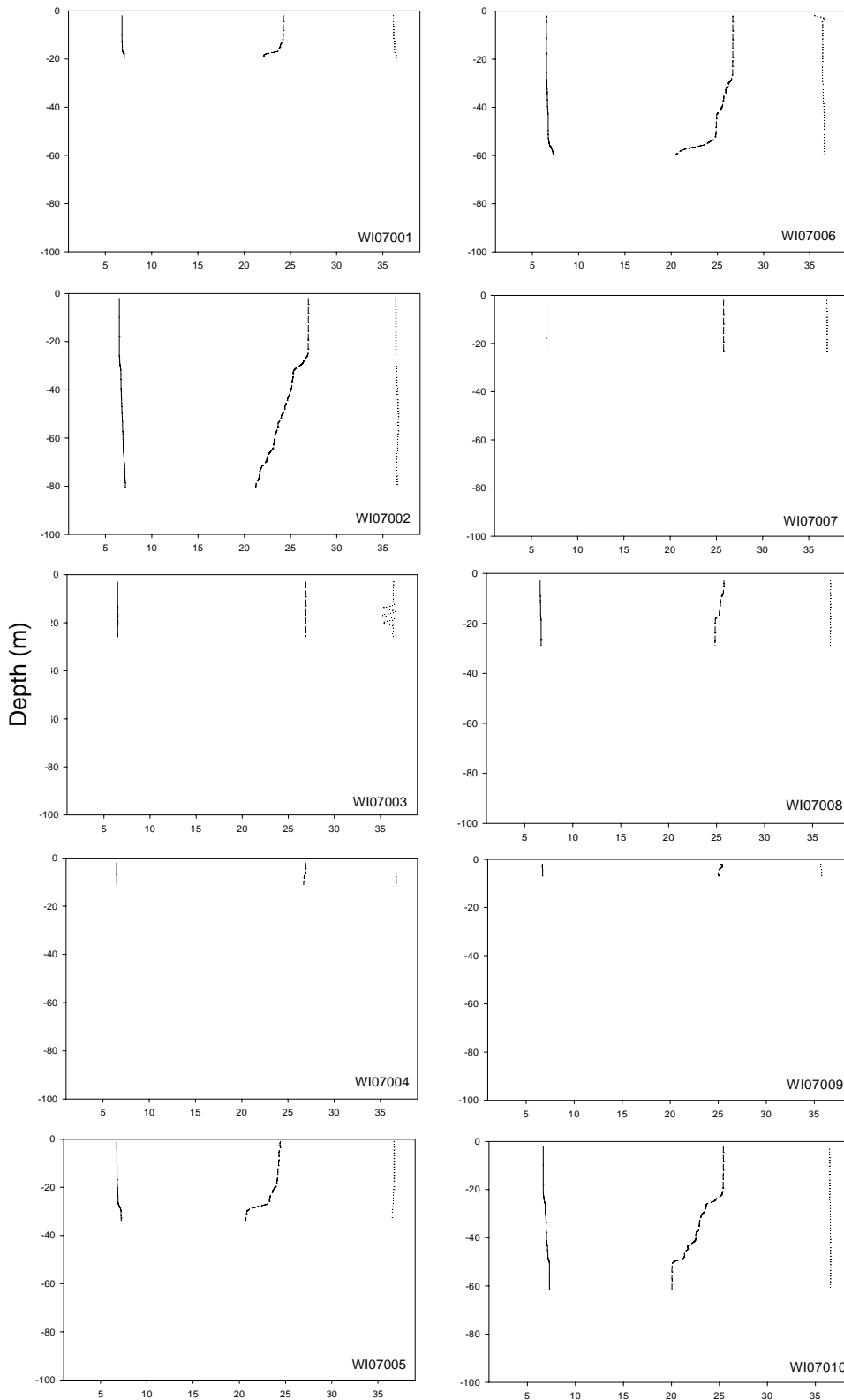
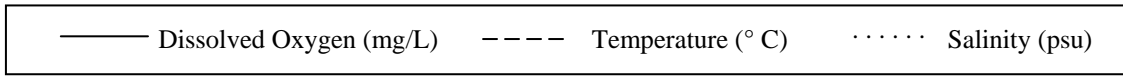
**Common and corresponding scientific names of species listed in Appendix A.**

Bank seabass ( <i>Centropristis ocyurus</i> )	Pigfish ( <i>Orthopristis chrysoptera</i> )
Blackline tilefish ( <i>Caulolatilus cyanops</i> )	Pinfish ( <i>Lagodon rhomboides</i> )
Blue runner ( <i>Caranx crysos</i> )	Red grouper ( <i>Epinephelus morio</i> )
Bluestriped grunt ( <i>Haemulon sciurus</i> )	Red porgy ( <i>Pagrus pagrus</i> )
Dusky flounder ( <i>Syacium papillosum</i> )	Saddle bass ( <i>Serranus notospilus</i> )
Gray triggerfish ( <i>Balistes capriscus</i> )	Sandperch ( <i>Diplectrum formosum</i> )
Jolthead porgy ( <i>Calamus bajonado</i> )	Tomtate ( <i>Haemulon aurolineatum</i> )
Lane snapper ( <i>Lutjanus synagris</i> )	Vermillion snapper ( <i>Rhomboplites aurorubens</i> )
Littlehead porgy ( <i>Calamus proridens</i> )	White grunt ( <i>Haemulon pluneri</i> )
Lizardfish ( <i>Synodus foetens</i> )	

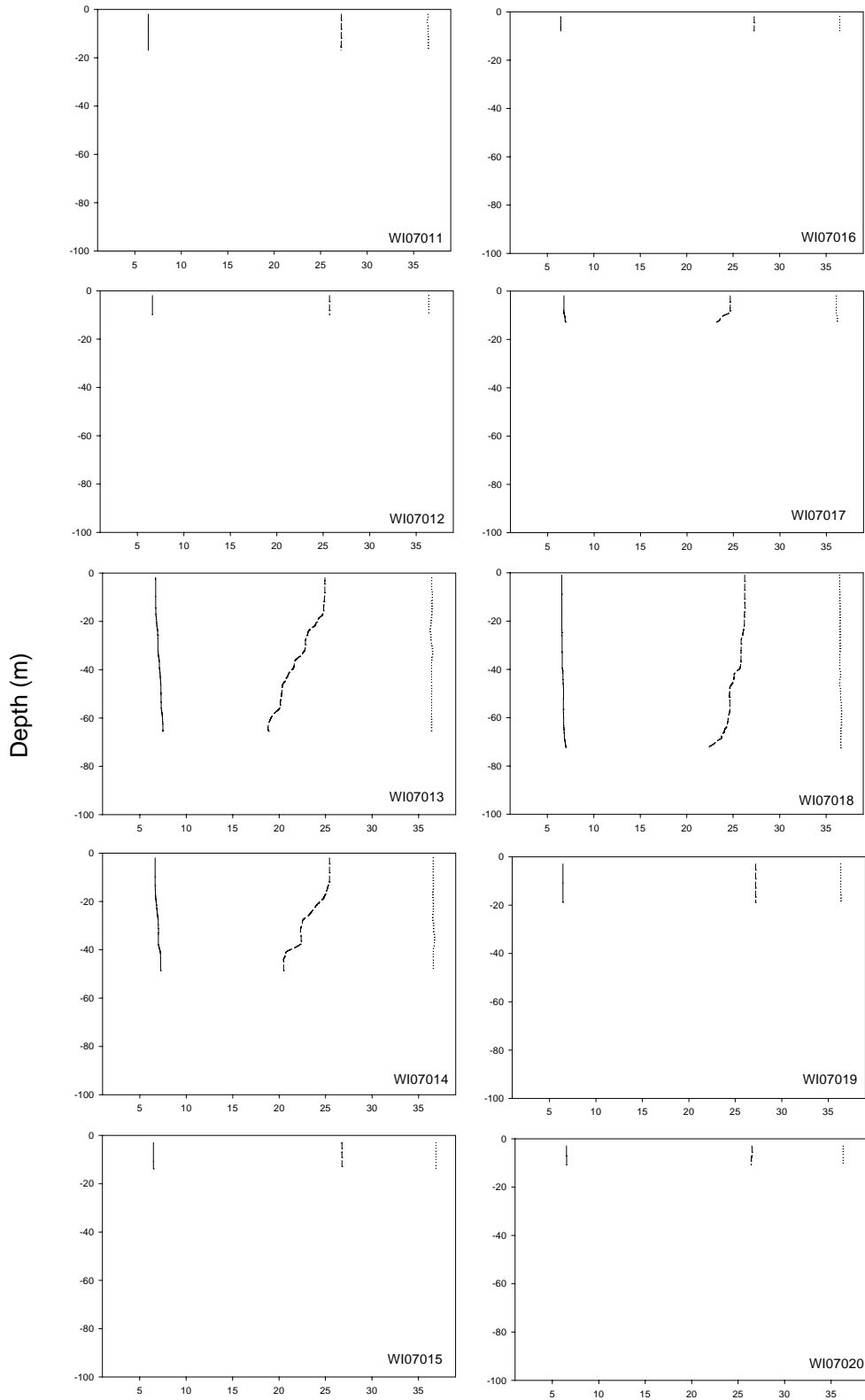
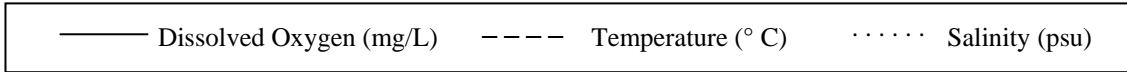


Appendix B  
Water Column Profiles:  
Temperature, Dissolved Oxygen, and Salinity

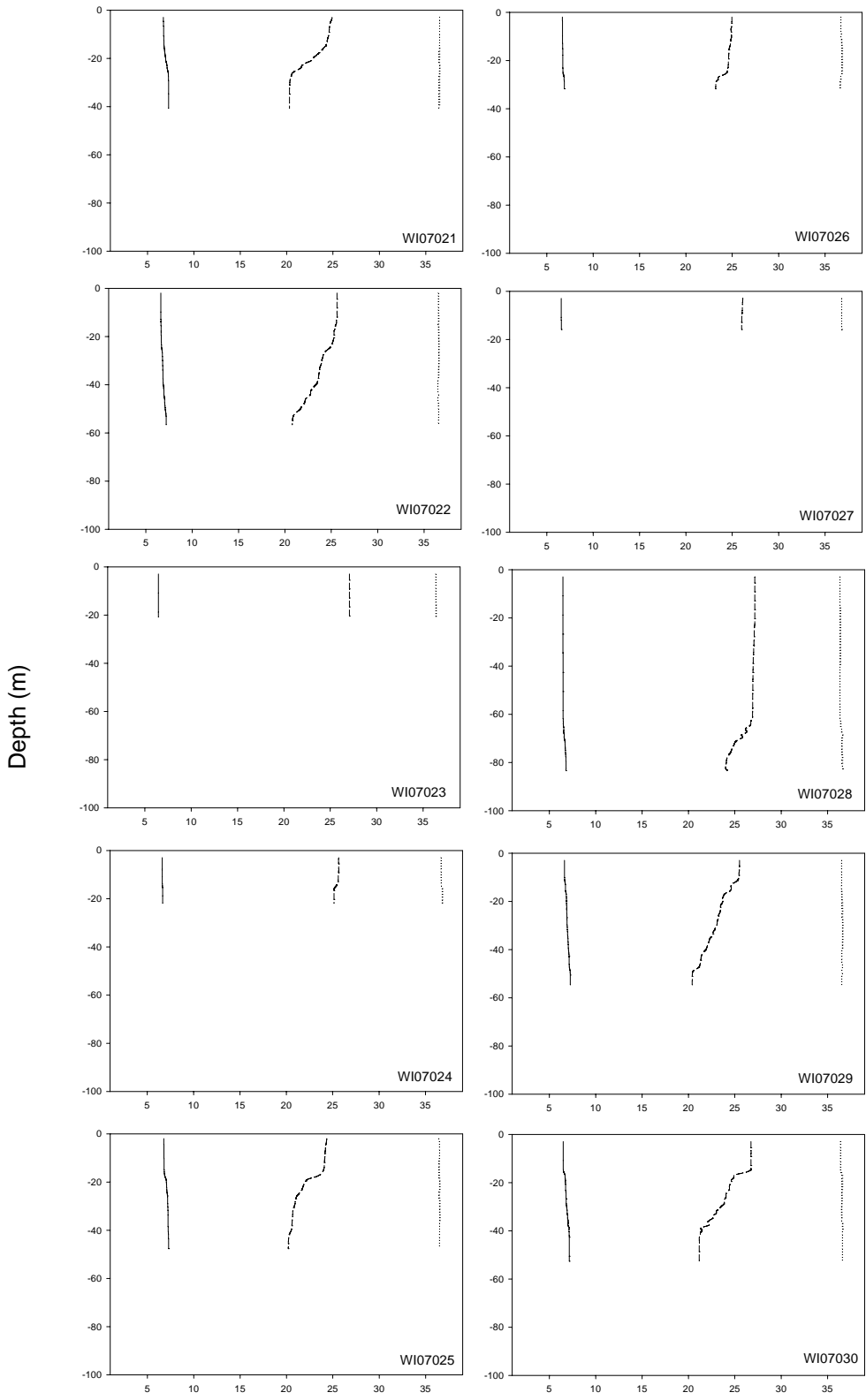
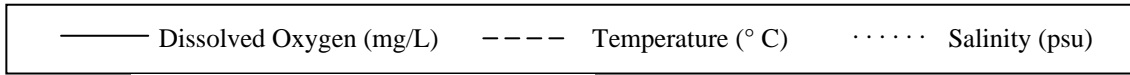
Appendix B. Water column profiles of temperature, dissolved oxygen, and salinity collected at all 50 stations of the West Indian Province with a Seabird CTD.



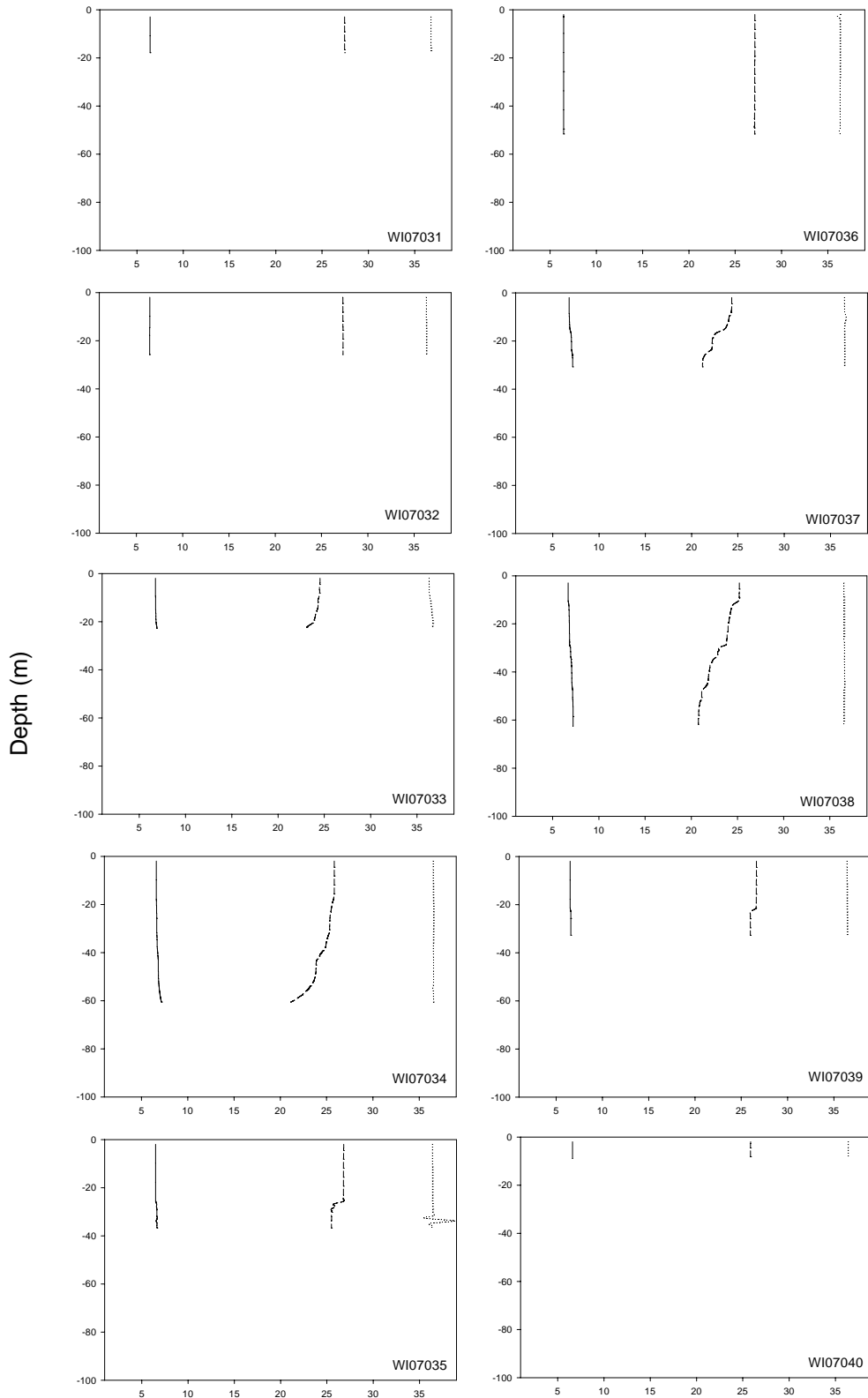
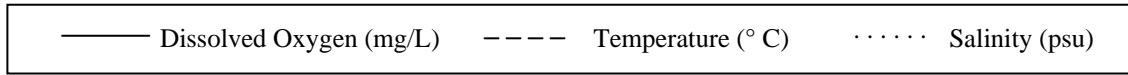
Appendix B continued.



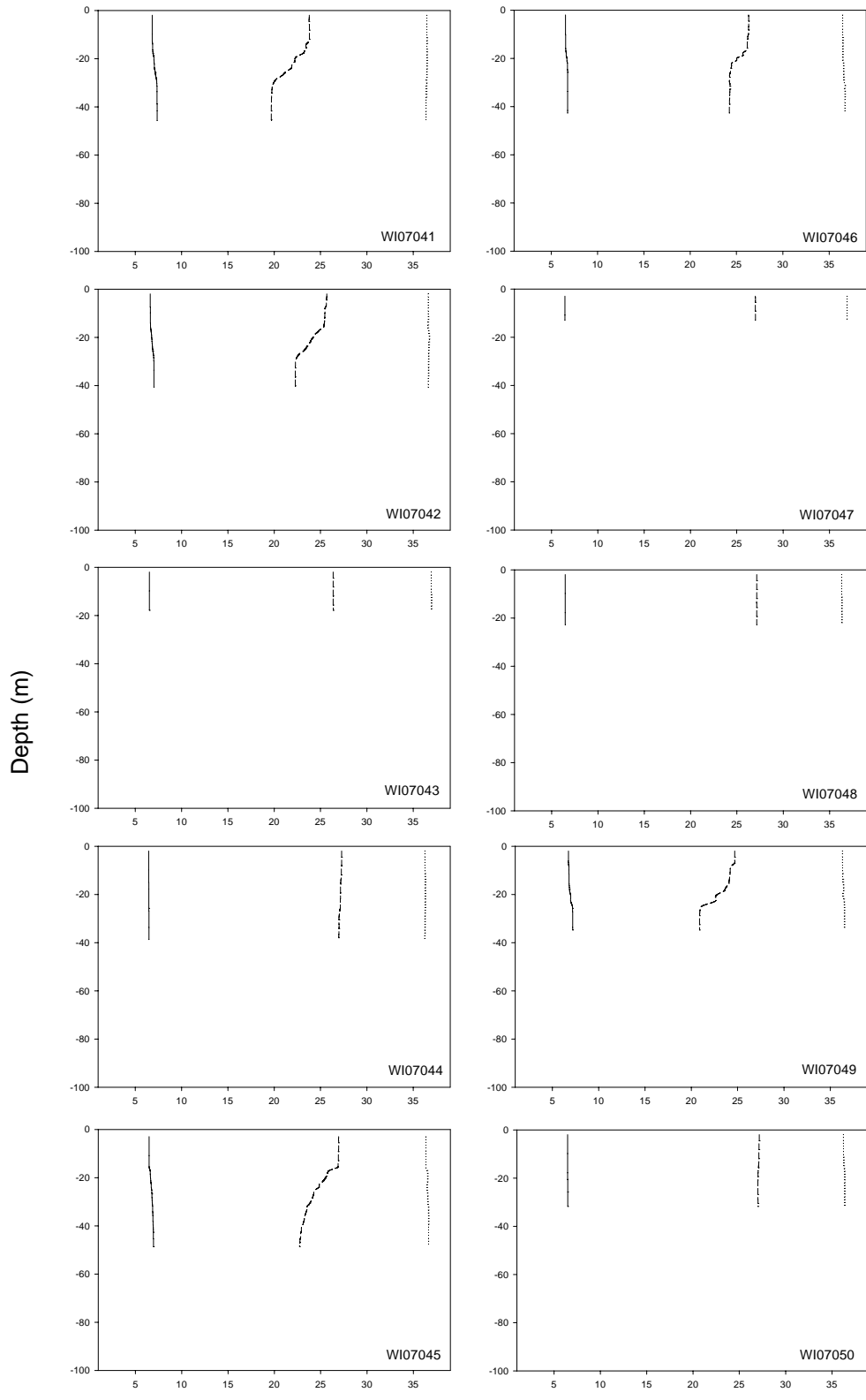
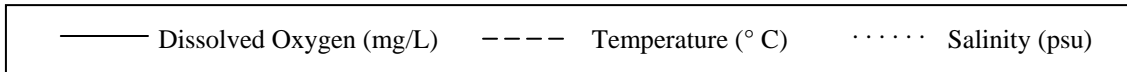
Appendix B continued.



Appendix B continued.



Appendix B continued.







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