Appendix 2-3: Annual Permit Report for the Biscayne Bay Coastal Wetlands – L-31 East Culverts

Permit Report (June 1, 2010–April 30, 2011)
Permit Numbers: 0271729-002 (FDEP); SAJ-1994-1327(IP-TRW) (USACE)

Bahram Charkhian

Contributors: Jorge Jaramillo, John Shaffer, Nirmala Jeyakumar, Leslye Waugh, Christina Stylianos, Linda Yarrish, Bradley Robbins, Raymond Sciortino, Stephen Blair[1], Josh Mahoney[1] and Dallas Hazelton[2]

SUMMARY

This annual report satisfies the reporting requirements specified in Florida Department of Environmental Protection (FDEP) permit number 0271729-002 and United States Army Corps of Engineers (USACE) permit number SAJ-1994-1327(IP-TRW). It is also the annual report required by the permits for the Biscayne Bay Coastal Wetlands – L-31 East Culverts Project.

Table 1 lists key permit-related information based on FDEP permit and reporting guidelines. Table A-1 in Attachment A shows specific pages, tables, and graphs where project status and annual reporting requirements are addressed. **Table 2** lists the attachments included with this report.

[1] Miami-Dade County Department of Environmental Resources Management
[2] Miami-Dade County Parks, Recreation and Open Spaces Department

Table 1. Key permit-related information.

	Florida Department of Environmental Protection (FDEP) Permit	United States Army Corps of Engineers (USACE) Permit
Project Name	Biscayne Bay Coastal Wetlands – L-31 East Project	
Permit Number	0271729-002	SAJ-1994-1327(IP-TRW)
Issue Date	May 23, 2008	May 2, 2008
Expiration Date	May 23, 2013	May 1, 2013
Project Phase	Ongoing	Ongoing
Permit Condition Requiring Annual Monitoring Report	Specific Condition 27	Special Conditions 9,10,11, and 12
Relevant Period of Record	June 1, 2010–April 30, 2011	Baseline Report August 2010
Report Generator	Bahram Charkhian bcharkh@sfwmd.gov 561-682-2284	
Permit Coordinator	Leslye Waugh lwaugh@sfwmd.gov 561-682-6483	

Table 2. Attachments included with this report.

Attachments	
A	Specific Conditions and Cross-References
B	2010–2011 Water Quality, Flow and Stage Data
C1	Letter to USACE in Reference to Submission of Ecological Baseline Monitoring Report for Biscayne Bay Coastal Wetlands
C2	Ecological Baseline Monitoring Report for Biscayne Bay Coastal Wetlands – L-31E Culverts Project, USACE Permit Number SAJ-1994-1327(IP-TKW), October 2010

INTRODUCTION

Comprehensive Everglades Restoration Plan Regulation Act (CERPRA) permit number 0271729-002 issued by the FDEP to the South Florida Water Management District (District or SFWMD) authorizes the District to construct and operate the L-31 East (L-31E) Culverts Project within the Biscayne Bay Coastal Wetlands Project study area (**Figure 1**). Specific Condition 27 of the permit requires the District to submit an annual report to the FDEP detailing the progress of the Biscayne Bay Coastal Wetlands Project and incorporate the annual monitoring report into the South Florida Environmental Report (SFER). The reporting period for this annual report for water quality monitoring is June 1, 2010–April 30, 2011, and for flow and stage is August 1, 2010–April 30, 2011. This document also serves as a comprehensive reference of water quality monitoring needed to evaluate the L-31E Culvert Project's performance toward meeting the planned restoration goals and to satisfy water quality sample data collection requirements outlined in the CERPRA permit.

The USACE issued permit number SAJ-1994-1327(IP-TKW) on May 15, 2008, to the District for construction of the L-31E Culverts Project. Special Condition 1 of the permit states that all submittals and reports required under the permit may be provided in the SFER.

The L-31E Culverts Project is located in Miami-Dade County between the C-102 and C-103 canals (Sections 4, 9, 28, 33, and Township 56 S Range 40 East and 57S Range 40 East). The project's goal is to reestablish, at least in part, historical sheetflow and wetland hydroperiods downstream of the project area with the installation of flap-gated culverts at four locations along the L-31E canal. This project may also provide the additional benefit of mitigating impacts of discharging fresh water via the existing canals. The project is expected to achieve its objectives by redirecting flow historically discharged through water control structures S-21A, S-20F, and S-20G (**Figure 1**), and discharging it into the adjacent coastal wetlands east of the L-31E levee along Biscayne Bay via a series of flap-gated culverts.

To evaluate project performance, the CERPRA permit requires the following:

- Monthly collection of water quality samples (turbidity, ammonia, color, total phosphorous, and nitrate-nitrite) and physiochemical data [specific conductance, dissolved oxygen, pH, temperature, and (calculated) salinity] at monitoring stations MI01, BB53, PR01, and MW01.
- Monthly water level monitoring using stage gauges upstream and downstream of water control structures S-21A, S-20G, and S-20F.
- Monthly calculated flow through culverts S-23A, S-23B, S-23C, and S-23D.

Water quality samples were analyzed by the Miami-Dade County's National Environmental Laboratory Accreditation Conference-certified laboratory under contract to the District, utilizing quantitative analytical methods approved by the FDEP.

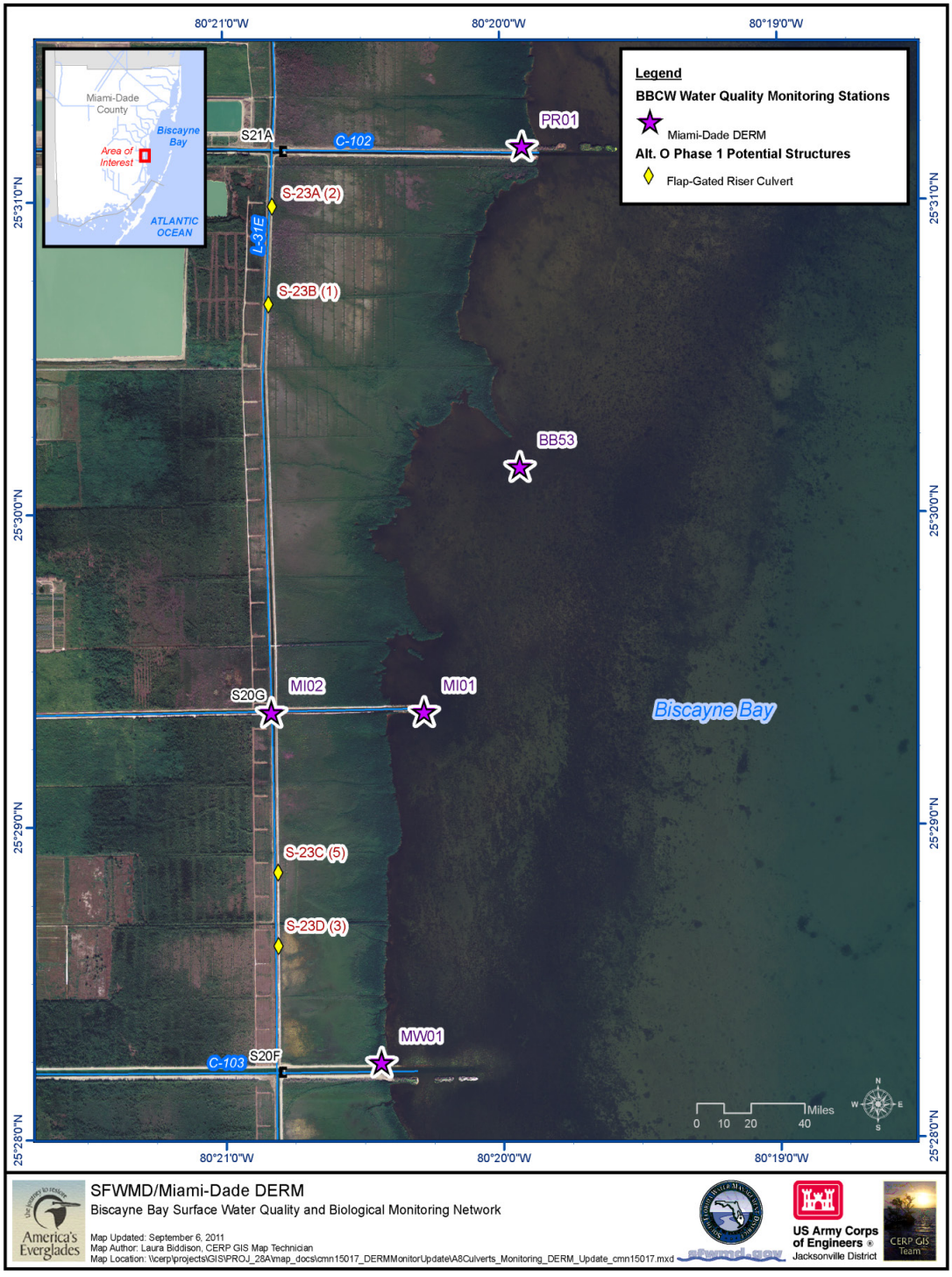

Figure 1. Monitoring stations for the Biscayne Bay Coastal Wetlands – L31 East (L-31E) Culverts Project. [Note: BBCW – Biscayne Bay Coastal Wetlands; DERM – Department of Environmental Resources Management; Alt. – Alternative; SFWMD – South Florida Water Management District]

PROJECT EVALUATION

2010–2011 WATER QUALITY

It should be noted that this annual report does not include a comparative analysis of monthly quarterly water quality data using the student's t-test with a 95 percent confidence interval because of the restricted period of record (June 2010 through May 2011). However, it is anticipated that future annual reports will include a comparison of quarterly water quality, stage, and flow data, as well as a comparison of annual performance. For this reporting period, water quality results from the designated monitoring stations are presented in **Tables 3** through **12**.

Table 3. Water quality results for pH at monitoring stations MW01, BB53, MI01, and PR01.

Date	BB53	MI01	MW01	PR01
June 9, 2010	7.85	7.55	7.85	7.92
July 14, 2010	8.07	7.80	7.91	7.99
August 4, 2010	8.05	7.90	7.99	7.85
September 15, 2010	8.01	7.56	7.28	7.44
October 6, 2010	7.86	7.78	7.75	7.85
November 3, 2010	8.05	7.44	7.41	7.60
December 8, 2010	8.32	8.25	7.95	8.28
January 5, 2011	7.82	7.76	7.84	7.71
February 9, 2011	8.17	8.08	8.04	8.02
March 9, 2011	8.41	8.28	8.02	8.03
April 6, 2011	8.20	8.02	8.04	8.10
Mean	**8.07**	**7.84**	**7.836**	**7.90**
Standard Deviation	**0.18**	**0.27**	**0.25**	**0.23**

Table 4. Water quality results for ammonia in milligrams per liter (mg/L) at monitoring stations MW01, BB53, MI01, and PR01.

Date	BB53	MI01	MW01	PR01
June 9, 2010	0.07	0.11	0.05	0.10
July 14, 2010	0.07	0.07	0.03	0.06
August 4, 2010	0.12	0.13	0.10	0.15
September 15, 2010	0.11	0.10	0.04	0.10
October 6, 2010	0.08	0.09	0.08	0.08
November 3, 2010	0.35	0.18	0.09	0.15
December 8, 2010	0.10	0.09	0.05	0.19
January 5, 2011	0.10	0.09	0.10	0.21
February 9, 2011	0.06	0.07	0.06	0.10
March 9, 2011	0.07	0.11	0.09	0.21
April 6, 2011	0.11	0.12	0.14	0.21
Mean	**0.11**	**0.11**	**0.08**	**0.14**
Standard Deviation	**0.08**	**0.03**	**0.03**	**0.06**

Table 5. Water quality results for turbidity in nephelometric turbidity units (NTU) at monitoring stations MW01, BB53, MI01, and PR01.

Date	BB53	MI01	MW01	PR01
June 9, 2010	0.70	0.70	1.10	1.20
July 14, 2010	0.90	0.60	0.70	1.10
August 4, 2010	0.50	0.60	0.70	1.10
September 15, 2010	0.80	0.80	0.50	0.40
October 6, 2010	1.00	1.30	2.30	1.10
November 3, 2010	1.20	1.00	0.60	1.60
December 8, 2010	0.07	0.90	0.40	1.20
January 5, 2011	0.60	1.10	0.80	1.00
February 9, 2011	0.70	1.70	0.70	1.20
March 9, 2011	0.50	1.00	0.60	0.70
April 6, 2011	1.20	0.70	0.60	1.10
Mean	**1.06**	**0.80**	**0.82**	**0.82**
Standard Deviation	**0.31**	**0.25**	**0.52**	**0.52**

Table 6. Water quality results for dissolved oxygen in mg/L at monitoring stations MW01, BB53, MI01, and PR01.

Date	BB53	MI01	MW01	PR01
June 9, 2010	5.87	2.9	2.61	4.72
July 14, 2010	4.72	4.50	3.08	3.92
August 4, 2010	6.53	2.69	3.07	3.83
September 15, 2010	8.72	4.57	4.88	4.74
October 6, 2010	6.89	6.20	5.63	6.14
November 3, 2010	6.74	3.31	2.95	3.69
December 8, 2010	9.88	9.17	8.70	8.97
January 5, 2011	7.36	7.02	6.99	3.61
February 9, 2011	9.37	8.55	6.30	7.22
March 9, 2011	10.74	8.43	6.00	6.91
April 6, 2011	7.57	6.44	6.09	4.65
Mean	**7.67**	**5.80**	**5.12**	**5.31**
Standard Deviation	**1.82**	**2.35**	**1.97**	**1.76**

Table 7. Water quality results for bottom salinity in practical salinity units (psu) at monitoring stations MW01, BB53, MI01, and PR01.

Date	BB53	MI01	MW01	PR01
June 9, 2010	16.2	13.76	19.22	16.74
July 14, 2010	25.61	21.73	30.92	24.34
August 4, 2010	29.95	29.61	33.96	28.06
September 15, 2010	6.40	11.78	0.63	0.44
October 6, 2010	14.26	13.37	15.21	16.38
November 3, 2010	7.49	11.10	9.96	8.51
December 8, 2010	17.48	22.39	24.36	19.92
January 5, 2011	25.85	24.12	28.56	22.82
February 9, 2011	23.01	24.60	27.69	21.27
March 9, 2011	27.09	25.58	28.5	29.97
April 6, 2011	34.28	34.44	36.1	34.34
Mean	**20.69**	**21.04**	**23.19**	**19.98**
Standard Deviation	**9.04**	**7.06**	**10.88**	**9.41**

Table 8. Water quality results for total phosphorus in mg/L at monitoring stations MW01, BB53, MI01, and PR01.

Date	BB53	MI01	MW01	PR01
June 9, 2010	0.004	0.009	0.014	0.006
July 14, 2010	0.005	0.006	0.005	0.006
August 4, 2010	0.004	0.008	0.007	0.011
September 15, 2010	0.005	0.006	0.006	0.005
October 6, 2010	0.004	0.006	0.012	0.005
November 3, 2010	0.006	0.008	0.007	0.006
December 8, 2010	0.003	0.006	0.005	0.005
January 5, 2011	0.003	0.009	0.006	0.008
February 9, 2011	0.004	0.008	0.007	0.008
March 9, 2011	0.004	0.011	0.009	0.008
April 6, 2011	0.003	0.008	0.008	0.011
Mean	**0.0041**	**0.008**	**0.008**	**0.007**
Standard Deviation	**0.0006**	**0.0016**	**0.0029**	**0.0020**

Table 9. Water quality results for nitrate-nitrite in mg/L at monitoring stations MW01, BB53, MI01, and PR01**.**

Date	BB53	MI01	MW01	PR01
June 9, 2010	0.23	0.69	0.83	1.43
July 14, 2010	0.01	1.19	0.63	2.18
August 4, 2010	0.04	0.29	0.30	0.91
September 15, 2010	1.06	0.48	1.64	2.58
October 6, 2010	0.44	0.54	0.59	0.57
November 3, 2010	1.28	0.52	1.75	3.29
December 8, 2010	1.02	0.52	0.28	1.96
January 5, 2011	0.19	0.21	0.09	0.48
February 9, 2011	0.3	0.14	0.23	2.50
March 9, 2011	0.01	0.11	0.01	0.30
April 6, 2011	0.01	0.04	0.01	0.02
Mean	**0.42**	**0.43**	**0.58**	**1.48**
Standard Deviation	**0.48**	**0.33**	**0.61**	**1.09**

Table 10. Water quality results for temperature in degrees Celsius at monitoring stations MW01, BB53, MI01, and PR01.

Date	BB53	MI01	MW01	PR01
June 9, 2010	30.01	29.54	30.67	30.55
July 14, 2010	31.33	32.18	32.51	31.27
August 4, 2010	31.53	33.39	32.53	32.25
September 15, 2010	29.42	30.42	27.36	27.47
October 6, 2010	25.28	24.69	24.68	24.93
November 3, 2010	25.48	26.32	26.41	26.14
December 8, 2010	14.06	14.64	14.77	14.6
January 5, 2011	22.66	22.73	21.59	22.52
February 9, 2011	22.35	22.75	23.69	22.73
March 9, 2011	24.96	24.34	23.31	24.06
April 6, 2011	26.09	26.3	25.56	26.16
Mean	**25.74**	**26.12**	**25.74**	**25.70**
Standard Deviation	**5.05**	**5.29**	**5.18**	**4.96**

Table 11. Water quality results for specific conductivity in microsiemens per centimeter (µS/cm) at monitoring stations MW01, BB53, MI01, and PR01.

Date	BB53	MI01	MW01	PR01
June 9, 2010	26,617	22,928	31,114	27,443
July 14, 2010	40,346	34,836	47,828	38,553
August 4, 2010	46,441	44,664	51,979	43,837
September 15, 2010	11,332	19,900	1,273	907
October 6, 2010	23,578	22,219	24,998	26,761
November 3, 2010	13,044	18,759	16,980	14,681
December 8, 2010	28,312	35,471	38,278	31,894
January 5, 2011	40,409	37,956	44,178	36,103
February 9, 2011	36,391	38,661	42,721	33,766
March 9, 2011	42,199	40,069	44,131	42,018
April 6, 2011	52,134	52,349	54,566	52,216
Mean	**32,800**	**33,438**	**36,186**	**31,652**
Standard Deviation	**13,306**	**11,029**	**16,234**	**14,233**

Table 12. Water quality results for color (PCU) at monitoring station BB53. [Note: Miami-Dade County, under contract to the South Florida Water Management District (District or SFWMD), initiated monthly collection of color data at MW01, MI01, and PR01.]

Date	BB53
June 9, 2010	20
July 14, 2010	22
August 4, 2010	10
September 15, 2010	20
October 6, 2010	18
November 3, 2010	10
December 8, 2010	12
January 5, 2011	15
February 9, 2011	20
March 9, 2011	10
April 6, 2011	25
Mean	**16.5**
Standard Deviation	**5.4**

2010–2011 PERFORMANCE EVALUATION

L-31E Culverts

The L-31E Culverts are fixed, flap-gated culverts with static operations. No active operational controls exist for these structures. Drought conditions experienced across South Florida during this reporting period resulted in relatively low flows. It should be noted that this annual report does not include a statistical interpretation of data because of the restricted period of record (June 2010–May 2011). However, it is anticipated that future annual reports will include a comparison of quarterly water quality, stage, and flow data, as well as a comparison of annual performance.

During this reporting period, the total quantity of water discharged through L-31E Culverts Project area (**Figure 2**) was approximately 722 acre-feet. Monthly average flow and stage data are presented on **Tables 13** and **14**, respectively, and related monitoring structures are shown in **Figure 2**. Supporting data for flow curve calculations is included as **Figure 3**.

Baseline ecological monitoring efforts were conducted in August 2010. Once additional monitoring efforts are complete, which will allow data comparison, project performance will be evaluated and included in subsequent SFER reports.

Deering Estates Flow-way

The Deering Estates Flow-way Project, a component of the Biscayne Bay Coastal Wetlands Project, is currently under construction. Refer to Chapter 2 of this volume for project status.

2010–2011 HERBICIDE AND PESTICIDE TRACKING

Exotic vegetation within the L-31E project area was treated using herbicides. During the reporting period, exotic vegetation within approximately 25 acres in the vicinity of S-23A and S-23B were treated with herbicides including Dilunt Blue, Polaris AQ, Rodeo, Sunwet, Garlon 4, and Garlon 3A. The application of herbicides was successful and the District will continue to treat and manage exotic vegetation within the L-31E Culverts Project area.

2010–2011 IMPLEMENTATION SCHEDULES

The L-31E Culverts and Deering Estates Flow-way are expedited components of the larger Biscayne Bay Coastal Wetlands Comprehensive Everglades Restoration Plan (CERP) Project, which requires congressional authorization and appropriation, which is anticipated to occur in or after 2015.

2010–2011 MERCURY AND OTHER TOXICANTS

The mercury and other toxicant monitoring has not yet been undertaken. The monitoring plan stipulates that initial monitoring take place within 30 days of flooding at structures S-700 and S-701. These structures have not yet been constructed. Expectation is that S-700 will be completed in late March 2012 and subsequent monitoring of this site, and a second site not affiliated with a structure, will be undertaken. Monitoring of the second structure site (S-701) will commence within 30 days of its completion. Construction of this structure has not yet begun.

Figure 2. Biscayne Bay Coastal Wetlands – L-31E Culverts Project area (green pattern) and monitoring structures.

Table 13. Monthly average flow in cubic feet per second (cfs) for the Biscayne Bay Coastal Wetlands – L-31E Culverts Project.

Month	S-23A	S-23B	S-23C	S-23D
August 2010	316	257	167	136
September 2010	182	129	90	156
October 2010	0	0	0	0
November 2010	0	0	0	0
December 2100	0	0	0	0
January 2011	0	0	0	0
February 2011	0	0	0	0
March 2011	0	0	0	0
April 2011	0	0	0	0

Table 14. Monthly average stage in feet National Geodetic Vertical Datum 29 (ft NGVD29) for the Biscayne Bay Coastal Wetlands – L-31E Culverts Project.

Month	Headwater			Tailwater		
	S-20F S-20F Spillway on C-103 Canal	S-20G S-20G Spillway on Military Canal	S-21A S-21A on C-102/ Princeton Canal	S-20F S-20F Spillway on C-103 Canal	S-20G S-20G Spillway on Military Canal	S-21A S-21A on C-102/ Princeton Canal
August 2010	1.96	1.98	2.00	0.81	0.84	0.86
September 2010	1.83	2.04	1.83	1.34	1.37	1.38
October 2010	1.51	1.64	1.47	1.25	1.25	1.27
November 2010	1.38	1.60	1.34	1.08	1.07	1.10
December 2010	1.33	1.49	1.36	0.67	0.65	0.70
January 2011	1.43	1.75	1.48	0.33	0.32	0.37
February 2011	1.42	1.53	1.47	0.30	0.31	0.35
March 2011	1.47	1.47	1.68	0.53	0.54	0.59
April 2011	1.23	1.26	1.51	0.53	0.60	0.62

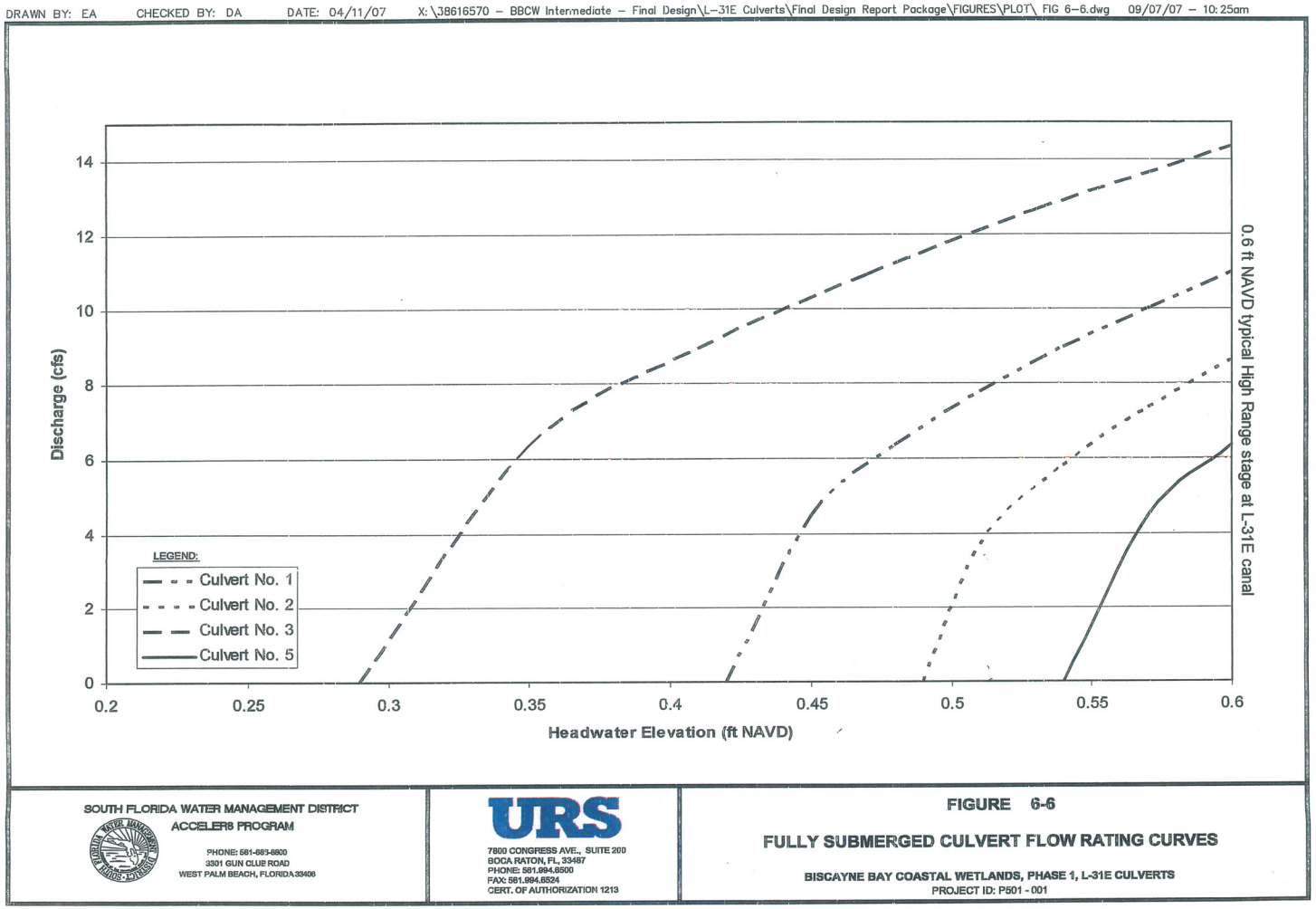

Figure 3. Biscayne Bay Coastal Wetlands – L-31E Culverts Project fully submerged culvert flow curves with headwater elevation in feet National Geodetic Vertical Datum of 1929 (ft NGVD29) from structures S-21A, S-20G, and S-20F utilized to calculate discharges in cubic feet per second (cfs) for culverts S-23A, S-23B, S-23C, and S-23D (Source: URS, 2007).

2010–2011 ECOLOGICAL MONITORING

In accordance with Specific Conditions 9(a) and 9(b) of the USACE permit number SAJ-1994-1327(IP-TKW), the District shall perform ecological monitoring of project benefits at two of the four culvert (S-23A and S-23D) locations including the mitigation enhancement areas. The project area is anticipated to be enhanced by water deliverables (salinity concentrations, water stage, wetland vegetation, and algal compositions).

In accordance with Specific Conditions 11(a) and 11(b) of the USACE permit number SAJ-1994-1327 (IP-TKW), the District completed ecological baseline monitoring in August 2010. The Ecological Baseline Monitoring Report for the Biscayne Bay Coastal Wetlands, L-31E Culverts Project was submitted by the District to the USACE in November 2010 (Attachments C1 and C2).

During the baseline monitoring event, physical water properties were measured at two culverts (S-23A and S-23D) using a calibrated YSI multi-parameter water quality monitoring instrument. Temperature, conductivity, pH, dissolved oxygen, and salinity were recorded at the surface. In addition, wetland staff gauge readings were recorded at culverts S-23A and S-23D.

To monitor wetland vegetation, a permanent 100 meter transect was established at culverts S-23A and S-23D. The origin for each transect is located near each of the culvert basins. Vegetation monitoring was conducted using the line-intercept method. Species occurring in both the ground cover and canopy strata were measured and recorded. Refer to Attachment C2 for the Ecological Baseline Monitoring Report. Once additional monitoring efforts are completed to allow for comparison data, project performance will be evaluated and included in subsequent SFER reports.

LITERATURE CITED

URS. 2007. Final Design Report, L-31E Culverts. URS Corporation, Boca Raton, FL, submitted under Work Order CN040936, WO#37, Job No. 38616570 to South Florida Water Management District, West Palm Beach, FL. September 7, 2007.

Attachment A: Specific Conditions and Cross-References

Table A-1 provides specific conditions, actions taken, and cross-references within this report for the Biscayne Bay Coastal Wetlands – L-31 East Culverts Project, CEPRA permit number 0271729-002.

Table A-1. Specific conditions, actions taken, and cross-references presented for the Biscayne Bay Coastal Wetlands – L-31 East Culverts Project (CEPRA Permit No. 0271729-002) in this report.

Specific Condition	Description	Applicable Phase	Action and Frequency	Reported in 2012 SFER *(All references are to Volume III, unless otherwise noted)*			
				Table	Narrative	Figure	Attachment
15	Operation of Passive Structures	Operation	Fixed structures with no active operations	---	App. 2-3-10	---	---
19	Public Health Safety and Welfare	Operation	Discharges did not pose a serious danger to public health/safety/welfare	---	---	---	---
20	Water Quality Monitoring Program	Operation	Water quality monitoring plan submitted within 90 days before starting flow; water quality monitoring program conducted as required	---	---	---	---
20A	Quality Assurance and Quality Control	Operation	Done as required	---	App. 2-3-3	---	B
20B	Method Detection Limits	Operation	Done as required	---	---	---	B
22	Mercury and Other Toxicants: Monitoring Plan	Operation	Submitted as part of the water quality monitoring plan (September 2008)	---	App. 2-3-10	---	---
23	Removal of Parameters	Operation	Not needed	---	---	---	---
24	Addition of Parameters	Operation	Not needed	---	---	---	---
27	Annual Reports	Operation	Project progress reported annually	All	All	All	A, B
27A	Water Quality Data	Operation	Records included all required details	3 – 12	App. 2-3-5	1	B
27B	Performance Evaluation	Operation	Project progress reported annually	13, 14	App. 2-3-10	2, 3	B
27C	Annual Herbicide and Pesticide Tracking	Operation	The South Florida Water Management District eliminated undesirable exotic vegetation in the wet area of the project	---	App. 2-3-10	---	---
27D	Implementation Schedules	Construction and Operation	Comprehensive Everglades Restoration Plan Implementation Schedule	---	App. 2-3-10	---	---
28	Permit Modifications	Operation	Not needed	---	---	---	---
29	Permit Renewal	Operation	Not applicable	---	---	---	---
30	Department Review and Approval	Operation	Not applicable	---	---	---	---

Attachment B: 2010–2011 Water Quality, Flow and Stage Data

This project information is required by Specific Condition 27-A of the Comprehensive Everglades Restoration Plan Regulation Act (CERPRA) Permit-Operations Authorization for the Biscayne Bay Coastal Wetlands – L-31 East Culverts Project, and is available upon request.

Attachment C1: Letter to USACE in Reference to Submission of Ecological Baseline Monitoring Report for Biscayne Bay Coastal Wetlands

This project information is required by Special Condition 11(b) of the United States Army Corps of Engineers (USACE) permit number SAJ-1994-1327(IP-TKW) for the Ecological Baseline Monitoring Report for the Biscayne Bay Coastal Wetlands, L-31E Culverts Project, which is submitted to the USACE.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Ref. # 11162010-02

November 16, 2010

Mr. Jose Rivera, Project Manager
U.S. Army Corps of Engineers
Palm Beach Gardens Regulatory Section
4400 PGA Blvd., Suite 500
Palm Beach Gardens, FL 33410

Dear Mr. Rivera:

Subject: Biscayne Bay Coastal Wetlands, L-31E Culverts Project
Permit # SAJ-1994-1327 (IP-TKW)
Ecological Baseline Monitoring Report for
Biscayne Bay Coastal Wetlands, L-31E Project

The U.S. Army Corps of Engineers (Corps) issued the above referenced permit to the South Florida Water Management District (District) on May 2, 2008 for the L-31E Culverts Project, a component of the Biscayne Bay Coastal Wetlands. In accordance with Special Condition 11(b), please find enclosed the Ecological Baseline Monitoring Report for Biscayne Bay Coastal Wetlands, L-31E Project.

If you have questions or need additional information, please contact Ron Bearzotti at (561) 681-2563 x3703 or Leslye Waugh at (561) 681-2563 x3737.

Sincerely,

Ron Bearzotti
Lead Environmental Analyst
Permit & Compliance Section
Everglades Restoration Resource Area

RB/rp
Enclosure

c: Richard Fike, FWS
Cynthia Ovdenk, USACE
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Attachment C2: Ecological Baseline Monitoring Report for Biscayne Bay Coastal Wetlands L-31E Culverts Project, USACE Permit No. SAJ-1994-1327 (IP-TKW), October 2010

This project information is required by Special Condition 11(b) of the United States Army Corps of Engineers (USACE) permit number SAJ-1994-1327(IP-TKW) for the Ecological Baseline Monitoring Report for the Biscayne Bay Coastal Wetlands, L-31E Culverts Project, which is submitted to the USACE.

Ecological Baseline Monitoring Report for Biscayne Bay Coastal Wetlands, L-31 Project

1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

This document serves as a comprehensive reference for ecological monitoring for the L-31E Project within the Biscayne Bay Coastal Wetlands (BBCW) Project study area (Figure 1). This monitoring plan has been designed to provide information needed to evaluate the L-31E's performance in meeting restoration goals and to satisfy anticipated ecological data collection requirements, of the Department of the Army 404 permit (Permit #SAJ-1994-1327[IP-TKW], Date of issue: May 15, 2008, Expiration date: November 13, 2012).

The guidance contained in this document will help maintain consistency in sampling locations, parameters, and frequencies, as well as providing documentation of the project scope.

1.2 Project Description

The L-31E is an element of the Biscayne Bay Coastal Wetlands Project located in southeastern Miami-Dade County. The Project site is located in Range 40E, Township 56S Section 33 and Range 40E, Township 57S, Sections 4, 9, and 16 as illustrated in Figure 1.

The Project includes installation of flap-gated culverts at various locations along the L-31E Canal to connect the canal with coastal wetlands along Biscayne Bay. Each culvert consists of 36-inch bituminous-coated corrugated metal pipe with flashboard risers at the culvert intake and aluminum flap gates fixed to concrete end walls. Discharge culverts include a 10-foot wide, 4-foot deep canal excavated from the L-31E Canal to the end wall for each culvert and from the downstream end wall to the property limit (Table 1 and Figure 1).

Figure 1- Biscayne Bay Coastal Wetland, L-31E Project

Table 1. L-31E Culvert Locations

Name	Type of Structure	Latitude	Longitude	Project	Function and/or Description
CC-H4 (A8, S23A)	Gated culvert	25° 30' 59"	80° 20' 49	L-31E	Located in L-31E borrow canal, south of the C-102/ Princeton Canal and north of S-23B on L-31E Canal
CC-H4 (A8, S23B)	Gated culvert	25° 30' 40"	80° 20' 50"	L-31E	Located in L-31E borrow canal, north of SW 280 Street and south of the C-102/Princeton Canal on L-31E Canal
CC-H4 (A8, S23C)	Gated culvert	25° 28' 51"	80° 20' 49"	L-31E	Located in L-31E borrow canal, north of the C-103/ Mowry Canal
CC-H4 (A8, S23D)	Gated culvert	25° 28' 37"	80° 20' 48"	L-31E	Located in L-31E borrow canal between the C-103/ Mowry and Military Canal

1.3 Active Mandates and Permits

The South Florida Water Management District (SFWMD or District) has received the following permits related to this project:

- The Department of the Army 404 permit #SAJ-1994-1327[IP-TKW] (Date of issue: May 15, 2008; Expiration date: November 13, 2012)

1.4 Project Objectives

The monitoring stations described in this document were established to satisfy requirements of the CERP PIR and to satisfy the anticipated requirements of Department of the Army 404 permit #SAJ-1994-1327[IP-TKW]. This Plan provides an outline for quantifying ecological quality, measure constituents of interest (i.e., phosphorous and nitrogen) in surface water entering and leaving the Project area, and measure and evaluate pollutant sources.

The objective of the L-31E Project is to provide freshwater flow into Biscayne Bay and redirect the flow into wetlands and estuarine communities, thereby removing contaminants from stormwater runoff. The L-31E culverts affect only the area between the C-102 and C-103 culverts.

2.0. DATA COLLECTION

Based on special conditions nine (9), Ten(10), Eleven(11), and Twelve (12) as found in the Department of the Army 404 permit to the U.S. Army Corps of Engineers (Permit no: SAJ-1994-1327[IP-TKW]), the South Florida Water Management District will be responsible for monitoring salinity, water stages, and wetland vegetation at culverts one (S-23A) and five (S-23D).

2.1. Sampling Locations

The sampling regimes for the Project monitoring stations are shown in Tables 2. The proposed sampling regimes are designed to match existing canal and bay monitoring programs to facilitate comparability and analysis of the Project data (Figures 1and 2 and Tables 1, 2and 3).

Ecological samples will be collected at a minimum of six (6) locations:

1. Immediately downstream of culvert S-23A
2. 50 meters downstream of culvert S-23A
3. 100 meters downstream of culvert S-23A
4. Immediately downstream of culvert S-23D
5. 50 meters downstream of culvert S-23D
6. 100 meters downstream of culvert S-23D

All sampling stations will be registered in the SFWMD Laboratory Information Management System (LIMS). Table 1 provides the GPS coordinates for each monitoring location. Each site has certain access and authority protocols for entry.

Table 2. Ecological Monitoring Regime to satisfy the Department of the Army 404 permit no: SAJ-1994-1327[IP-TKW] for L-31 E Culverts

Location of monitoring Sites		Collection Method	Matrix	Monitoring effort (New/ Existing)	Frequency	Parameters
Culvert 1 (S-23A)	Immediately downstream of culvert 1 (S-23A)	Grab	Water	New	Monthly	Temperature, pH, conductivity, dissolved oxygen, **salinity**
		Visual	Water	New	Monthly	Staff gauges (at S-23B
	50 and100 meters downstream of culvert 1(S-23A)	Grab	Water	New	Monthly	Temperature, pH, conductivity, dissolved oxygen, **salinity**
		Visual	Water	New	Monthly	**Water level (wetland stages)**
Culvert 5 (S-23D)	Immediately downstream of culvert 5 (S-23D)	Grab	Water	New	Monthly	Temperature, pH, conductivity, dissolved oxygen, **salinity**
		Visual	Water	New	Monthly	Staff gauges (at S-23B
	50 and 100 meters downstream of culvert 5(S-23D)	Grab	Water	New	Monthly	Temperature, pH, conductivity, dissolved oxygen, **salinity**
		Visual	Water	New	Monthly	**Water level (wetland stages)**
Culverts S-23A and S-23D - 100 meter transects east of the levee at culvert S23-A and S-23D: Transects will coincide with the water quality monitoring stations. Vegetation cover along the transect will be documented visually each time water quality is collected at the 100 M station (within an acre).	Vegetation cover along the transect will be documented visually each time water quality is collected at the 100 M station (within an acre).	Visual	Wetland vegetation	New	Monthly	**Wetland vegetation**- vegetation cover by species along a transect (within an acre)

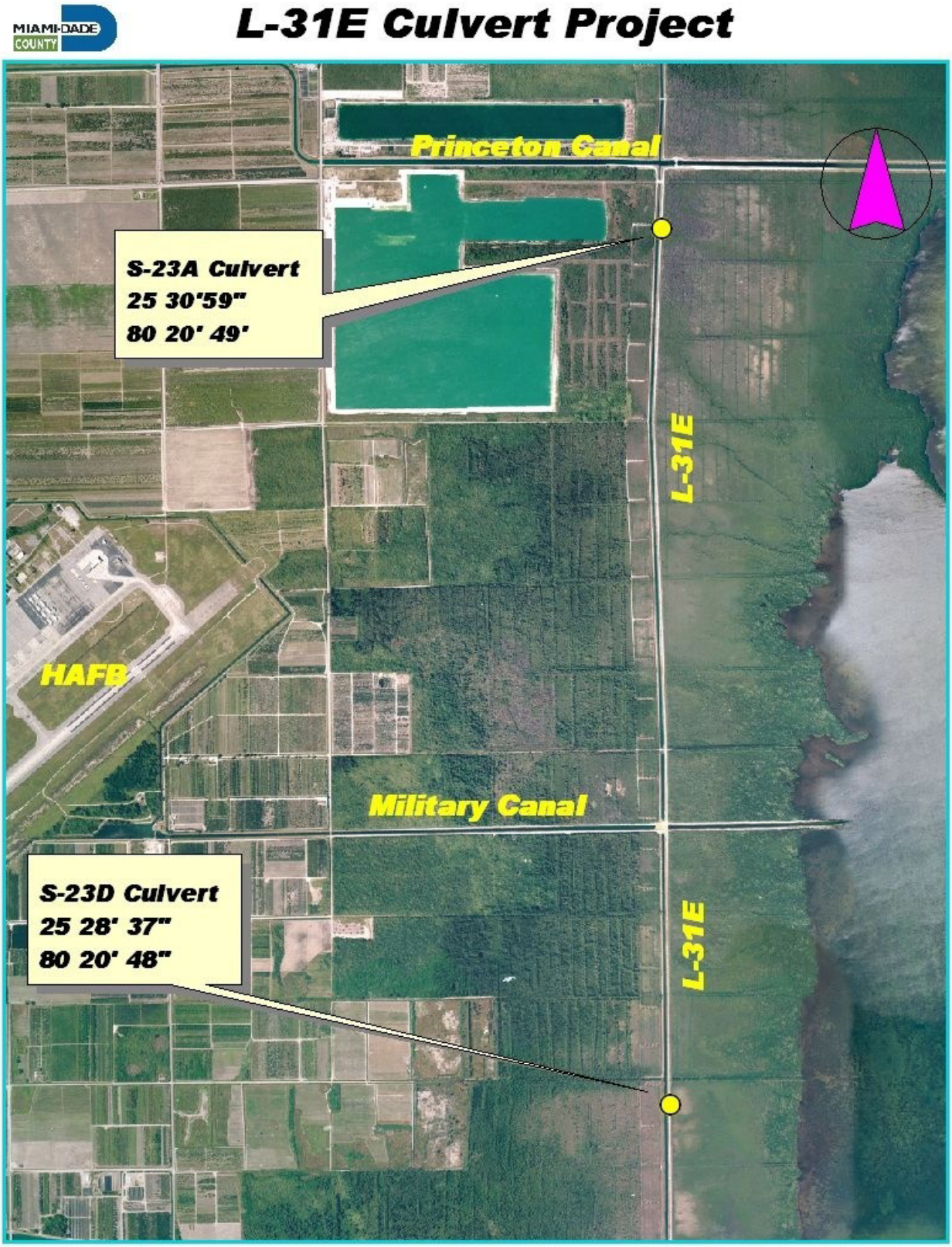

Figure 2- Location of Monitoring Stations for BBCW, L-31 E Project

Table 3. Coordinates for L-31E Culvert Stations			
Station Name	**Description**	**Latitude**	**Longitude**
S-23A (0)	*0 meters*	25.51633238	80.34698146
S-23A (50)	*50 meters*	25.51604647	80.346585
S-23A (100)	*100 meters*	25.51570499	80.34626607
S-23D (0)	*0 meters*	25.47699334	80.34667737
S-23D (50)	*50 meters*	25.4769661	80.34621435
S-23D (100)	*100 meters*	25.47691849	80.34570716

Figure 3- Location of Monitoring Stations
(S-23A upstream of Culvert and S-23D downstream of Culvert)

2.2 - Physical Properties and Baseline

Physical properties were measured at all of the four (4) contracted stations, and two (2) additional stations, on August 11, 2010 using a calibrated YSI multi-parameter water quality monitoring instrument. Temperature, conductivity, pH, dissolved oxygen, and salinity were recorded at the surface. A “spot” check using the YSI multi-parameter water quality monitoring instrument showed each of the culvert basins to be individually homogenous. All data met QA/QC requirements (Figures 1& 2 and Tables 1, 2, and4).

Table 4- Results for Physical Parameters Stations S-23A and S-23D (Baseline Monitoring)

Project Name	DATE	TIME	STATION	STYPE	PTYPE	MATRIX	DEP	PARMTER	Dbase Name	METHOD	RESULT	UNITS
L31E	8/11/2010	10:20	S23A (0)	SAMP	MON	AQUEOUS-Fresh	0.1	TEMP	Temperature (Field)	SM 2550B	27.7	^C
		10:45	S23A (50)				0.1	TEMP		SM 2550B	27.03	
		12:30	S23A (100)				0.1	TEMP		SM 2550B	31.75	
		10:20	S23A (0)				0.1	SpCond	Specific Conductivity (Field)	SM 2510A	589	umhos/cm
		10:45	S23A (50)				0.1	SpCond		SM 2510A	477	
		12:30	S23A (100)				0.1	SpCond		SM 2510A	1206	
		10:20	S23A (0)				0.1	SALIN	Salinity	SM 2520B	0.28	ppt
		10:45	S23A (50)				0.1	SALIN		SM 2520B	0.23	
		12:30	S23A (100)				0.1	SALIN		SM 2520B	0.59	
		10:20	S23A (0)				0.1	DISSOXY	Dissolved Oxygen (Fld)	SM 4500-O G	2.94	mg/L
		10:45	S23A (50)				0.1	DISSOXY		SM 4500-O G	27.72	
		12:30	S23A (100)				0.1	DISSOXY		SM 4500-O G	2.72	
		10:20	S23A (0)				0.1	pH	pH (Field)	SM 4500H+B	7.32	.
		10:45	S23A (50)				0.1	pH		SM 4500H+B	7.38	
		12:30	S23A (100)				0.1	pH		SM 4500H+B	7.3	

Table 4- Results for Physical Parameters Stations S-23A and S-23D (Baseline Monitoring) - Continued

Project Name	DATE	TIME	STATION	STYPE	PTYPE	MATRIX	DEP	PARMTER	Dbase Name	METHOD	RESULT	UNITS
L31E	8/11/2010	13:00	S23D (0)	SAMP	MON	AQUEOUS-Fresh	0.1	TEMP	Temperature (Field)	SM 2550B	28.82	^C
		13:15	S23D (50)				0.1	TEMP		SM 2550B	33.39	
		13:30	S23D (100)				0.1	TEMP		SM 2550B	36.37	
		13:00	S23D (0)				0.1	SpCond	Specific Conductivity (Field)	SM 2510A	611	umhos/cm
		13:15	S23D (50)				0.1	SpCond		SM 2510A	577	
		13:30	S23D (100)				0.1	SpCond		SM 2510A	756	
		13:00	S23D (0)				0.1	SALIN	Salinity	SM 2520B	0.29	ppt
		13:15	S23D (50)				0.1	SALIN		SM 2520B	0.27	
		13:30	S23D (100)				0.1	SALIN		SM 2520B	0.36	
		13:00	S23D (0)				0.1	DISSOXY	Dissolved Oxygen (Fld)	SM 4500-O G	2.6	mg/L
		13:15	S23D (50)				0.1	DISSOXY		SM 4500-O G	4.26	
		13:30	S23D (100)				0.1	DISSOXY		SM 4500-O G	9.81	
		13:00	S23D (0)				0.1	pH	pH (Field)	SM 4500H+B	7.29	.
		13:15	S23D (50)				0.1	pH		SM 4500H+B	7.53	
		13:30	S23D (100)				0.1	pH		SM 4500H+B	7.91	

2.3. Baseline Staff Gauge Monitoring

Wetland staff gauge readings were recorded at all of the four (4) contracted stations on August 11, 2010. GPS coordinates and photographs were recorded for all four stations (Figure2 and Tables 3, 5 and 6).

Table 5. Coordinates for L-31E Staff Gauges.			
Staff Gauge	**Description**	**Latitude**	**Longitude**
S-23A (W)	west culvert staff gauge	25.51642222	80.34714444
S-23A (E)	east culvert staff gauge	25.51633238	80.34698146
S-23A (WTLND)	wetland staff gauge	25.51623993	80.3467435
S-23D (W)	west culvert staff gauge	25.476975	80.34689722
S-23D (E)	east culvert staff gauge	25.47699334	80.34667737
S-23D (WTLND)	wetland staff gauge	25.47696744	80.3461996

Table 6. BBCW, L-31E Staff Gauges Reading (Baseline Monitoring)

Project Name	DATE	STAGE GAUGE	HEIGHT
L31E Culverts	8/11/2010	S-23A west	n/a
L31E Culverts	8/11/2010	S-23A east	2
L31E Culverts	8/11/2010	S-23A wetland	0.1
L31E Culverts	8/11/2010	S-23D west	n/a
L31E Culverts	8/11/2010	S-23D east	2.6
L31E Culverts	8/11/2010	S-23D wetland	1.32

2.4. Baseline Vegetation Monitoring

On August 11, 2010, a permanent 100 meter transect for vegetation monitoring was established at both of the contracted culverts. The origin for each transect is located near each of the culvert basins [S-23A (0) and S-23D (0)]. Vegetation monitoring was conducted using the line-intercept method. Species occurring in both the ground cover and canopy strata were measured and recorded (Figures 2, 4, 5, 6, and 7 and tables 7, 8, 9, 10, 11, 12, and 13)

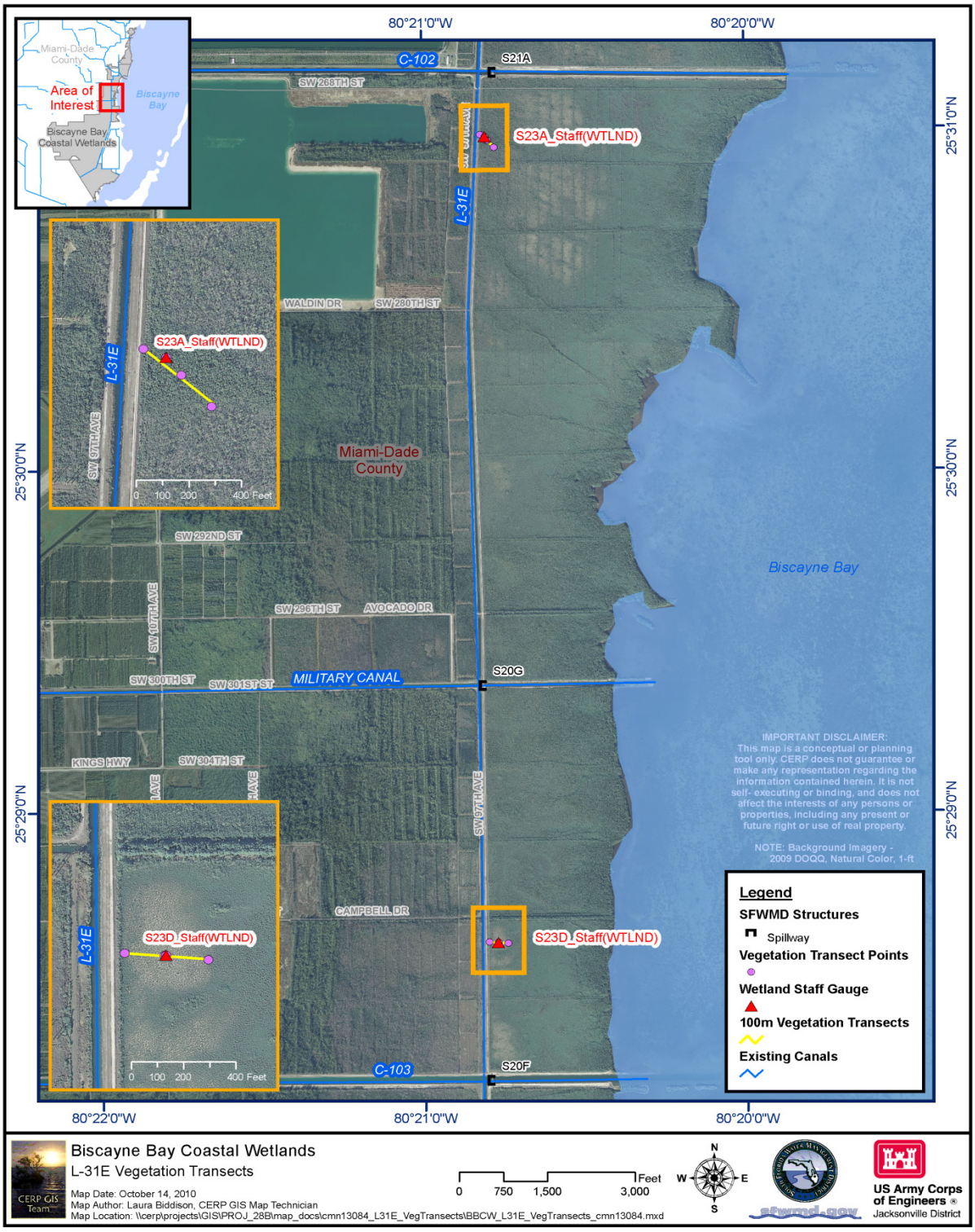

Figure 4- Location of transects east of the levee at culvert S23-A and S-23D

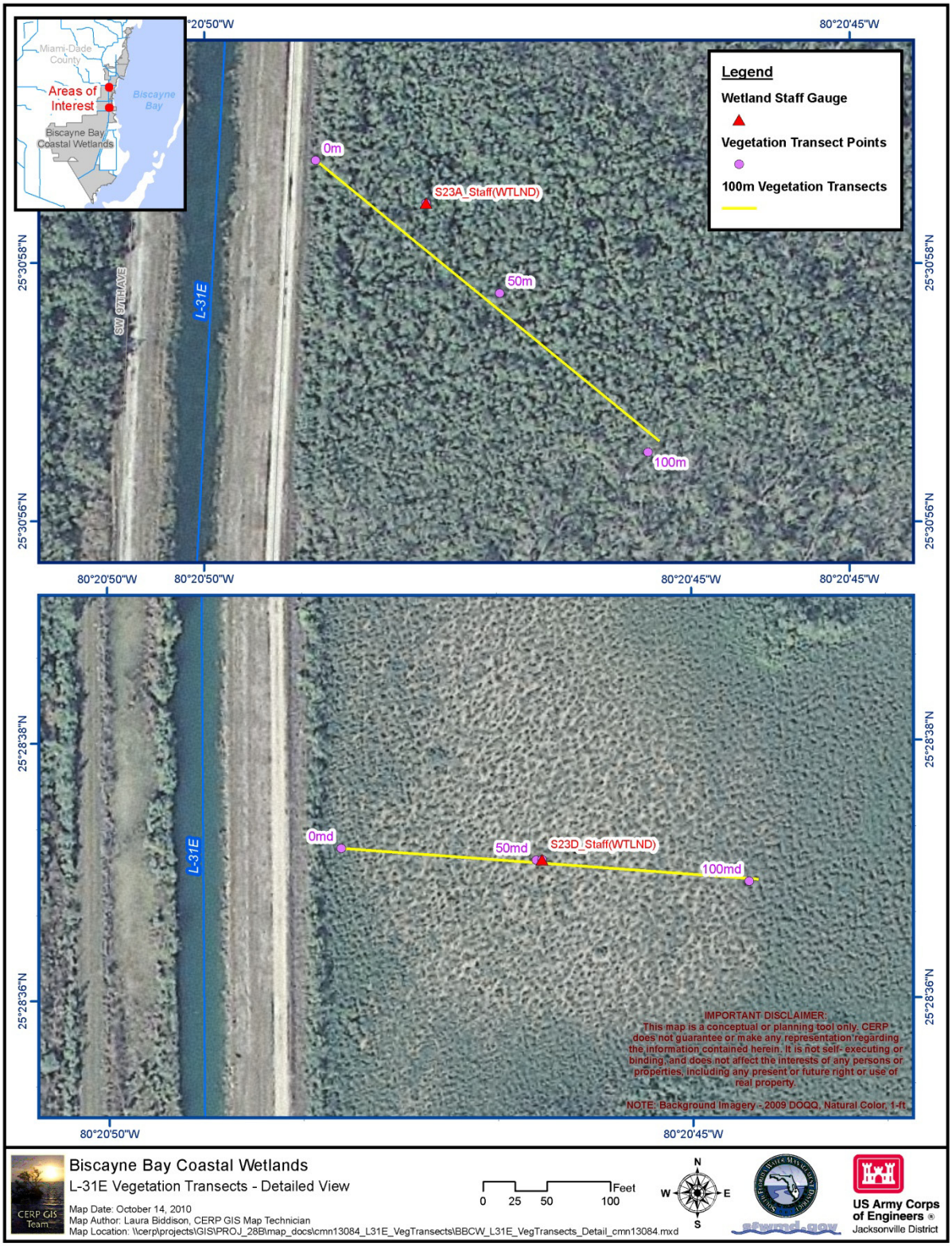

Figure 5- Location of transects east of the levee at culvert S23-A and S-23D

Table7.BBCW, L-31E Vegetation monitoring S-23A and S-23D (Baseline Monitoring)

S23A - Canopy		S23A- Groundcover	
Species	**% Cover**	**Species**	**% Cover**
Annona glabra	0.80%	Acrostichum aureum	25.80%
Casuarina equisetifolia	0.30%	Ardisia elliptica	3.70%
Conocarpus erectus	12.10%	Cladium jamaicensis	22.40%
Laguncularia racemosa	5.00%	Conocarpus erectus	4.10%
Metopium toxiferum	0.40%	Psilotum nudum	0.30%
Rhizophora mangle	98.60%	Rhizophora mangle	4.90%
Tillandsia flexuosa	0.40%	Ludwigia repens	0.50%

Figure 4- Vegetation monitoring downstream Culvert S-23A (Within 100 meters of Culvert S-23A)

Figure 5- Vegetation monitoring downstream Culvert S-23A (Within 100 meters of Culvert S-23A)

Table 8. BBCW, L-31E Vegetation monitoring S-23D Groundcover (Baseline Monitoring)

S23D- Groundcover	
Species	**% Cover**
Rhizophora mangle	82.50%
Panicum repens	0.20%

Figure 6- Vegetation monitoring downstream Culvert S-23D (Within 100 meters of Culvert S-23D)

Figure 7- Vegetation monitoring downstream Culvert S-23D (Within 100 meters of Culvert S-23D)

Table 9- Biscayne Bay coastal, L-31E Vegetation monitoring within 100 meter transect downstream of S-23A (Canopy- Detail) (Baseline Monitoring)

Transect ID: **S23A**														Date: **8/11/2010**		
L-31E Vegetation Monitoring (100 meter transect)																
Species	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**TOTAL LENGTH**	**% Cover**
Acrostichum aureum															0	0.00%
Annona glabra	17.3	18.1													0.8	0.80%
Ardisia elliptica															0	0.00%
Avicinnia germinans															0	0.00%
Baccharis angustifolia															0	0.00%
Casuarina equisetifolia	9.7	10													0.3	0.30%
Cladium jamaicensis															0	0.00%
Conocarpus erectus	62.2	62.8	46.4	52.2	43.5	45.9	2.1	3	1.2	1.9	1.3	3			12.1	12.10%
Encylclia tampensis															0	0.00%
Laguncularia racemosa	86.3	86.8	80.6	80.7	75.6	76.3	56.5	57.2	36.2	38.5	3	3.7			5	5.00%
Metopium toxiferum	8.3	8.7													0.4	0.40%
Psilotum nudum															0	0.00%
Rhabdadenia biflora															0	0.00%
Rhizophora mangle	86.9	90	77.3	83.6	52.2	82	38.8	50.4	1.2	49					98.6	98.60%
Schinus terebinthifolia															0	0.00%
Tillandsia utriculata															0	0.00%

Table 10- Biscayne Bay coastal, L-31E Vegetation monitoring within 100 meter transect downstream of S-23A (Canopy- Detail) , Baseline Monitoring - Continued

Transect ID: **S23A**															Date: **8/11/2010**	
L-31E Vegetation Monitoring (100 meter transect)																
Species	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**TOTAL LENGTH**	**% Cover**
Species	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**TOTAL LENGTH**	**% Cover**
															0	0.00%
Tillandsia flexuosa	0.1	0.5													**0.4**	**0.40%**
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
		-													0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%

Table 11- Biscayne Bay coastal, L-31E Vegetation monitoring within 100 meter transect downstream of S-23A Baseline Monitoring (Ground Cover Detail)

Transect ID: **S23A**	Ground Cover													Date: **8/11/2010**	
L-31E Vegetation Monitoring (100 meter transect)															
Species	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**TOTAL LENGTH**	**% Cover**
Acrostichum aureum	4.8	6.8	8.7	9	12.6	13.2	15.3	17.3	20.9	22.3	37.2	41	44.3	45	10.8	10.80%
Annona glabra															0	0.00%
Ardisia elliptica	2.4	2.8	9.2	9.9	23	23.9	27.8	28.7	63.1	63.9					3.7	3.70%
Avicinnia germinans															0	0.00%
Baccharis angustifolia															0	0.00%
Casuarina equisetifolia															0	0.00%
Cladium jamaicensis	1	2.4	17.3	19.9	26.2	28	29.5	30.3	33.2	49					22.4	22.40%
Conocarpus erectus	13.5	15.3	52.5	53	53.4	55.2									4.1	4.10%
Encylclia tampensis															0	0.00%
Laguncularia racemosa															0	0.00%
Metopium toxiferum															0	0.00%
Psilotum nudum	41.5	41.8													0.3	0.30%
Rhabdadenia biflora															0	0.00%
Rhizophora mangle	7.2	8.1	51.2	51.5	52	52.5	55.1	55.4	66.6	68.5	88	89			4.9	4.90%
Schinus terebinthifolia															0	0.00%
Tillandsia utriculata															0	0.00%

Table 11- Biscayne Bay coastal, L-31E Vegetation monitoring within 100 meter transect downstream of S-23A Baseline Monitoring (Canopy- Detail) – Continued

Transect ID: **S23A**	Ground Cover														Date: **8/11/2010**	
L-31E Vegetation Monitoring (100 meter transect)																
Species	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**TOTAL LENGTH**	**% Cover**
Acrostichum aureum	55.2	60.5	69.8	70.5	73.8	76.3	79.6	82.7	84.7	86.9	88	89.2			**25.8**	**25.80%**
Annona glabra															0	0.00%
Ardisia elliptica															**3.7**	**3.70%**
Avicinnia germinans															0	0.00%
Baccharis angustifolia															0	0.00%
Casuarina equisetifolia															0	0.00%
Cladium jamaicensis															**22.4**	**22.40%**
Conocarpus erectus															**4.1**	**4.10%**
Encylclia tampensis															0	0.00%
Laguncularia racemosa															0	0.00%
Metopium toxiferum															0	0.00%
Psilotum nudum															**0.3**	**0.30%**
Rhabdadenia biflora															0	0.00%
Rhizophora mangle															**4.9**	**4.90%**
Schinus terebinthifolia															0	0.00%
Tillandsia utriculata															0	0.00%

Table 11- Biscayne Bay coastal, L-31E Vegetation monitoring within 100 meter transect downstream of S-23A Baseline Monitoring (Canopy- Detail) – Continued

Transect ID: **S23A**					Ground Cover										Date: **8/11/2010**	
L-31E Vegetation Monitoring (100 meter transect)																
Species	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**TOTAL LENGTH**	**% Cover**
Ludwigia repens	25.5	26													**0.5**	**0.50%**
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
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															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%

Table 12- Biscayne Bay coastal, L-31E Vegetation monitoring within 100 meter transect downstream of S-23D Baseline Monitoring (Groundcover- Detail)

Transect ID: **S23D**														Date: **8/11/2010**		
L-31E Vegetation Monitoring (100 meter transect)																
Species	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**TOTAL LENGTH**	**% Cover**
Acrostichum aureum															0	0.00%
Annona glabra															0	0.00%
Ardisia elliptica															0	0.00%
Avicinnia germinans															0	0.00%
Baccharis angustifolia															0	0.00%
Casuarina equisetifolia															0	0.00%
Cladium jamaicensis															0	0.00%
Conocarpus erectus															0	0.00%
Encylclia tampensis															0	0.00%
Laguncularia racemosa															0	0.00%
Metopium toxiferum															0	0.00%
Psilotum nudum															0	0.00%
Rhabdadenia biflora															0	0.00%
Rhizophora mangle	55.7	57.2	57.9	62.4	63.7	67.7	68.3	70.5	71.5	78.6	80.1	86.7	87.6	90	28.3	28.30%
Rhizophora mangle	22.2	28	28.8	34.3	35.3	39.7	40.2	46.2	47.6	48	48.6	50.4	51.6	54.2	54.8	54.80%
Rhizophora mangle	3.8	7.3	7.7	10	0.3	3.9	4.4	6.5	6.9	10.4	10.7	11.8	12.3	21	79.6	79.60%

Table 12- Biscayne Bay coastal, L-31E Vegetation monitoring within 100 meter transect downstream of S-23D Baseline Monitoring (Groundcover- Detail) – Continued

Transect ID: **S23D**															Date: **8/11/2010**	
L-31E Vegetation Monitoring (100 meter transect)																
Species	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**TOTAL LENGTH**	**% Cover**
Rhizophora mangle	0	2.9													**82.5**	**82.50%**
Annona glabra															0	0.00%
Ardisia elliptica															0	0.00%
Avicinnia germinans															0	0.00%
Baccharis angustifolia															0	0.00%
Casuarina equisetifolia															0	0.00%
Cladium jamaicensis															0	0.00%
Conocarpus erectus															0	0.00%
Encylclia tampensis															0	0.00%
Laguncularia racemosa															0	0.00%
Metopium toxiferum															0	0.00%
Psilotum nudum															0	0.00%
Rhabdadenia biflora															0	0.00%
Rhizophora mangle															28.3	28.30%
Schinus terebinthifolia															54.8	54.80%
Tillandsia utriculata															79.6	79.60%

Table 12- Biscayne Bay coastal, L-31E Vegetation monitoring within 100 meter transect downstream of S-23D Baseline Monitoring (Groundcover- Detail) – Continued

Transect ID: **S23D**														Date: **8/11/2010**		
L-31E Vegetation Monitoring (100 meter transect)																
Species	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**Start**	**End**	**TOTAL LENGTH**	**% Cover**
Panicum repens	0	0.2													0.2	0.20%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%
															0	0.00%

Table 13- List of Invasive Plant Species (Baseline Monitoring)
Florida Exotic Pest Plant Council's-2009 List of Invasive Plant Species
of Category I and II invasive Established by the Florida Exotic Pest Plant Council)

Florida Exotic Pest Plant Council's 2009 List of Invasive Plant Species **CATEGORY I: Invasive** exotics that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives. This definition does not rely on the economic severity or geographic range of the problem, but on the documented ecological damage caused.		Biscayne Bay Coastal Wetlands, L-31 E Project		Category
		Within 100 meters downstream S-23A	Within 100 meters downstream S-23D	
Scientific Name	Common Name	Not Present	Not Present	I
Abrus precatorius	Rosary pea	Not Present	Not Present	I
Acacia auriculiformis	Earleaf acacia	Not Present	Not Present	I
Albizia julibrissin	Mimosa, silk tree	Not Present	Not Present	I
Albizia lebbeck	Woman's tongue	Not Present	Not Present	I
Ardisia crenata (A. crenulata misapplied)	Coral ardisia	Not Present	Not Present	I
Ardisia elliptica (A. humilis misapplied)	**shoebutton ardisia**	**Present**	**Not Present**	**I**
Asparagus aethiopicus (A. sprengeri;	asparagus-fern	Not Present	Not Present	I
A. densiflorus misapplied)		Not Present	Not Present	I
Bauhinia variegata	orchid tree	Not Present	Not Present	I
Bischofia javanica		Not Present	Not Present	I
Calophyllum antillanum(C. calaba and C. inophyllum misapplied)	Santa maria (names "mast wood,""Alexandrian laurel" used in cultivation)	Not Present	Not Present	I
Casuarina equisetifolia	**Australian-pine, beach sheoak**	**Present**	**Not Present**	**I**
Casuarina glauca	suckering Australian-pine, gray sheoak	Not Present	Not Present	I
Cinnamomum camphora	camphor tree	Not Present	Not Present	I
Colocasia esculenta	wild taro	Not Present	Not Present	I
Colubrina asiatica	lather leaf	Not Present	Not Present	I
Cupaniopsis anacardioides	carrotwood	Not Present	Not Present	I
Dioscorea alata	winged yam	Not Present	Not Present	I
Dioscorea bulbifera	air-potato	Not Present	Not Present	I
Eichhornia crassipes	water-hyacinth	Not Present	Not Present	I
Eugenia uniflora	Surinam cherry	Not Present	Not Present	I
Ficus microcarpa (F. nitida and	laurel fig	Not Present	Not Present	I
F. retusa var. nitida misapplied)1		Not Present	Not Present	I
Hydrilla verticillata	hydrilla	Not Present	Not Present	I

Table 13- List of Invasive Plant Species (Baseline Monitoring)-Continued
Florida Exotic Pest Plant Council's-2009 List of Invasive Plant Species
of Category I and II invasive Established by the Florida Exotic Pest Plant Council)

Florida Exotic Pest Plant Council's 2009 List of Invasive Plant Species **CATEGORY I: Invasive** exotics that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives. This definition does not rely on the economic severity or geographic range of the problem, but on the documented ecological damage caused.		Biscayne Bay Coastal Wetlands, L-31 E Project		Category
		Within 100 meters downstream S-23A	Within 100 meters downstream S-23D	
Scientific Name	Common Name	Not Present	Not Present	I
Hygrophila polysperma	green hygro	Not Present	Not Present	I
Hymenachne amplexicaulis	West Indian marsh grass	Not Present	Not Present	I
Imperata cylindrica (I. brasiliensis misapplied)	cogon grass	Not Present	Not Present	I
Ipomoea aquatica	water-spinach	Not Present	Not Present	I
Jasminum dichotomum	Gold Coast jasmine	Not Present	Not Present	I
Jasminum fluminense	Brazilian jasmine	Not Present	Not Present	I
Lantana camara (= L. strigocamara)	lantana, shrub verbena	Not Present	Not Present	I
Ligustrum lucidum	glossy privet	Not Present	Not Present	I
Ligustrum sinense	Chinese privet, hedge privet	Not Present	Not Present	I
Lonicera japonica	Japanese honeysuckle	Not Present	Not Present	I
Ludwigia peruviana	Peruvian primrosewillow	Not Present	Not Present	I
Luziola subintegra	Tropical American water grass	Not Present	Not Present	I
Lygodium japonicum	Japanese climbing fern	Not Present	Not Present	I
Lygodium microphyllum	**Old World climbing fern**	**Present**	**Not Present**	**I**
Macfadyena unguis-cati	cat's claw vine	Not Present	Not Present	I
Manilkara zapota	sapodilla	Not Present	Not Present	I
Melaleuca quinquenervia	melaleuca, paper bark	Not Present	Not Present	I
Melinis repens (= Rhynchelytrum repens)	Natal grass	Not Present	Not Present	I
Mimosa pigra	catclaw mimosa	Not Present	Not Present	I
Nandina domestica	nandina, heavenly bamboo	Not Present	Not Present	I
Nephrolepis cordifolia	sword fern	Not Present	Not Present	I
Nephrolepis brownii (= N. multiflora)	Asian sword fern	Not Present	Not Present	I

Table 13- List of Invasive Plant Species (Baseline Monitoring)-Continued
Florida Exotic Pest Plant Council's-2009 List of Invasive Plant Species of Category I and II invasive Established by the Florida Exotic Pest Plant Council)

Florida Exotic Pest Plant Council's 2009 List of Invasive Plant Species **CATEGORY I: Invasive** exotics that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives. This definition does not rely on the economic severity or geographic range of the problem, but on the documented ecological damage caused.		Biscayne Bay Coastal Wetlands, L-31 E Project		Category
		Within 100 meters downstream S-23A	Within 100 meters downstream S-23D	
Scientific Name	Common Name	Not Present	Not Present	I
Neyraudia reynaudiana	Burma reed, cane grass	Not Present	Not Present	I
Nymphoides cristata	snowflake	Not Present	Not Present	I
Nymphoides cristata	snowflake	Not Present	Not Present	I
Paederia cruddasiana	sewer vine, onion vine	Not Present	Not Present	I
Paederia foetida	skunk vine	Not Present	Not Present	I
Panicum repens	torpedo grass	Not Present	Not Present	I
Pennisetum purpureum	Napier grass	Not Present	Not Present	I
Pistia stratiotes	water-lettuce	Not Present	Not Present	I
Psidium cattleianum (= P. littorale)	strawberry guava	Not Present	Not Present	I
Psidium guajava	guava	Not Present	Not Present	I
Pueraria montana var. lobata (= P. lobata)	kudzu	Not Present	Not Present	I
Rhodomyrtus tomentosa	downy rose-myrtle	Not Present	Not Present	I
Rhynchelytrum repens (See Melinis repens)		Not Present	Not Present	I
Ruellia brittoniana2	Mexican petunia	Not Present	Not Present	I
Salvinia minima	water spangles	Not Present	Not Present	I
Sapium sebiferum (= Triadica sebifera)	popcorn tree, Chinese tallow tree	Not Present	Not Present	I
Scaevola taccada(= Scaevola sericea, S. frutescens)	scaevola, half-flower, beach naupaka	Not Present	Not Present	I
Schefflera actinophylla(= Brassaia actinophylla)	schefflera, Queensland umbrella tree	Not Present	Not Present	I
Schinus terebinthifolius	**Brazilian pepper**	**Present**	**Not Present**	**I**
Scleria lacustris	Wright's nutrush	Not Present	Not Present	I
Senna pendula var. glabrata(= Cassia coluteoides)	climbing cassia, Christmas cassia,Christmas senna	Not Present	Not Present	I

Table 13- List of Invasive Plant Species (Baseline Monitoring)-Continued
Florida Exotic Pest Plant Council's-2009 List of Invasive Plant Species of Category I and II invasive Established by the Florida Exotic Pest Plant Council)

Florida Exotic Pest Plant Council's 2009 List of Invasive Plant Species **CATEGORY I: Invasive** exotics that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives. This definition does not rely on the economic severity or geographic range of the problem, but on the documented ecological damage caused.		Biscayne Bay Coastal Wetlands, L-31 E Project		Category
		Within 100 meters downstream S-23A	Within 100 meters downstream S-23D	
Scientific Name	Common Name	Not Present	Not Present	I
Solanum tampicense (= S. houstonii)	wetland nightshade, aquatic soda apple	Not Present	Not Present	I
Solanum viarum	tropical soda apple	Not Present	Not Present	I
Syngonium podophyllum	arrowhead vine	Not Present	Not Present	I
Syzygium cumini	jambolan plum, Java plum	Not Present	Not Present	I
Tectaria incisa	incised halberd fern	Not Present	Not Present	I
Thespesia populnea	seaside mahoe	Not Present	Not Present	I
Tradescantia fluminensis	small-leaf spiderwort	Not Present	Not Present	I
Urochloa mutica (= Brachiaria mutica)	Para grass	Not Present	Not Present	I

Table 13- List of Invasive Plant Species (Baseline Monitoring)-Continued
Florida Exotic Pest Plant Council's-2009 List of Invasive Plant Species of Category I and II invasive Established by the Florida Exotic Pest Plant Council)

Florida Exotic Pest Plant Council's 2009 List of Invasive Plant Species CATEGORY II **Invasive exotics that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species. These species may become ranked Category I, if ecological damage is demonstrated.**		Biscayne Bay Coastal Wetlands, L-31 E Project		Category
		Within 100 meters downstream S-23A	Within 100 meters downstream S-23D	
Adenanthera pavonina	red sandalwood	Not present	Not present	II
Agave sisalana	sisal hemp	Not present	Not present	II
Aleurites fordii (= Vernicia fordii)	tung oil tree	Not present	Not present	II
Alstonia macrophylla	devil tree	Not present	Not present	II
Alternanthera philoxeroides	alligator weed	Not present	Not present	II
Antigonon leptopus	coral vine	Not present	Not present	II
Aristolochia littoralis	calico flower	Not present	Not present	II
Asystasia gangetica	Ganges primrose	Not present	Not present	II
Begonia cucullata	wax begonia	Not present	Not present	II
Blechum pyramidatum	green shrimp plant, Browne's blechum	Not present	Not present	II
Broussonetia papyrifera	paper mulberry	Not present	Not present	II
Callisia fragrans	inch plant, spironema	Not present	Not present	II
Callistemon viminalis	bottlebrush, weeping bottlebrush	Not present	Not present	II
Casuarina cunninghamiana	river sheoak, Australian-pine	Not present	Not present	II
Cecropia palmata	trumpet tree	Not present	Not present	II
Cestrum diurnum	day jessamine	Not present	Not present	II
Chamaedorea seifrizii	bamboo palm	Not present	Not present	II
Clematis terniflora	Japanese clematis	Not present	Not present	II
Cryptostegia madagascariensis	rubber vine	Not present	Not present	II
Cyperus involucratus(C. alternifolius misapplied)	umbrella plant	Not present	Not present	II
Cyperus prolifer	dwarf papyrus	Not present	Not present	II
Dactyloctenium aegyptium	Durban crowfootgrass	Not present	Not present	II
Dalbergia sissoo	Indian rosewood, sissoo	Not present	Not present	II
Elaeagnus umbellata	silverberry, autumn olive	Not present	Not present	II
Elaeagnus pungens	silverthorn, thorny olive	Not present	Not present	II

Table 13- List of Invasive Plant Species (Baseline Monitoring)-Continued
Florida Exotic Pest Plant Council's-2009 List of Invasive Plant Species
of Category I and II invasive Established by the Florida Exotic Pest Plant Council)

Florida Exotic Pest Plant Council's 2009 List of Invasive Plant Species CATEGORY II **Invasive exotics that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species. These species may become ranked Category I, if ecological damage is demonstrated.**		Biscayne Bay Coastal Wetlands, L-31 E Project		Category
		Within 100 meters downstream S-23A	Within 100 meters downstream S-23D	
Pittosporum pentandrum	Philippine pittosporum, Taiwanese cheesewood	Not present	Not present	II
Pteris vittata	Chinese brake fern	Not present	Not present	II
Ptychosperma elegans	solitaire palm	Not present	Not present	II
Rhoeo spathacea (see Tradescantia spathacea)		Not present	Not present	II
Ricinus communis	castor bean	Not present	Not present	II
Rotala rotundifolia	roundleaf toothcup, dwarf Rotala	Not present	Not present	II
Sansevieria hyacinthoides	bowstring hemp	Not present	Not present	II
Sesbania punicea	purple sesban, rattlebox	Not present	Not present	II
Solanum diphyllum	two-leaf nightshade	Not present	Not present	II
Solanum jamaicense	Jamaica nightshade	Not present	Not present	II
Solanum torvum	susumber, turkey berry	Not present	Not present	II
Sphagneticola trilobata (= Wedelia trilobata)	wedelia	Not present	Not present	II
Stachytarpheta cayennensis (= S. urticifolia)	nettle-leaf porterweed	Not present	Not present	II
Syagrus romanzoffiana(= Arecastrum romanzoffianum)		Not present	Not present	II
Taliparitiliaceum (= Hibiscus tiliaceus)	mahoe, sea hibiscus	Not present	Not present	II
Terminalia catappa	tropical-almond	Not present	Not present	II
Terminalia muelleri	Australian-almond	Not present	Not present	II
Tradescantia spathacea(= Rhoeo spathacea, Rhoeo discolor)	Tribulus cistoides	Not present	Not present	II
Urena lobata	Caesar's weed	Not present	Not present	II
Vitex trifolia	simple-leaf chaste tree	Not present	Not present	II
Washingtonia robusta	Washington fan palm	Not present	Not present	II
Wedelia (see Sphagneticola above)		Not present	Not present	II
Wisteria sinensis	Chinese wisteria	Not present	Not present	II
Xanthosoma sagittifolium	malanga, elephant ear	Not present	Not present	II