East Lake Outfall

Methods

Study Area Analysis

The watershed containing the stream being assessed was analyzed using ESRI ArcGIS 10.2. Using this software with 2011 Hillsborough County aerial, Land Use/ Land Cover (LULC) and Watershed boundary layers courtesy of the Southwest Florida Water Management District, Landscape Development Intensity (LDI) Index values were calculated for each watershed following the procedures of Reiss & Brown 2012(Reiss & Brown. 2012. Landscape Development Intensity (LDI) Index User's Manual. H.T. Odum Center for Wetlands, University of Florida. March 2012). According to Reiss and Brown "The LDI represents a human disturbance gradient for wetland systems. The LDI is an integrated measure of human activity, combining the effects from air and water pollutants, physical damage, changes in the suite of environmental conditions … on the structure and processes of landscapes and ecosystems… Natural, undeveloped LU/LC classes have a LDI index value of zero. In the Florida framework, the maximum LDI index score is approximately 42."

Habitat/Vegetation Assessment

For small streams that are not easily navigated by Jonboat for bathymetric mapping and vegetation analysis, Hillsborough County requested the implementation of the Florida Department of Environmental Protection methods for Stream and River Habitat Assessment (FT 3100) (http://www.dep.state.fl.us/water/sas/sop/sops.htm) using forms FD 9000-3, FD 9000-4 and FD 9000-5, Rapid Periphyton Survey (FS 7230) using form FD 9000-25 and Linear Stream Vegetation Survey (FS 7320) using form FD 9000-32. These methods were utilized on two sampling locations on each stream, typically near access points along roadways.

Stream and River Habitat Assessment per FT3100 receives a score calculated in Form FD 9000-5. This score results from the ranking of the primary habitat components (substrate diversity, substrate availability, water velocity and habitat smothering) and secondary habitat components (Artificial channelization, bank stability, riparian buffer zone width and riparian zone vegetation quality). The maximum score possible in this method is a 160.

Two metrics are utilized in the Linear Vegetation Survey. The Mean Coefficient of Conservatism (CoC) applies a score of 0-10 to each species based on its ecological tolerances and fidelity to pre-settlement conditions. Species with higher scores show a high fidelity to native, undisturbed habitats and are typically sensitive to alterations. Available CoC scores can be obtained from LT 7000 from the Florida Department of Environmental Protection at: http://www.dep.state.fl.us/water/sas/sop/sops.htm. The Percent Florida Exotic Pest Plant Council (% FLEPPC) metric calculates the percent invasive exotics as the number of occurrences of FLEPPC Category I or II in the 100 m reach divided by the total number of taxa occurrences in the 100 m reach. The FLEPPC list can be found at: http://www.fleppc.org/list/11list.html

Water Quality Assessment

Physical water quality samples were taken using a Eureka Manta Sub-2 multiprobe pre and post calibrated daily. Measurements taken with this device include: depth, conductivity, pH, Dissolved Oxygen (mg/l and % Saturation) and salinity. Chemical water parameters were collected and preserved on ice by USF Water Institute staff and analyzed at the Environmental Protection Commission of Hillsborough County Laboratory. Analysis include; Chlorophyll (a, b, c, t and corrected), Alkalinity, Color, Fecal Coliform, Enterococci, Ammonia, Nitrates/Nitrites, Total Phosphorous, Kjeldahl Nitrogen and Total Nitrogen.

Study Area

East Lake Outfall located in Hillsborough County Florida was sampled at two localities on separate dates. The first sampling locality was sampled on 8/22/2014 and is located near Chelsea Avenue in the city of Tampa Florida at: N 27.9862438, W 82.372138. The second sampling locality was sampled on 9/22/2014 and is located near Danny Bryan Blvd at: N 27.9771235, W 82.3654895. East Lake Outfall drains from East Lake and discharges into the Tampa Bypass Canal. The watershed surrounding East Lake Outfall is dominated by Residential High Density (24.92%), Commercial (16.92%), Natural Land/Open Water (14.28%) and Industrial (10.82%) land uses. The Landscape Development Intensity Index of the watershed is 34.04.

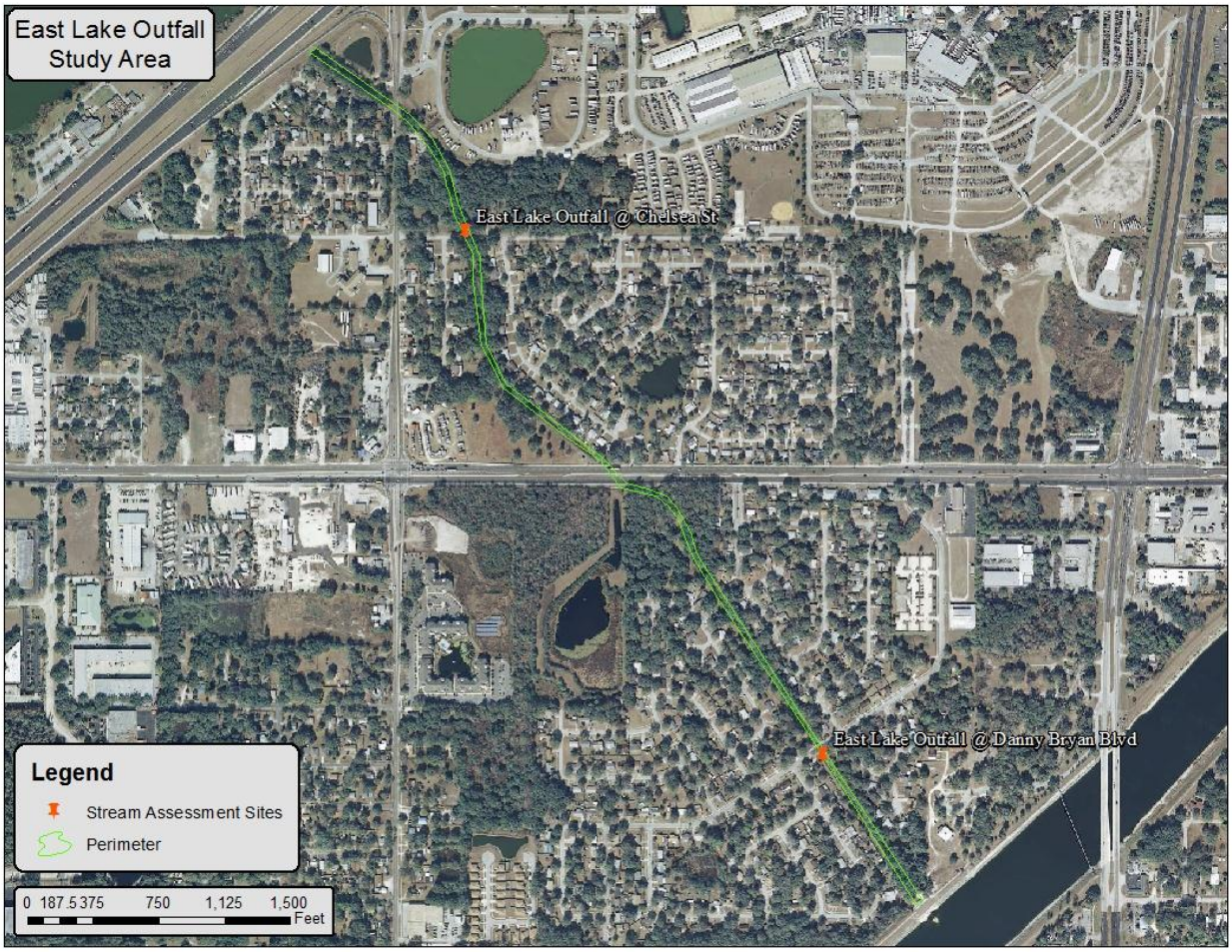

Figure 1 2014 East Lake Outfall Assessment Study Area Map

Habitat Assessment

East Lake Outfall at Danny Bryan Blvd

Figure 2 Overview photograph of East Lake Outfall at Danny Bryan Blvd sample site

East Lake Outfall at Danny Bryan Blvd near Veterans Memorial Park received a Habitat Assessment score of 37 due to low substrate diversity, domination by non-native invasive species and the fact that the stream was artificially straightened lacking sinuosity as would be expected in a Coastal Plain flow regime. Artificial channelization was obvious, bankful was <60% of bank height and there was a significant lack of armoring vegetation along the left bank. Very few productive habitats were observed, only one significant pool was observed and other potentially available habitats were silt/sand smothered. Water velocity was suboptimal at 0.13 m/s at the time of assessment at the 40 meter mark. The riparian buffer zone was almost absent due to residential housing and a maintenance easement along the banks and vegetation removal was obvious. The thickness of the riparian zone was measured at 1 m and 1 m for the left and right banks respectively.

During the Rapid Periphyton Survey, periphyton was not observed in the 99 individual grab samples performed. The average canopy cover in the 100 meter region was 46.09%. The Secchi Disk

Depth was measured as 1.5’ at the 50 meter mark. The average water depth at the time of the assessment was 2.5’.

The Linear Vegetation Survey identified 13 species rooted in the water at the time of the assessment. The majority of these species (7) are non-native, invasive species. The remaining 6 species are native to this region. Para Grass (*Urochola mutica*) was the dominant species in all 10 sections of the Linear Vegetation Survey. The vegetation community along this sample location showed evidence of frequent disturbance (mowing) resulting in the dominance by pioneering species. There were a total of 65 species observations in the 100 meter study area. The mean Coefficient of Conservatism (CoC) metric for the study area was 0.73 and the % FLEPPC metric for the study area was 78.46%.

Table 1 Linear Vegetation Survey Results - East Lake Outfall @ Danny Bryan Blvd

Plant Species	Sample Site										Obsevations/ Species	CoC
	0-1 m	10-20m	20-30m	30-40m	40-50m	50-60m	60-70m	70-80m	80-90m	90-100m		
Alternanthera philoxeroides	1	1	1	1	1	1	1	1	1	1	10	0
Ludwigia peruviana	1	1	1	1	1	1	1	1	1	1	10	0
Urochloa mutica	D	D	D	D	D	D	D	D	D	D	10	0
Colocasia esculenta	1	1	1	1	1	1		1	1	1	9	0
Commelina diffusa	1	1	1			1	1	1			6	2.02
Ruellia simplex	1	1	1				1	1			5	0
Boehmeria cylindrica	1		1	1	1						4	5
Lemna spp.	1		1	1				1			4	1
Typha spp.								1	1	1	3	1
Bidens alba		1									1	1
Pontederia cordata				1							1	5.38
Sphagneticola (Wedelia) trilobata		1									1	0
Hydrocotyl umbellata	1										1	2
Observations/station	9	8	8	7	5	5	5	8	5	5	65	

Total Observations	65
Mean CoC	0.73
% FLEPPC	78.46

Figure 3. *Colocasia esculenta* and *Urochloa mutica* along the banks of East Lake Outfall at the Danny Bryan Blvd sampling site

East Lake Outfall at Chelsea Avenue

Figure 4. Overview photograph of the East Lake Outfall at Chelsea Avenue Sample Site

East Lake Outfall at Chelsea Avenue received a Habitat Assessment score of 32 due to low substrate diversity and the fact that the stream was artificially straightened lacking sinuosity as would be expected in a typical Coastal Plain flow regime. Artificial channelization was obvious and bank stability was poor given the bankful was <60% of bank height and numerous erosion zones along the left bank. Very few productive habitats were observed in the field and silt smothering of productive habitats was obvious. Intense human activity significantly reduced the amount of riparian buffer zone available. Water velocity was suboptimal at 0.13 m/s measured at the 30 meter mark. Thickness of riparian zone was measured at 5 m on each bank.

During the Rapid Periphyton Survey, no periphyton was observed. The average canopy cover in the 100 meter region was 82.09%. The Secchi Disk Depth was measured as 1.0' at the 50 meter mark. The average water depth in the study area was 0.98' at the time of the assessment.

The Linear Vegetation Survey identified 10 species rooted in the water at the time of the assessment. The majority of these species (6) are non-native, invasive species. The remaining 6 species are native to this region. Wild Taro (*Colocasia esculenta*) and Para Grass (*Urochloa mutica*) were the dominant species in the Linear Vegetation Survey. The vegetation community along this sample location showed evidence of frequent disturbance resulting in the dominance by pioneering species. There were

a total of 45 species observations in the 100 meter study area. The mean Coefficient of Conservatism (CoC) metric for the study area was 0.91 and the % FLEPPC metric for the study area was 73.33%. Native vegetation along the creek was sparse.

Table 2 Linear Vegetation Survey Results - East Lake Outfall @ Chelsea Avenue

Plant Species	Sample Site										Observations/ Species	CoC
	0-1 m	10-20m	20-30m	30-40m	40-50m	50-60m	60-70m	70-80m	80-90m	90-100m		
Alternanthera philoxeroides	1	1	1	1	1	1	1	1	1	1	10	0
Colocasia esculenta	1	1	1	1	1	1	1	1	1	1	10	0
Ludwigia peruviana	1				1			1	1	1	5	0
Sambucus canadensis	1		1	1						1	4	1.48
Urochloa mutica	1				1			1	1		4	0
Commelina diffusa	1			1				1			3	2.02
Pontederia cordata								1	1	1	3	5.38
Lemna spp.		1						1	1		3	1
Boehmeria cylindrica				1	1						2	5
Sphagneticola (Wedelia) trilobata			1								1	0
Observations/station	6	3	4	5	5	2	2	7	6	5	45	

Total Observations	45
Mean CoC	0.914
% FLEPPC	73.33

Figure 5 USF Water Institute staff conducting the Linear Vegetation Survey on East Lake Outfall at Chelsea Avenue

Water Quality Assessment

No long-term water quality data is available for East Lake Outfall at Chelsea Avenue. This means that there is nothing that Values from the 2014 USF Water Institute Assessment can be compared to. Table 3 provides a summary of the Physical/Chemical conditions recorded at both sites.

Table 3 Delaney Creek Physical Water Quality (Field)

East Lake Outfall @ Danny Bryan Blvd							
Depth (m)	**T (ºC)**	**pH**	**DO mg/L**	**DO Sat %**	**Cond. (UMHO/cm)**	**Salinity (ppt)**	**Secchi Depth (ft)**
0.11	27.48	7.33	6.33	76.8	173.9	0.08	1.5'
0.19	27.47	7.27	6.11	74.1	181.1	0.08	
East Lake Drain @ Chelsea Avenue							
Depth (m)	**T (ºC)**	**pH**	**DO mg/L**	**DO Sat %**	**Cond. (UMHO/cm)**	**Salinity (ppt)**	**Secchi Depth (ft)**
							1.0'

The chemical water quality analysis for the East Lake Outfall is shown in Table 4. Total Phosphorous values were below the nutrient region threshold developed by FDEP of 0.49 mg/l. Total Nitrogen values were higher at the Chelsea Ave site and below the nutrient region threshold at Danny Bryan Blvd (threshold developed by FDEP of 1.65 mg/l). Chlorophyll-a values were far above threshold values at Chelsea and above the site specific evaluation range of 3.2 µg/l to 20 µg/l at Danny Bryan Blvd. For sites with Chlorophyll-a values in this range, the assessment is conclusive of conditions reflecting an imbalance in flora. It should be noted that the geomean data represented in table four is a culmination of multi-agency data for East Lake and not the outfall, since data was not available. This data can be relied upon to be representative of the outfall water quality since East Lake drains into the outfall.

Table 4 East Lake Outfall Water Quality (Laboratory)

East Lake Outfall			
Parameter	Chelsea Avenue	Danny Bryan Blvd	East Lake 2012 Geomean
Ammonia	0.255 mg/L	0.231 mg/L	0.042
Nitrates/Nitrites	0.052 mg/L	0.109 mg/L	0.009
Kjeldahl Nitrogen	1.798 mg/L	1.371 mg/L	No Data
Total Nitrogen	1.850 mg/L	1.480 mg/L	2.488
Total Phosphorous	0.108 mg/L	0.104 mg/L	0.058
Alkalinity	81.3 mg/LCaCO3	140 mg/LCaCO3	No Data
Chlorophyll - a	76.1 ug/L	33.2 ug/L	261.591
Chlorophyll - a Corrected	64.7 ug/L	28.4 ug/L	No Data
Color	25.3 Pt/Co	27.1 Pt/Co	20.700
Fecal Coliform	3160 #/100 ml	400 #/100 ml	No Data
Enterococci	1000 #/100 ml	700 #/100 ml	No Data

Conclusion

The results of the assessment of East Lake Outfall shows impairment based on water quality data alone. The system also shows impairment in the vegetation communities through the linear vegetation survey results with a high percentage of non-native invasive species. The habitat assessment performed on the two sample sites shows habitat degradation at both sites with Habitat Assessment scores of 32 and 37 for Chelsea Ave and Danny Bryan Ave respectively. Availability and diversity of habitat for aquatic macroinvertebrates was very low at each site. Also of concern is the sewage smell observed emanating from the water at the Chelsea Avenue site.

Table 5 Summary of Water Quality, Floristic Surveys and Habitat Assessments

Measure		Chelsea	Danny Bryan	Threshold
Total Phosphorous (mg/l)		0.108	0.104	< 0.49
Total Nitrogen (mg/l)		1.85	1.48	< 1.65
RPS (% Rank 4-6)		0	0	< 25%
LVS	Avg C of C	0.914	0.73	≥ 2.5
	FLEPPC %	73.30%	78.46%	< 25%
Chlorophyll (µg/l)		6.2	3.3	< 20 µg/l
Habitat Assessment		32	37	