

Delaney Creek Tributary

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

Delaney Creek Tributary located in Hillsborough County Florida was sampled at two localities on separate dates. The first sampling locality was sampled on 10/24/2014 and is located off of Causeway Boulevard at: 27.9217235 N and 82.3898877 W. The second sampling locality was sampled on 10/24/2014 and is located off of 16th Avenue at: 27.9335787 N and 82.3820479 W. Delaney Creek Tributary discharges into Delaney Creek. The watershed surrounding Delaney Creek Tributary is dominated by Residential (45.37%), Industrial/Commerical (20.8%), Natural Land/Open Water (11.63%) and Pasture/Livestock (4.2%). The Landscape Development Intensity Index of the watershed is 28.57.

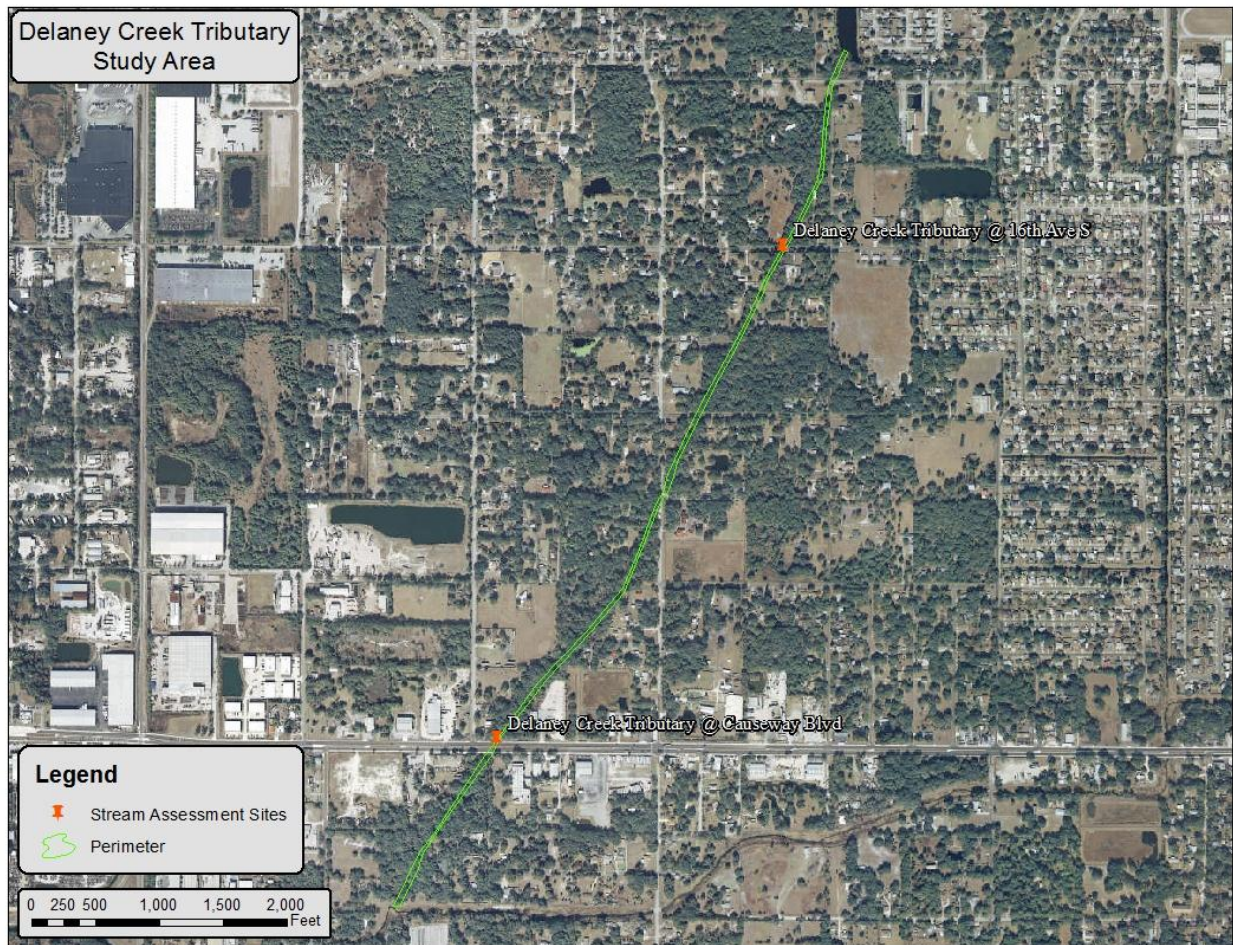


Figure 1 2014 Delaney Creek Assessment Study Area Map

Habitat Assessment

Delaney Creek Tributary at Causeway Boulevard



Figure 2 USF Water Institute staff conducting the Linear Vegetation Survey on Delaney Creek at Causeway Blvd sample site

Delaney Creek Tributary at Causeway Boulevard received a habitat assessment score of 114 due to good substrate diversity and availability but with a lack of the necessary number of stable pools due to smothering by silt. Plant communities present were dominated by non-native species. Given the overall small size of the creek bank slopes were for the most part not steep save a few notable spots

along the left bank. Bankful was >60% of bank height for a fair number of sections but was actually <60% for about half of the length of the left side. Bank slope was <60° for the majority of the sampled section. Productive habitats noted included a small number of pools, leaf packs, snags, and rocks. Water velocity was measured at the 85 meter mark and falls within the suboptimal range (0.17 m/s) at the time of assessment. The riparian buffer zone was variable being 20-30 m on the left bank and anywhere from 15-75 m on the right bank.

During the Rapid Periphyton Survey, periphyton was not observed. The average canopy cover in the 100 meter region was 98%. The Secchi Disk Depth was measured as 0.5ft at the 50 meter mark. The average water depth at the time of the assessment was 1.5'.

The Linear Vegetation Survey identified 7 species rooted in the water at the time of the assessment. There were a total of 33 species observations in the 100 meter study area. The mean Coefficient of Conservatism (CoC) metric for the study area was .71 and the % FLEPPC metric for the study area was 69.7%. The native species present in the most abundance were the American Evergreen (*Sygonium podophyllum*) and the Marsh Pennywort (*Hydrocotyl sp.*). The overall vegetation was dominated by Wild Taro (*Colocasia esculenta*) and Britons Wild Petunia (*Ruellia simplex*). The vegetation present is indicative of a disturbed habitat with some recovery. Of the plants present within each study site, no one plant was clearly dominant over other species present.

Table 1 Linear Vegetation Survey Results - Delaney Creek @ Causeway

[illegible]



Figure 3 Vegetation along the banks of Delaney Creek @ Causeway

Delaney Creek Tributary at 16th Avenue



Figure 4 Overview photograph of Delaney Creek at 16th Avenue

Delaney Creek Tributary at 16th Avenue received a habitat assessment score of 43 due to unavailability of productive habitats, a lack of flow, and habitats completely smothered by rotting leaves and silt. Abundance of aquatic vegetation along the 16th Avenue section was very low. Bank stability met two of the requirements for stable banks. Notably the water level was <60% of bankfull and the banks, despite lack of aquatic vegetation were well armored and not >60° in slope angle. Productive habitat was not present. The entire bottom consisted of mostly leaf litter and silt which often smelled of sulphur or fecal matter when examined and methane release upon placing foot on bottom was a common occurrence. There was no observed movement in the water along the sections and water velocity was determined to be 0 m/s. Riparian buffer was 10-15 m on the left bank and 20 m on the right bank.

During the Rapid Periphyton Survey, no periphyton was observed. The average canopy cover in the 100 meter region was 93%. The Secchi Disk Depth was measured as 1.0' at the 50 meter mark. The average water depth in the study area was 1.5' at the time of the assessment.

The Linear Vegetation Survey identified 3 species rooted in the water at the time of the assessment. There were a total of 6 species observations in the 100 meter study area. The mean Coefficient of Conservatism (CoC) metric for the study area was 0.15 and the % FLEPPC metric for the study area was 33.33%. Plant communities at 16th Avenue were of low diversity and very sparse. The vegetation present is indicative of a disturbed habitat and possibly a straight drainage channel dug through an established hardwood forest. Of the plants present within each study site, no one plant was clearly dominant over other species present.

Table 2 Linear Vegetation Survey Results - Delaney Creek @ 16th Avenue

Plant Species	Sample Site										Observations /Species	CoC
	0-10 m	10-20m	20-30m	30-40m	40-50m	50-60m	60-70m	70-80m	80-90m	90-100m		
<i>Hydrocotyl umbellata</i>		1	1	1				1			4	2
<i>Sphagneticola trilobata</i>										1	1	0
<i>Lygodium microphyllum</i>									1		1	1
Observations/Station	0	1	1	1	0	0	0	1	1	1	6	
Total Observations	6											
Mean CoC	1.50											
%FLEPPC	33.33											



Figure 5 Diversity of aquatic plants rooted in the water at 16th Avenue was very low.

Water Quality Assessment

Limited long-term water quality data is available for this tributary to Delaney Creek. The data that is available was collected by the Hillsborough County Environmental Protection Commission in 2013. Values for the 2014 USF Water Institute Assessment fall within the range of the previous data collections. Table 3 provides a summary of the Physical/Chemical conditions recorded at both sites. Of note in the physical water quality table is the overall low Dissolved oxygen in the system, particularly at the 16th Ave sample site and the increase in Salinity and Conductivity at the Causeway sample site due to tidal influence.

Table 3 Delaney Creek Physical Water Quality (Field)

Delaney Creek @ Causeway							
Depth (m)	T (°C)	pH	DO mg/L	DO Sat %	Cond. (UMHO/cm)	Salinity (ppt)	Secchi Depth (ft)
0.13	20.67	7.68	3.9	41.7	844	0.41	1.5'
0.14	20.63	7.84	3.94	42.2	843.9	0.41	
Delaney Creek @ 16th Ave							
Depth (m)	T (°C)	pH	DO mg/L	DO Sat %	Cond. (UMHO/cm)	Salinity (ppt)	Secchi Depth (ft)
0.11	19.8	7.27	1.5	15.7	414	0.2	0.5'
0.12	19.8	7.26	1.34	14.1	414.6	0.2	

The chemical water quality analysis for the Delaney Creek Tributary is shown in Table 4 along with geometric mean values for the past three years for available parameters. Total Phosphorous values were below the nutrient region threshold developed by FDEP of 0.49 mg/l. Total Nitrogen values were also below the nutrient region threshold developed by FDEP of 1.65 mg/l. Chlorophyll-a values fall within the site specific evaluation range of 3.2 µg/l to 20 µg/l. For sites with Chlorophyll-a values in this range, the assessment is inconclusive of conditions reflecting an imbalance in flora. Of particular concern in the laboratory analysis values are the values at both sample sites for Fecal Coliform and Enterococci with the sample site at 16th Avenue showing clear contamination.

Table 4 Delaney Creek Water Quality (Laboratory)

Delaney Creek			
Parameter	Causeway	16th Avenue	Delany Creek Tributary 2013 Geomean
Ammonia	.512 mg/L	.731 mg/L	0.351
Nitrates/Nitrites	.117 mg/L	.117 mg/L	0.054
Kjeldahl Nitrogen	1.204 mg/L	1.607 mg/L	1.327
Total Nitrogen	1.321 mg/L	1.610 mg/L	1.418
Total Phosphorous	.266 mg/L	.345 mg/L	0.257
Alkalinity	280 mg/LCaCO ₃	123.3 mg/LCaCO ₃	No Data
Chlorophyll - a	4.4 ug/L	9.6 ug/L	21.16
Chlorophyll - a Corrected	3.3 ug/L	6.2 ug/L	No Data
Color	66 Pt/Co	92.8 Pt/Co	No Data
Fecal Coliform	1600 #/100 ml	>4000 #/100 ml	1663
Enterococci	1700 #/100 ml	>4000 #/100 ml	No Data

Conclusion

The Delaney Creek Tributary that was assessed during this study does not show impairment based on water quality alone although the dissolved oxygen and bacteria sampling indicates a stressed and potentially contaminated system. The system does show 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 the 16th Avenue site with a Habitat Assessment score of 43. The Causeway sample site showed a good diversity and amount of habitat for aquatic macroinvertebrates with a habitat assessment score of 114.

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

Measure		16th Avenue	Causeway	Threshold
Total Phosphorous (mg/l)		0.345	0.266	< 0.49
Total Nitrogen (mg/l)		1.61	1.321	< 1.65
RPS (% Rank 4-6)		0	0	< 25%
LVS	Avg C of C	0.71	1.5	≥ 2.5
	FLEPPC %	33.33%	69.70%	< 25%
Chlorophyll (µg/l)		6.2	3.3	< 20 µg/l
Habitat Assessment		43	114	