Spartman Branch

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

Spartman Branch located in Hillsborough County Florida was sampled at two localities on separate dates. The first locality was sampled on 11/5/2014 and is located at Beauchamp Road near Plant City at: 28.0241919 N and 82.1857492 W. The second sampling locality was sampled on 11/5/2014 at SR 574 near Plant city at: 28.0107303 N and 82.1590865 W. Spartman Branch drains into Pemberton Creek. The watershed surrounding Spartman Branch is dominated by Residential (35%), Natural Land/Open Water (23%), Industrial/Commercial (17.7%), and Pasture/Livestock (5.5%) land uses. The Landscape Development Intensity Index of the watershed is 28.83.

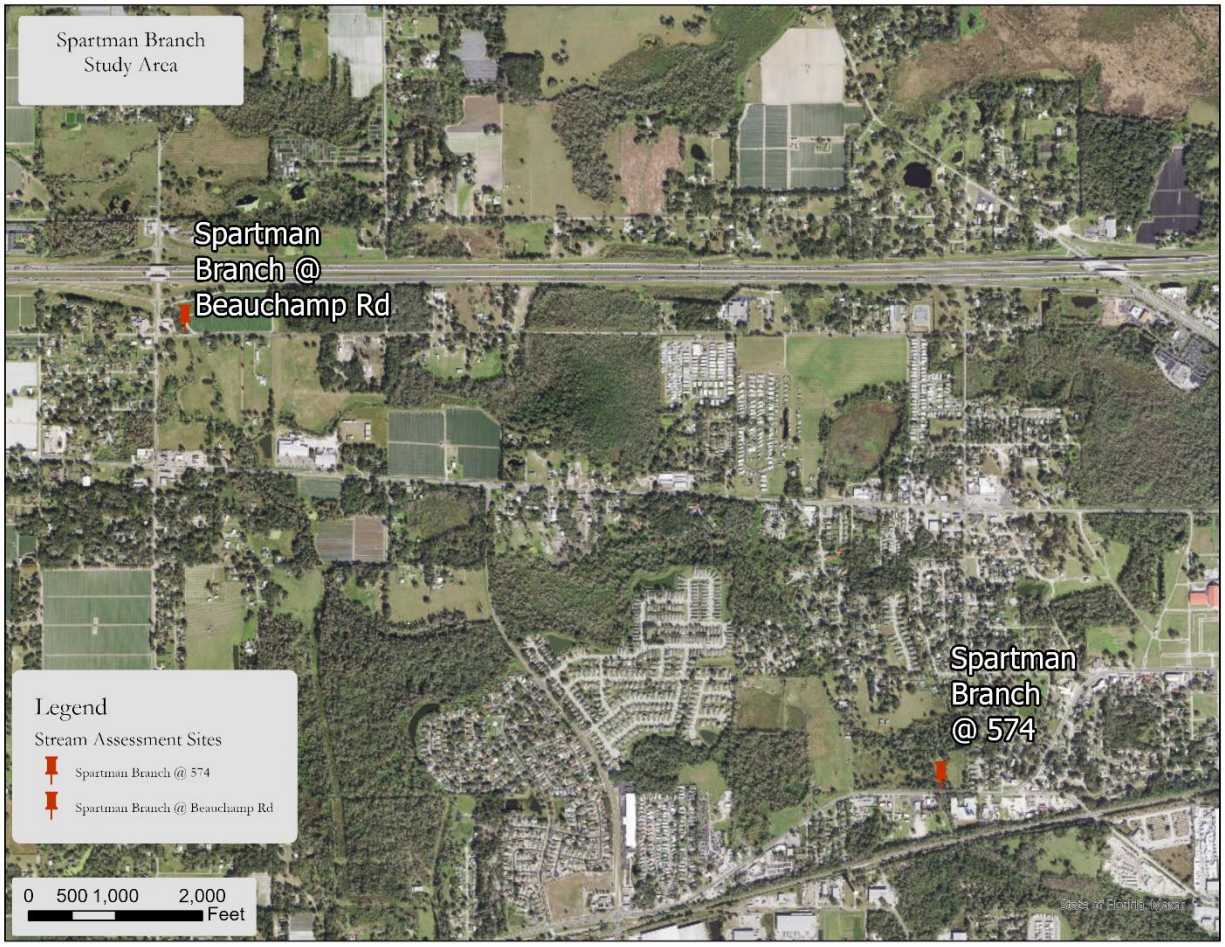

Figure 1 Spartman Branch Assessment Study Area Map

Habitat Assessment

Spartman Branch at Beauchamp Road

Figure 2 Overview photograph of Spartman Branch at Beauchamp

Spartman Branch at Beauchamp Road received a Habitat Assessment score of 83. The conditions contributing to this score are due to suboptimal substrate diversity, suboptimal availability and some artificial channelization. This stream was also dominated by non-native invasive species. Bankfull was optimal throughout the stream at >60% of bank height. Water velocity was marginal and measured at 40 m at an observed rate of 0.1 m/s. Habitat smothering was marginal due to an inadequate number of stable pools. Bank stability was suboptimal since the slope was somewhat steep in the left bank where the slope was >60 degrees and the right bank slope was >60 degrees at certain points. The riparian buffer zone was rated poor due to intensive human activities and a riparian buffer width of <6m. Riparian zone vegetation quality is marginal on both sides and <50% of this zone was undisturbed.

During the Rapid Periphyton Survey, periphyton was not observed. The average canopy cover in the 100 meter region was 33.63%. The Secchi Disk Depth was measured as 2.2' at the 50 meter mark. The average water depth at the time of the assessment was 3'.

The Linear Vegetation Survey identified 13 species rooted in the water at the time of the assessment. There were a total of 71 species observations in the 100 meter study area. Plant communities at the Beauchamp site was mostly invasive consisting of Alligator Weed *(Alternanthera philoxeroides),* Water Hyacinth *(Eichornia crassipes),*East Indian Hygrophila *(Hygrophila polysperma)* Peruvian Primrosewillow*, (Ludwigia peruviana)*,and Parrot Feather (*Limnophila sessiliflora*). Of the plants present within each study site, no one plant was clearly dominant over other species present. The mean Coefficient of Conservatism (CoC) metric for the study area was 1.06 and the % FLEPPC metric for the study area was 63.38%.

Table 1 Linear Vegetation Survey Results - Spartman Branch at Beauchamp

Plant Species	Sample Site										Observations /Species	CoC
	0-10 m	10-20 m	20-30 m	30-40 m	40-50 m	50-60 m	60-70 m	70-80 m	80-90 m	90-100 m		
Limnophila sessiliflora	1	1	1	1	1	1	1	1	1	1	10	0
Hygrophila polysperma	1	1	1	1	1	1	1	1	1	1	10	0
Alternanthera philoxeroides		1	1	1	1	1		1	1	1	8	0
Polygonum punctatum	1	1	1	1	1	1	1			1	8	3
Hydrocotyl umbellata	1	1		1	1	1	1	1		1	8	1.92
Eichhornia crassipes			1	1		1	1	1	1	1	7	0
Lemna spp.			1	1	1			1	1	1	6	1
Ludwigia peruviana		1	1	1			1				4	0
Salvinia minima					1	1			1	1	4	0
Crinum americanum					1	1				1	3	9
Mikania scandens				1							1	1.95
Myriophyllum spicatum										1	1	0.98
Urochloa mutica									1		1	0
Observations/Station	4	6	7	9	8	8	6	6	7	10	71	

Total Observations	**71**
Mean CoC	**1.06**
% FLEPPC	**63.38**

Figure 3 Presence of Water Hyacinth (*Eichornia crassipes*) at Spartman Branch at Beauchamp

Spartman Branch at SR 574

Figure 4 Overview photograph of Spartman Branch at 574

Spartman Branch at SR 574 received a Habitat Assessment score of 83. The conditions contributing to this score are due to a high level of habitat smothering. This stream contained no stable pools and was affected by sand accumulation. Artificial straightening was evident but the stream has recovered some sinuosity. Undercutting was observed and >50% of the banks observed contained root exposure (Figure 5). Substrate diversity was suboptimal as a result of the presence of three major productive habitats (snags, aquatic vegetation, and leaf packs). Substrate availability was optimal since >30% major productive habitat was present. Water velocity was measured at 65m and rated suboptimal at 0.13m/sec. This stream recovered some sinuosity but was rated suboptimal due to straightening. Bank stability on the left was suboptimal and bank undercutting was observed. The right bank was also suboptimal due to some erosion (Figure 5). The left bank had a riparian zone thickness of 15 m and the right had a zone thickness of 10 m. The riparian zone vegetation quality was suboptimal with 50% to 80% undisturbed.

During the Rapid Periphyton Survey, no periphyton was observed. The average canopy cover in the 100 meter region was 81.66%. The Secchi Disk Depth was measured at 1.75’ at the 100 meter mark. The average water depth at the time of the assessment was 2’.

The Linear Vegetation Survey identified 8 species rooted in the water at the time of the assessment. Half of these species (4) are non-native, invasive species. The remaining 4 species are native to this region. Of the plants present within each study site, no one plant was clearly dominant over other species present. There were a total of 41 species observations in the 100 meter study area. The mean Coefficient of Conservatism (CoC) metric for the study area was 1.59 and the % FLEPPC metric for the study area was 60.98%.

Table 2 Linear Vegetation Survey Results - Spartman Branch @ 574

Plant Species	Sample Site										Observations /Species	CoC
	0-10 m	10-20 m	20-30 m	30-40 m	40-50 m	50-60 m	60-70 m	70-80 m	80-90 m	90-100 m		
Colocasia esculenta	1	1	1	1	1	1		1	1	1	9	0
Hydrocotyl umbellata	1	1	1	1	1		1	1	1	1	9	1.92
Alternanthera philoxeroides	1	1		1	1	1			1	1	7	0
Ludwigia peruviana		1	1	1	1	1		1		1	7	0
Osmunda regalis		1	1	1				1		1	5	7.6
Hygrophila polysperma				1			1				2	0
Osmunda cinnamomea		1									1	6.44
Nuphar lutea var. advena							1				1	3.5
Observations/Station	3	6	4	6	4	3	3	4	3	5	41	

Total Observations	**41**
Mean CoC	**1.59**
% FLEPPC	**60.98**

Figure 5 Example of root exposure/bank undercutting at the Hwy 574 site

Water Quality Assessment

Limited long-term water quality data is available for Spartman Branch. The data that is available was collected by the Hillsborough County Environmental Protection Commission biannually in 2012. Values for the 2014 USF Water Institute Assessment largely fall within the range of the previous data collections (two notable exceptions: Nitrates/Nitrites, Fecal Coloform). Table 3 provides a summary of the Physical/Chemical conditions recorded at both sites. Of note in the physical water quality table is the lower Dissolved oxygen content recorded at the State Road 574 site.

Table 3 Spartman Branch Water Quality (Field)

Spartman Branch @ Beauchamp							
Depth (m)	**T (ºC)**	**pH**	**DO mg/L**	**DO Sat %**	**Cond. (UMHO/cm)**	**Salinity (ppt)**	**Secchi Depth (ft)**
0.09	19.34	7.33	6.84	87.2	242.4	0.11	2.2'
0.09	19.41	7.27	6.79	83.5	243.2	0.11	
Spartman Branch @ 574							
Depth (m)	**T (ºC)**	**pH**	**DO mg/L**	**DO Sat %**	**Cond. (UMHO/cm)**	**Salinity (ppt)**	**Secchi Depth (ft)**
0.07	19.35	6.66	4.95	51.5	249	0.12	1.75'
0.07	19.36	6.7	5.08	53	249	0.12	

The chemical water quality analysis for Spartman Branch 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.

Table 4 Spartman Branch Water Quality (Laboratory)

Spartman Branch			
Parameter	Beauchamp	574	Spartman Branch 2012 Geomean
Ammonia	.094 mg/L	.098 mg/L	0.065
Nitrates/Nitrites	.274 mg/L	.317 mg/L	0.022
Kjeldahl Nitrogen	1.101 mg/L	.822 mg/L	1.013
Total Nitrogen	1.375 mg/L	1.139 mg/L	1.071
Total Phosphorous	.469 mg/L	.304 mg/L	0.356
Alkalinity	38.0 mg/LCaCO3	48.0 mg/LCaCO3	No Data
Chlorophyll - a	3.1 ug/L	3.1 ug/L	3.294
Chlorophyll - a Corrected	3.0 ug/L	3.0 ug/L	3.000
Color	129.5 Pt/Co	59.2 Pt/Co	136.457
Fecal Coliform	880 #/100 ml	460 #/100 ml	113.137
Enterococci	460 #/100 ml	1320 #/100 ml	733.212

Conclusion

Results of the assessments on Spartman Branch does not show impairment based on water quality alone. The system does show some impairment in the vegetation communities through the linear vegetation survey results with a somewhat high percentage of non-native invasive species. The habitat assessment performed on the two sample sites scored each site an 83 indicating lower than ideal diversity and amount of habitat for aquatic macroinvertebrates.

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

Measure		Beauchamp	574	Threshold
Total Phosphorous (mg/l)		0.469	0.304	< 0.49
Total Nitrogen (mg/l)		1.375	1.139	< 1.65
RPS (% Rank 4-6)		0	0	< 25%
LVS	Avg C of C	1.06	1.59	≥ 2.5
	FLEPPC %	63.38%	60.98%	< 25%
Chlorophyll (µg/l)		3	3	< 20 µg/l
Habitat Assessment		83	83	