



Little Alafia River above Medard Reservoir

STREAM HABITAT ASSESSMENT, STREAM CONDITIONS INDEX, LINEAR
VEGETATION SURVEY, RAPID PERIPHYTON SURVEY AND WATER QUALITY

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Methods

STUDY AREA ANALYSIS

The watershed containing the stream being assessed was analyzed using ESRI ArcGIS 10.2. Using this software with 2016 Hillsborough County aerial, 2014 Land Use/ Land Cover (LULC) and Watershed boundary (WBID) layers courtesy of the Florida Department of Environmental Protection. The Landscape Development Intensity Index (LDI) was calculated for the WBID containing the stream. From FDEP “The Landscape Development Intensity index (LDI) is an estimate of how much humans have altered an area of interest around a waterbody. Various land use types (low density residential, row crops, industrial and natural) are assigned coefficients of land use intensity based on estimates of the amount of human energy that is put into those land use types.

The LDI is calculated by multiplying each land use coefficient by the percentage of the area of interest occupied by that land use, and then summing the results. The Florida Department of Environmental Protection (DEP) uses the LDI as a tool to estimate potential land use impacts on streams, lakes, and wetlands. LDI values less than two (≤ 2) can be considered minimally disturbed.” In the Florida framework, the maximum LDI index score is approximately 42.

HABITAT AND 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/ulist.html>

STREAM CONDITION INDEX ASSESSMENT

The Stream Condition Index (SCI) was sampled per DEP SOP FS7420 and calculated per DEP SOP LT7200. The SCI consists of collecting macroinvertebrates via 20 D-frame dipnet sweeps (0.5 m in length) in the most productive habitats in a 100 m reach of stream. The organisms are sub-sampled, and identified to the lowest practical taxonomic level. The SCI is composed of ten metrics, eight of which decrease in response to human disturbance, with two metrics (% very tolerant and % dominant) increasing in response to human disturbance. According to DEP SOP LT 7000, the SCI score ranges and categories are: (68-100) Exceptional; (35-67) Healthy; and (0-34) Impaired. Proposed biological health assessment criteria state that a site is considered to meet designated uses if the average of the two most recent SCI scores is 40 or higher and neither of those scores is less than 35.

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, E. Coli, Enterococci, Ammonia, Nitrates/Nitrites, Total Phosphorous, Kjeldahl Nitrogen and Total Nitrogen.

Study Area

Little Alafia River above Medard Reservoir is located in eastern Hillsborough County. Its headwaters are located east of James L. Redmond Parkway and Sparkman Rd and the outfall of Little Alafia River above Medard Reservoir is in the Medard Reservoir. The assessment of the Little Alafia River was conducted on February 19, 2019. At the time of the assessment, the water levels were normal for the dry season. The Little Alafia River above Medard Reservoir WBID

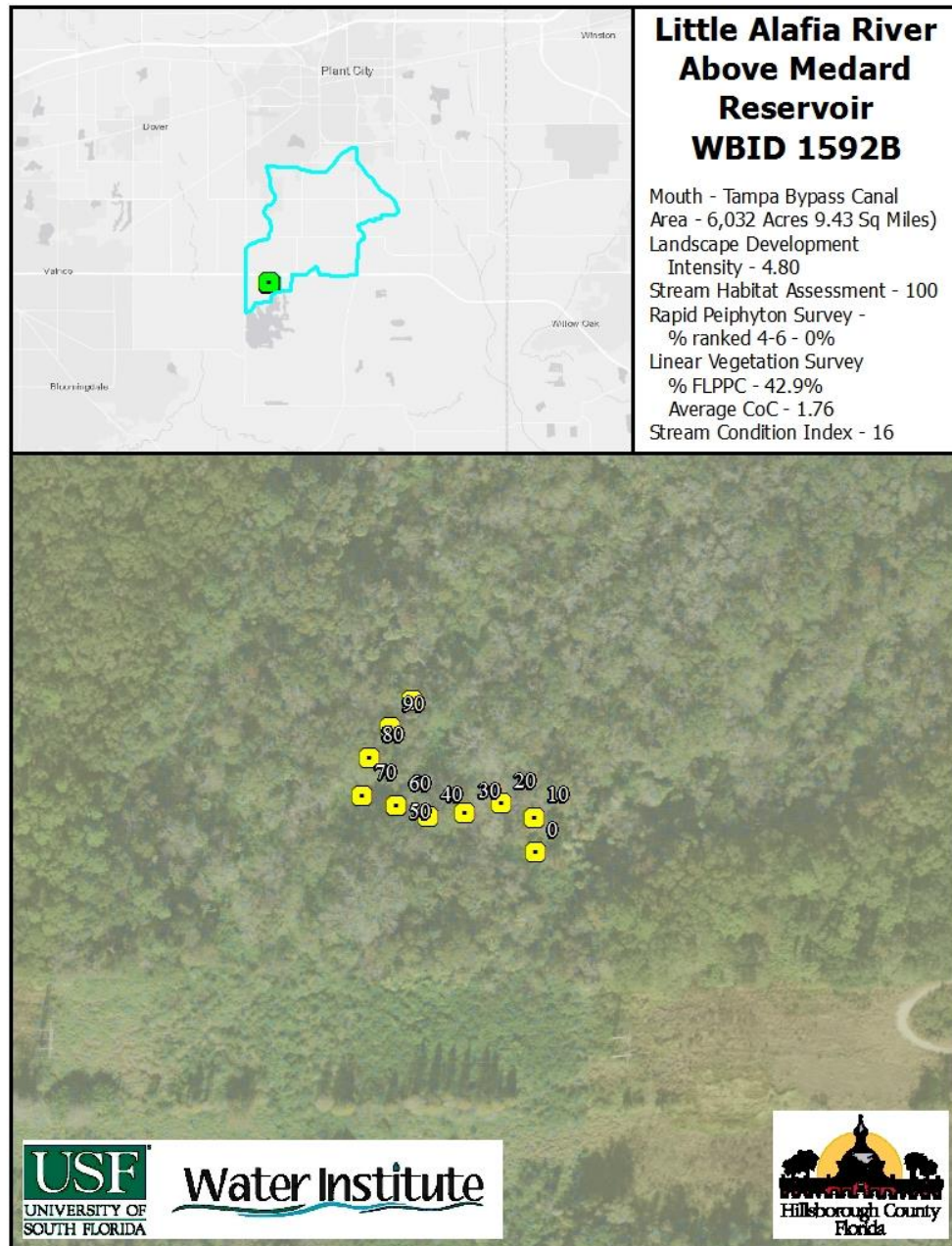


Figure 1 2019 Little Alafia River above Medard Reservoir Study Area Map

covers 9.43 square miles and is dominated by agricultural (36.0%) residential (35.1%) and natural (20.8%) land uses. The resulting calculated landscape development intensity index score was 4.80.



Habitat and Vegetation Assessment

The region of the Little Alafia River where the assessment was conducted is in a mixture of agricultural, residential and natural land use. The region was moderately shaded with a mean canopy cover measurement of 79.5%. The Little Alafia River averaged 0.2 meters in depth, approximately 4.7 meters wide with a flow of 0.21 m/s.

The primary habitat components of the FDEP Habitat Assessment focus on in-water habitat. The primary habitat components score in the suboptimal category for Water Velocity and Habitat Smothering (Many of the productive habitats were affected by sand smothering and the pools were sufficient. Marginal scores were achieved for Substrate Diversity (Presence of two major productive habitats (snags, roots)). Substrate Availability scored in the poor category due to low overall percentage of productive habitats (4.5% of total stream area). Minor habitats included leaf, sand and silt deposits. The total score for the primary habitat components was a 38 out of 80.

The secondary habitat components of the FDEP Habitat Assessment focus on the surrounding features of the stream. At the water level at the time of assessment, the Little Alafia River was low on its banks. The secondary habitat components scored in the optimal category for

Riparian Buffer Zone Width and Bank Stability. Artificial Channelization and Riparian Zone Vegetation Quality scored in the suboptimal category. The riparian buffer zone surrounding the stream was greater than 18 meters on both banks and consisted of native trees, but also several invasive species indicative of disturbance such as *Ruellia simplex*. The vegetation in the stream itself was dominated by mostly native species with 6 non-native invasive species. The secondary habitat components received a score of 62 out of 80. The resulting FDEP Habitat Assessment score was an 100.

Periphyton was not encountered during the 99 samples taken during the Rapid Periphyton Survey. The tree canopy in the assessment area averaged 76.5% limiting available sunlight for macrophytes and algae.

The FDEP Linear Vegetation Survey encountered 16 herbaceous species in the Little Alafia River, ten of which are native. *Colocasia esculenta*, *Ruellia simplex*, *Urochloa mutica*, *Alternanthera philoxeroides*, *Commelina diffusa*, *Ludwigia peruviana* and *Sphagneticola trilobata* are non-native invasive species. None of the species encountered were abundant. *Lemna*, *Ruellia simplex* and *Saururus cernuus* were the most commonly occurring species.

Table 1 Linear Vegetation Survey Results – Little Alafia River above Medard Reservoir

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Stream Condition Index

The analysis of the SCI sample involves splitting the sample into 2 aliquots for analysis. The SCI metrics are then calculated on each separately. The final SCI score is an average of the two scores. The SCI score for the Little Alafia river was 16 out of a possible 100 points, corresponding with an “Impaired” designation, lacking the expected community of a healthy stream.

Low scores were achieved for the majority of the metrics with the exception of % Filter Feeders in both samples. Both subsamples contained a Long-lived taxa. Neither sample contained any sensitive taxa, Ephemeroptera, Trichoptera or Tanytarsini. This may indicate an acute pollution event or desiccation events in the past year. The full results of the SCI sampling are shown in Table 3 (Sample A) and Table 4 (Sample B) for the Little Alafia River.

Table 2 SCI metric summaries for Little Alafia River above Medard Reservoir

SCI Metric		Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa		11.00	-1.67	0.00
Total Ephemeroptera		0.00	0.00	0.00
Total Trichoptera		0.00	0.00	0.00
% Filter Feeders		23.23	5.24	5.24
Total Clingers		1.00	1.43	1.43
Total Long-lived Taxa		1.00	3.33	3.33
% Dominance		49.03	2.99	2.99
% Tanytarsini		0.00	0.00	0.00
Total Sensitive Taxa		0.00	0.00	0.00
% Very Tolerant Individuals		53.55	1.75	1.75
SCI Sum	14.75			
Final SCI score	16.38			

SCI Metric		Raw Totals	SCI scores	Adjusted SCI scores
Total Taxa		9.00	-2.50	0.00
Total Ephemeroptera		0.00	0.00	0.00
Total Trichoptera		0.00	0.00	0.00
% Filter Feeders		25.64	5.80	5.80
Total Clingers		1.00	1.43	1.43
Total Long-lived Taxa		1.00	3.33	3.33
% Dominance		55.77	1.65	1.65
% Tanytarsini		0.00	0.00	0.00
Total Sensitive Taxa		0.00	0.00	0.00
% Very Tolerant Individuals		57.69	1.57	1.57
SCI Sum	13.78			
Final SCI score	15.31			

Table 3 SCI full results for Sample A

Stream Condition Index Results for Little Alafia above Medard SCIA

[illegible]

Table 4 SCI full results for Sample B

Stream Condition Index Results for Little Alafia above Medard SCIB

Phylum	Subphylum	Class	Subclass	Order	Family	Taxa	Abundance	Collapsed Abundance	Taxa Presence	Ephemeroptera	Trichoptera Taxa	50% Filterer	100% Filterer	Clinger Taxa	Long-lived Taxa	Dominant Taxa	Tanytarsini	Sensitive Taxa	Very Tolerant	Specimen Notes
Annelida		Clitellata	Oligochaeta	Tubificida	Naididae	<i>Nais communis</i>	1	1	1	0	0	0	0	0	0		0	0	1	
Mollusca		Bivalvia	Heterodonta	Veneroida	Corbiculidae	<i>Corbicula</i> spp.	40	40	1	0	0	0	40	0	1		0	0	0	
Arthropoda	Hexapoda	Insecta	Ptenopta	Odonata	Coenagrionid	<i>Coenagrionidae</i> spp.	2	2	1	0	0	0	0	0	0		0	0	0	Damaged and/or
Arthropoda	Hexapoda	Insecta	Ptenopta	Coleoptera	Elmidae	<i>Stenelmis</i> spp.	4	4	1	0	0	0	0	1	0		0	0	0	3 larvae, 1 adult
Arthropoda	Hexapoda	Insecta	Ptenopta	Diptera		<i>Diptera</i> spp.	2		0	0	0	0	0	0	0		0	0	0	0 pupae, no posterior ends
Arthropoda	Hexapoda	Insecta	Ptenopta	Diptera	Chironomidae	<i>Chironomidae</i> spp.	9		0	0	0	0	0	0	0		0	0	0	0 pupa
Arthropoda	Hexapoda	Insecta	Ptenopta	Diptera	Chironomidae	<i>Polypedilum illinoense</i>	78	87	1	0	0	0	0	0	0		0	0	87	
Arthropoda	Hexapoda	Insecta	Ptenopta	Diptera	Chironomidae	<i>Glyptotendipes</i> spp.	1	1	1	0	0	0	0	0	0		0	0	1	
Arthropoda	Hexapoda	Insecta	Ptenopta	Diptera	Chironomidae	<i>Coronapneura</i> spp.	5	6	1	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Ptenopta	Diptera	Chironomidae	<i>Cricotopus</i> or <i>Orthocladius</i>	13	14	1	0	0	0	0	0	0		0	0	0	
Arthropoda	Hexapoda	Insecta	Ptenopta	Lepidoptera	Crambidae	<i>Elaphila</i> spp.	1	1	1	0	0	0	0	0	0		0	0	1	

Water Quality Assessment

Long-term water quality data is available for the Little Alafia River above Medard Reservoir. The data that is available was collected by the Hillsborough County Environmental Protection Commission. Values for the physical water parameters begin in 2005 and continue through present. Values for the laboratory water parameters begin in 2005 through present including the sample taken along with this assessment. The 2019 USF Water Institute Assessment fall within the range of the previous data collections. Table 5 provides a summary of the Physical/Chemical conditions recorded at the site.

Table 5 Little Alafia River Physical Water Quality (Field)

Little Alafia River above Medard Reservoir								
Date	Depth (m)	Temp (°C)	pH	DO (mg/L)	DO (% Sat)	Cond (UMHO/cm	Salinity (PPT)	Secchi Depth (m)
2/19/19	0.04	19.97	8.78	8.08	87.1	277.6	0.13	0.4 VOB
Mean POR		20.88	7.46	6.65	75.12	337.4	0.16	0.54

The chemical water quality analysis for the Little Alafia River is shown in Table 6 along with mean values for the period of record for available parameters. Period of record mean and the sample for this assessment for Total Phosphorous values were above the nutrient region threshold developed by FDEP of 0.49 mg/L with a mean value of 0.674 mg/L (2005-2019). The three year geometric mean of Total Phosphorous was 0.760 mg/L. Total Phosphorous values for the sample from this assessment were 0.791 mg/L. During the past 3 year period, there were nine samples exceeding the threshold. Total Nitrogen values were above the nutrient region threshold developed by FDEP of 1.65 mg/L with a mean value of 4.270 mg/L (2005-2019). The three year geometric mean of Total Nitrogen was 2.827 mg/L. The Total Nitrogen value from the assessment was above the threshold with a concentration of 3.708 mg/L. During the past 3 years there were nine samples exceeding the Total Nitrogen standard. Chlorophyll-a corrected values fall within the site specific evaluation range of 3.2 µg/l to 20 µg/l for the period of record (4.44 µg/l 2005-2019), and in the site specific evaluation range for the most recent three year geomean (8.28 µg/l). For sites with Chlorophyll-a values in this range, the assessment is inconclusive of conditions reflecting an imbalance in flora. Elevated biomass of the bacterial parameters was observed in the long term dataset with E. Coli having a geomean of 850 colonies/100 ml, 2,529/100 ml for Enterococci.

Table 6 Little Alafia River above Medard Reservoir Water Quality (Laboratory)

Parameter	Little Alafia River	POR Mean	Units
Alkalinity	66.0		mg/LCaCO ₃
Nitrates/Nitrites	2.845	2.832	mg/L
E. Coli	980	850	#/100 ml
Enterococci	2,000	2,529	#/100 ml
Chlorophyll a	4.8	5.38	ug/L
Chlorophyll b	0.5	1.68	ug/L
Chlorophyll c	0.4	0.83	ug/L
Chlorophyll t	5.2	7.12	ug/L
Chlorophylla Corr	4.1	4.44	ug/L
Chlorophyll-pheo	5.4	3.43	ug/L
Ammonia	0.064	0.080	mg/L
Kjeldahl Nitrogen	0.863	1.058	mg/L
Total Nitrogen	3.708	4.270	mg/L
Total Phosphorus	0.791	0.674	mg/L
Color(345)F.45	22.8	36.7	Pt/Co

Conclusion

Little Alafia River above Medard Reservoir is located in a preserved area near an agricultural area. The stream itself showed signs of past alteration immediately upstream from the sample site where the river has been straightened. At the time of the habitat assessment, the water levels were low, corresponding to the middle of the dry season, however sufficient habitat for macroinvertebrates was observed. Due to these factors, the Habit Assessment resulted in a suboptimal score of 100. Disruption to the vegetation community was observed in the results of the Linear Vegetation Survey with the Little Alafia River not meeting the metric for Average Coefficient of Conservatism or the Percent FLEPPC. The Little Alafia River did meet standards for the rapid periphyton survey with 0% of samples being ranked between 4 and 6. The historical water quality record for the Little Alafia River showed unacceptable concentrations of Total Phosphorous and Total Nitrogen. The results of the SCI sampling indicate that the stream is “impaired” based on the macroinvertebrate community. The long term data indicates high levels of bacterial contamination. Table 7 summarizes the results of the nutrient sampling, floristic sampling, habitat assessment and SCI.

Table 7 Summary of Water Quality, Floristic Surveys and Habitat Assessments

Measure		Little Alafia River	Mean POR	Threshold
Total Phosphorous (mg/l)		0.791	0.674	< 0.49
Total Nitrogen (mg/l)		3.708	4.27	< 1.65
RPS (% Rank 4-6)		0.00%		< 25%
LVS	Avg C of C	1.76		≥ 2.5
	FLEPPC %	42.86%		< 25%
Chlorophyll (µg/l)		4.1	4.44	< 20 µg/l
Habitat Assessment		100		> 34
SCI		16		> 34