Turkey Creek

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

Stream Condition Index

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, Fecal Coliform, Enterococci, Ammonia, Nitrates/Nitrites, Total Phosphorous, Kjeldahl Nitrogen and Total Nitrogen.

Study Area

Turkey Creek, located in eastern Hillsborough County Florida, was sampled upstream for Durant Road was assessed on 5/31/2016. Turkey Creek discharges into the Alafia River. The watershed surrounding Turkey Creek is dominated by Residential (25.0%), Reclaimed Lands (20.8%), Agricultural (27.9%), and Natural (15.7%) land use. The Landscape Development Intensity Index of the watershed is 5.35.

Figure 1. 2016 Turkey Creek Assessment Study Area Map

Habitat Assessment

Figure 2 Overview photograph of the Turkey Creek at Durant Road sample site

Turkey Creek at Durant Road received a Habitat Assessment score of 130. The primary habitat components scored in the optimal category for Substrate Availability, Substrate Diversity and Habitat Smothering. Suboptimal scores were observed for Water Velocity. The secondary habitat components showed suboptimal scores for artificial channelization. The left bank scored in the suboptimal range for Riparian Buffer Width and Riparian Zone Vegetation Quality and scored marginal for Bank Stability. The right bank scored higher than the left bank with optimal scores for Riparian Buffer Zone Width, Bank Stability and Riparian Zone Vegetation Quality.

During the Rapid Periphyton Survey, periphyton was observed in 31 of the 99 individual grab samples performed with 13 being ranked 4-6. The average canopy cover in the 100 meter region was 75.5%. The Secchi Disk Depth was measured as 0.3 meters visible on bottom at the 50 meter mark. The average water depth at the time of the assessment was 0.3 meters.

The Linear Vegetation Survey identified 3 species rooted in the water at the time of the assessment. The majority of these species (2) are non-native, invasive species shown in bold in Table 1. The remaining 1 species are native to this region. None of the three species were identified as dominant species in the regions of 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 9 species observations in the 100 meter study area. The mean Coefficient of Conservatism (CoC) metric for the study area was 0.64 and the % FLEPPC metric for the study area was 66.66%. Both of these metrics do not meet the FDEP thresholds of > 2.5 for Mean CoC and < 25% for % FLEPPC.

Table 1 Linear Vegetation Survey Results – Turkey Creek at Durant Road

Taxa Name	C of C Score	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	Total Occurrences
Alternanthera philoxeroides	0	1			1						1	3
Colocasia esculenta	0				1			1			1	3
Hydrocotyle umbellata	1.92				1			1			1	3

Figure 3. Mixture of native and non-native species growing along Turkey Creek at Durant Road

Stream Condition Index Assessment

The SCI score for this site was 26 out of a possible 100 points, corresponding with a "Impaired" designation, without the expected community of a healthy stream. None of the taxa collected in each cohort were pollution-sensitive.

Turkey Creek @Durant SCI A	**Raw Totals**	**SCI scores**	**Adjusted SCI scores**
Total Taxa	12.00	-1.25	0.00
Total Ephemeroptera	1.0	2.00	2.00
Total Trichoptera	1.0	1.43	1.43
% Filter Feeders	25.63	5.80	5.80
Total Clingers	1.00	1.43	1.43
Total Long-lived Taxa	1.00	3.33	3.33
% Dominance	34.38	5.93	5.93
% Tanytarsini	0.00	0.00	0.00
Total Sensitive Taxa	0.00	0.00	0.00
% Very Tolerant Individuals	14.38	4.92	4.92

SCI Sum	24.83
Final SCI score	27.59

Turkey Creek @ Durant SCI B	**Raw Totals**	**SCI scores**	**Adjusted SCI scores**
Total Taxa	13.00	-0.83	0.00
Total Ephemeroptera	1.00	2.00	2.00
Total Trichoptera	1.00	1.43	1.43
% Filter Feeders	15.63	3.47	3.47
Total Clingers	1.00	1.43	1.43
Total Long-lived Taxa	1.00	3.33	3.33
% Dominance	34.38	5.93	5.93
% Tanytarsini	0.00	0.00	0.00
Total Sensitive Taxa	0.00	0.00	0.00
% Very Tolerant Individuals	20.63	4.07	4.07

SCI Sum	21.65
Final SCI score	24.06

Water Quality Assessment

Long-term water quality data is available for Turkey Creek at Durant Road from the Hillsborough County Environmental Protection Commission and USF Water Institute. Table 3 provides a summary of the Physical/Chemical conditions recorded the sample site.

Table 2 Turkey Creek Physical Water Quality (Field)

Depth (m)	Temp (c)	pH	DO (mg/L)	DO (% Sat)	Cond (umho/cm)	Salinity (ppt)	TDS (mg/L)
0.41	24.92	7.92	6.41	76.2	416.3	0.2	266.4

The chemical water quality analysis for the Turkey Creek is shown in Table 4 along with geometric mean values for the past three years for available parameters. Three year Geomean Total Phosphorous values were above the nutrient region threshold developed by FDEP of 0.49 mg/l. Total Phosphorous concentrations are exceeded using only the sample taken with this assessment (0.594 mg/l TP). Three Year Geomean Total Nitrogen values were also above the nutrient region threshold developed by FDEP of 1.65 mg/l. Total Nitrogen concentrations are not exceeded using only the sample taken with this assessment (0.855 mg/l TN). Chlorophyll-a values fall within the site specific evaluation range of 3.2 µg/l to 20 µg/l with a value of 3.4 for this assessment (4.76 mg/L 3-year geomean). For sites with Chlorophyll-a values in this range, the assessment is inconclusive of conditions reflecting an imbalance in flora.

Table 3 Turkey Creek Water Quality (Laboratory)

Parameter	Thonotosassa Rd	3-Year Geomean	Units
Alkalinity			mg/LCaCO3
Nitrates/Nitrites	0.309		mg/L
Fecal Coliform	210		#/100 ml
Enterococci	800		#/100 ml
Chlorophyll a	1.2		ug/L
Chlorophyll b	2.6		ug/L
Chlorophyll c	0.5		ug/L
Chlorophyll t	1.9		ug/L
Chlorophylla Corr	3.4	4.76	ug/L
Chlorophyll-pheo	6.6		ug/L
Ammonia	0.024		mg/L
Kjeldahl Nitrogen	0.546		mg/L
Total Nitrogen	0.855	1.935	mg/L
Total Phosphorus	0.594	0.830	mg/L
Color(345)F.45	19.7		Pt/Co

Conclusion

The Turkey Creek region that was assessed during this study shows impairment based on water quality alone using the three year geomeans. The system also shows imbalance in the vegetation communities through the linear vegetation survey results with a high percentage of non-native invasive species. The rapid periphyton survey with 13.1% of samples being ranked 4-6 is not listed as showing imbalance. The habitat assessment performed on the site shows habitat is sufficient for biotic use, however the low SCI score of 26 indicates impairment.

Table 4 Summary of Water Quality, Floristic Surveys and Habitat Assessments

Measure		Durant Road	Threshold
Total Phosphorous (mg/l)		0.83	< 0.49
Total Nitrogen (mg/l)		1.935	< 1.65
RPS (% Rank 4-6)		43.40%	< 25%
LVS	Avg C of C	0.64	≥ 2.5
	FLEPPC %	66.66%	< 25%
Chlorophyll (µg/l)		4.76	< 20 µg/l
Habitat Assessment		130	> 34
SCI		26	> 34

Turkey @ Durant SCI A
Stream Condition Index (SCI)
Samples Collected 5/31/2016
Project #: 6067160115

Stream Condition Index Results for Turkey @ Durant SCI A

Phylum	Class	Order	Family	Genus Species	Abundance	Collapsed/Reduced Abundance	Taxa Presence	Ephemeroptera Taxa	Trichoptera Taxa	50% Filterer	100% Filterer	Clinger Taxa	Long-lived Taxa	Dominant Taxa	Tanytarsini	Sensitive Taxa	Very Tolerant Individuals
Mollusca	Gastropoda	Hygrophila	Physidae	*Physella cubensis*	5	4	1	0	0	0	0	0	0		0	0	4
Mollusca	Gastropoda	Hygrophila	Planorbidae	*Planorbella scalaris*	20	18	1	0	0	0	0	0	0		0	0	18
Mollusca	Gastropoda	Littorinimorpha	Hydrobiidae	Hydrobiidae spp.	61	55	1	0	0	0	0	0	0		0	0	0
Mollusca	Gastropoda	Neotaenioglossa	Thiaridae	*Melanoides tuberculata*	1	1	1	0	0	0	0	0	0		0	0	1
Mollusca	Bivalvia	Veneroida	Corbiculidae	*Corbicula fluminea*	2	1	1	0	0	0	1	0	1		0	0	0
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Baetis intercalaris*	2	2	1	1	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Odonata	Coenagrionidae	*Argia spp.*	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Cheumatopsyche spp.*	43	40	1	0	1	0	40	1	0		0	0	0
Arthropoda	Insecta	Coleoptera	Elmidae	*Microcylloepus spp.*	19	18	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum scalaenum group*	2	2	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum convictum group*	17	17	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Ablabesmyia mallochi*	1	1	1	0	0	0	0	0	0		0	0	0

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SCI Sum	24.83
Final SCI score	27.59

Source: Amec Foster Wheeler, 2016
Prepared by: SEM
Checked by: MAE

Turkey @ Durant SCI B
Stream Condition Index (SCI)
Samples Collected 5/31/2016
Project #: 6067160115

Stream Condition Index Results for Turkey @ Durant SCI B

Phylum	Class	Order	Family	Genus Species	Abundance	Collapsed/Reduced Abundance	Taxa Presence	Ephemeroptera Taxa	Trichoptera Taxa	50% Filterer	100% Filterer	Clinger Taxa	Long-lived Taxa	Dominant Taxa	Tanytarsini	Sensitive Taxa	Very Tolerant Individuals
Mollusca	Gastropoda	Hygrophila	Physidae	*Physella cubensis*	6	4	1	0	0	0	0	0	0		0	0	4
Mollusca	Gastropoda	Hygrophila	Planorbidae	*Planorbella scalaris*	29	23	1	0	0	0	0	0	0		0	0	23
Mollusca	Gastropoda	Littorinimorpha	Hydrobiidae	Hydrobiidae spp.	79	55	1	0	0	0	0	0	0		0	0	0
Mollusca	Gastropoda	Neotaenioglossa	Thiaridae	*Melanoides tuberculata*	6	5	1	0	0	0	0	0	0		0	0	5
Mollusca	Bivalvia	Veneroida	Corbiculidae	*Corbicula fluminea*	3	2	1	0	0	0	2	0	1		0	0	0
Arthropoda	Insecta	Ephemeroptera	Baetidae	Baetidae spp.	1	1	1	1	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Odonata	Coenagrionidae	*Argia spp.*	1	1	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Trichoptera	Hydropsychidae	*Cheumatopsyche spp.*	34	23	1	0	1	0	23	1	0		0	0	0
Arthropoda	Insecta	Coleoptera	Elmidae	*Microcylloepus spp.*	24	21	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum convictum group*	30	21	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Polypedilum illinoense group*	1	1	1	0	0	0	0	0	0		0	0	1
Arthropoda	Insecta	Diptera	Chironomidae	*Ablabesmyia mallochi*	4	2	1	0	0	0	0	0	0		0	0	0
Arthropoda	Insecta	Diptera	Chironomidae	*Cricotopus or Orthocladius*	1	1	1	0	0	0	0	0	0		0	0	0

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