# Double Branch Creek

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

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# Methods

## STUDY AREA ANALYISIS

The watershed containing the stream being assessed was analyzed using ESRI ArcGIS Pro. Using this software with 2022 Hillsborough County aerial, 2017 Land Use/ Land Cover (LULC) and Waterbody ID (WBID) layers courtesy of the Florida Department of Environmental Protection (FDEP). The Landscape Development Intensity Index (LDI) was calculated for the WBID containing the stream. From FDEP (https://floridadep.gov/dear/bioassessment/content/bioassessment-ldi-hdg-bcg ) "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 FDEP 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 FDEP 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 one sampling location 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 (LVS). 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 Table LVI 1000-1 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 in FDEP LVI 1000-1.

## STREAM CONDITION INDEX ASSESSMENT

The Stream Condition Index (SCI) was sampled and calculated per DEP SOP SCI 1000. 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 SCI 1000, the SCI scores greater than 35 are considered healthy. Proposed biological health assessment criteria state that a WBID is considered to meet designated uses if the average of the two most recent SCI scores is 40 or higher and neither of the most recent 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 Hillsborough County Public Utilities 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. Results will be discussed in the Florida Department of Environmental Protection's Numeric Nutrient Criteria framework and combined with the monthly sampling from the Hillsborough County Environmental Protection Commission Monthly sampling data.

## Study Area

Double Branch Creek is located in north-eastern Hillsborough County in the Double Branch Watershed. Its headwaters are located west of Countryway Blvd and Glenfield Ave in Hillsborough County. The outfall of Double Branch Creek is in Old Tampa Bay. The assessment of Double Branch Creek was conducted on March 20th, 2023 and, at that time, water levels were normal. The Double Branch Creek WBID covers 8.84 square miles and is dominated by forest/natural (48.16%), residential (39.13%), and industry (7.77%) land uses. The resulting calculated landscape development intensity (LDI) index score was a 4.37.

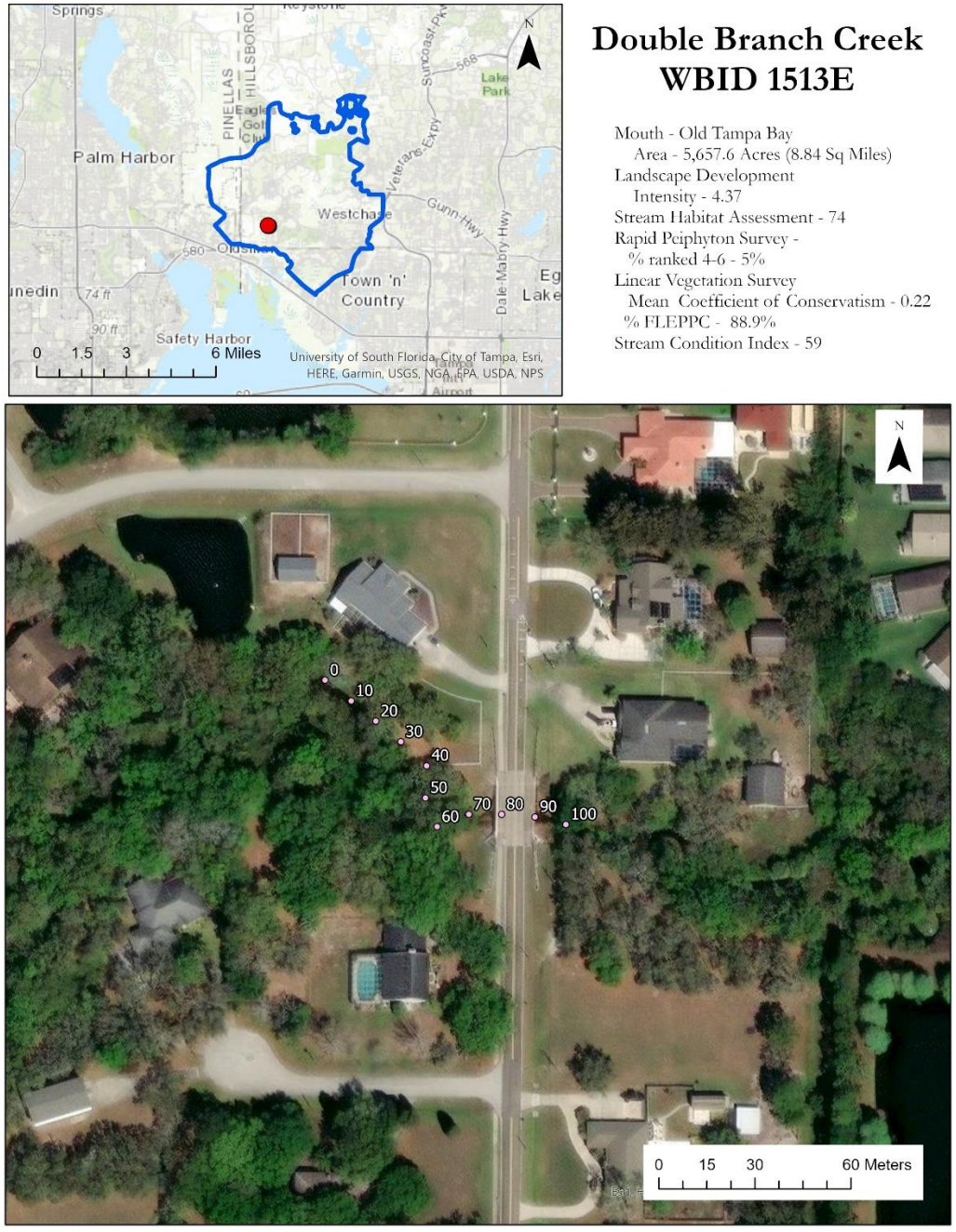


*Figure 1 2023 Double Branch Creek Study Area Map*

*Figure 2 Overview photograph of the Double Branch Creek Sample Site showing the vegetated riparian zone and the heavy sand/silt smothering conditions.*

## Habitat and Vegetation Assessment

The region of Double Branch Creek where the assessment was conducted is in a residential area in Twin Branch Acres. The region was moderately shaded with a mean canopy cover measurement of 64.9%. Double Branch Creek averaged 0.25 meters in depth and approximately 2.95 meters wide with a flow of 0.09 m/s.

The primary habitat components of the FDEP Habitat Assessments focus on in-water habitat. The primary habitat components score in the suboptimal category for Habitat Smothering with an adequate number of pools present and heavy silt smothering on most productive habitats. Substrate Diversity (presence of two major productive habitats (snag, root)) and Water Velocity (0.09 m/s) were scored in the marginal category. Substrate Availability was scored as poor for having major productive habitats in only 2.4% of the stream. Minor habitats included leaf packs/mats, and sand and silt deposits. The total score for the primary habitat components was a 30 out of 80.

The secondary habitat components of the FDEP Habitat Assessment focus on the surrounding features of the stream. The secondary habitat components scored in the optimal category for Artificial Channelization with good sinuosity and no evidence of spoil banks or straightening. Bank Stability was scored in suboptimal for both banks only meeting 2 out of 3 requirements. Riparian Zone Vegetation Quality was scored in marginal for obvious disturbance indicators and only having about 50% native plant species present on both banks. Riparian Buffer Zone Width was scored in the poor category for both banks having less than 6 meters of riparian buffer zone due to the residential sample site. The secondary habitat components received a score of 44 out of 80. The resulting FDEP Habitat Assessment score was a 74.

*Table 1 Scoring Summary for the Stream Habitat Assessment*

| Metric | Score |
|---|---|
| **Primary Habitat Components** | |
| Substrate Diversity | 7 |
| Substrate Availability | 3 |
| Water Velocity | 9 |
| Habitat Smothering | 11 |
| **Primary Score** | **30** |
| **Secondary Habitat Components** | |
| Artificial Channelization | 16 |
| Bank Stability - Right Bank | 7 |
| Bank Stability - Left Bank | 6 |
| Riparian Buffer Zone Width - Right Bank | 3 |
| Riparian Buffer Zone Width - Left Bank | 2 |
| Riparian Zone Vegetation Quality - Right Bank | 5 |
| Riparian Zone Vegetation Quality - Left Bank | 5 |
| **Secondary Score** | **44** |
| **Habitat Assessment Score** | **74** |

Periphyton was encountered during 8 of the 99 samples taken during the Rapid Periphyton Survey. Five of these samples were ranked 4-6 (>6 mm in length). The tree canopy in the assessment area averaged 64.9% reducing available light for periphyton to flourish.

The FDEP Linear Vegetation Survey (LVS) encountered more than two square meters of rooted herbaceous vegetation in Double Branch Creek at the time of the assessment. The vegetation was dominated by non-native species with *Alternanthera philoxeroides, Ruellia simplex,* and *Sphagneticola trilobata* having the most occurrences. The mean coefficient of conservatism metric was 0.16, failing the FDEP threshold of 2.5. The percent FLEPPC metric for the assessment also failed the FDEP threshold of 25% with a 92.3%.

*Table 2 Linear Vegetation Survey Results – Double Branch Creek*

| Taxa Name | C of C Score | Sample Site | | | | | | | | | | Total Occurrences |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 | |
| *Ruellia simplex* | 0 | 1 | 1 | 1 | 1 | 1 | 1 | D | 1 | | | 8 |
| *Alternanthera philoxeroides* | 0 | 1 | 1 | 1 | | 1 | 1 | | | | 1 | 6 |
| *Sphagneticola trilobata* | 0 | 1 | 1 | 1 | 1 | 1 | | | | | | 5 |
| *Urochloa mutica* | 0 | 1 | | | | | | | D | | D | 3 |
| *Commelina diffusa* | 2.02 | | | | | | | | 1 | | 1 | 2 |
| *Ludwigia peruviana* | 0 | 1 | 1 | | | | | | | | | 2 |
| *Mikania scandens* | 1.95 | | 1 | | | | | | | | | 1 |

*Figure 3 Snag and roots were the most abundant major productive habitats in Double Branch Creek.*

## 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 Double Branch Creek was 59 out of a possible 100 points, corresponding with a "Category 2 Healthy" designation, with noticeable loss of taxonomic diversity from the expected community of a healthy stream. Both 2023 subsamples contained low total taxa with 17 in subsample A and 28 in subsample B. High scores (above 7.0) were achieved for the Total Clingers (both samples), % Dominance (both samples), % Tanytarsini (both samples), and % Very Tolerant Individuals (Sample B). Low scores (less than 3.0) were achieved for the Total Taxa (Sample A), Total Ephemeroptera (Sample A), Total Trichoptera (Sample A), Total Long-Lived Taxa (Sample B), and Total Sensitive Taxa (both samples). The full results of the SCI sampling are shown in Table 4 (Sample A) and Table 5 (Sample B) for Double Branch Creek.

*Table 3 SCI metric summaries for Double Branch Creek Sample A (top) and Sample B (bottom)*

| SCI Metric | Raw Totals | SCI scores | Adjusted SCI scores |
|---|---|---|---|
| **Total Taxa** | 17.00 | 0.83 | 0.83 |
| **Total Ephemeroptera** | 1.00 | 2.00 | 2.00 |
| **Total Trichoptera** | 2.00 | 2.86 | 2.86 |
| **% Filter Feeders** | 21.38 | 4.81 | 4.81 |
| **Total Clingers** | 6.00 | 8.57 | 8.57 |
| **Total Long-lived Taxa** | 1.00 | 3.33 | 3.33 |
| **% Dominance** | 15.09 | 9.78 | 9.78 |
| **% Tanytarsini** | 18.24 | 8.70 | 8.70 |
| **Total Sensitive Taxa** | 2.00 | 2.86 | 2.86 |
| **% Very Tolerant Individuals** | 10.06 | 5.74 | 5.74 |

| | |
|---|---|
| SCI Sum | 49.48 |
| Final SCI score | 54.98 |

| SCI Metric | Raw Totals | SCI scores | Adjusted SCI scores |
|---|---|---|---|
| **Total Taxa** | 28.00 | 5.42 | 5.42 |
| **Total Ephemeroptera** | 2.00 | 4.00 | 4.00 |
| **Total Trichoptera** | 3.00 | 4.29 | 4.29 |
| **% Filter Feeders** | 28.85 | 6.55 | 6.55 |
| **Total Clingers** | 6.00 | 8.57 | 8.57 |
| **Total Long-lived Taxa** | 0.00 | 0.00 | 0.00 |
| **% Dominance** | 21.79 | 8.44 | 8.44 |
| **% Tanytarsini** | 30.13 | 10.11 | 10.00 |
| **Total Sensitive Taxa** | 2.00 | 2.86 | 2.86 |
| **% Very Tolerant Individuals** | 5.13 | 7.22 | 7.22 |

| | |
|---|---|
| SCI Sum | 57.34 |
| Final SCI score | 63.71 |

## *Table 4 SCI full results for Sample A*

**Stream Condition Index Results for Double Branch Creek SCIA**

| Phylum | Subphylum | Class | Subclass | Order | Family | Taxa | Abundance | Collapsed Abundance | Taxa Presence | Ephemeroptera Taxa | Trichoptera Taxa | 50% Filterer | 100% Filterer | Clinger Taxa | Long-lived Taxa | Dominant Taxa | Tanytarsini | Sensitive Taxa | Very Tolerant Individuals | Specimen Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Annelida | | Clitellata | Oligochaeta | Tubificida | Naididae | *Slavina appendiculata* | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Annelida | | Clitellata | Hirudinida | Rhynchobdellida | Glossiphoniidae | *Helobdella papillata* | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 1 | |
| Mollusca | | Gastropoda | Heterobranchia | Hygrophila | Ancylidae | Ancylidae spp. | 5 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | Damaged |
| Mollusca | | Gastropoda | Heterobranchia | Hygrophila | Planorbidae | *Menetus dilatatus* | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 3 | |
| Mollusca | | Gastropoda | Caenogastropoda | | Thiaridae | *Melanoides tuberculata* | 8 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 8 | |
| Mollusca | | Bivalvia | Autobranchia | Venerida | Cyrenidae | *Corbicula* spp. | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | | 0 | 0 | 0 | |
| Arthropoda | Crustacea | Malacostraca | Eumalacostraca | Amphipoda | Hyalellidae | *Hyalella* spp. | 14 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Ephemeroptera | Heptageniidae | Heptageniidae spp. | 3 | 3 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 1 | 0 | No Gill 7 |
| Arthropoda | Hexapoda | Insecta | Pterygota | Odonata | Macromiidae | Macromiidae spp. | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | Ealy instar |
| Arthropoda | Hexapoda | Insecta | Pterygota | Trichoptera | Hydropsychidae | *Cheumatopsyche* spp. | 5 | 5 | 0 | 0 | 1 | 0 | 5 | 1 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Trichoptera | Hydroptilidae | *Neotrichia* spp. | 2 | 2 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Coleoptera | Elmidae | *Dubiraphia* spp. | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | Adult=1 |
| Arthropoda | Hexapoda | Insecta | Pterygota | Coleoptera | Elmidae | *Stenelmis* spp. | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | Larvae=4; Adult=1 |
| Arthropoda | Hexapoda | Insecta | Pterygota | Coleoptera | Elmidae | *Microcylloepus* spp. | 11 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | Larvae=9; Adult=2 |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | Chironomidae spp. | 2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 2 pupae |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | Tanytarsini spp. | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | damaged |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Tanytarsus* spp. | 2 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | | 2 | 0 | 0 | 2 not sp. T |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Tanytarsus* sp. T | 4 | 4 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | | 4 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Cryptochironomus* spp. | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 1 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Polypedilum* spp. | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | damaged |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Polypedilum scalaenum* group | 10 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Polypedilum flavum* | 23 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Polypedilum illinoense* group | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 1 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Rheotanytarsus* spp. | 21 | 23 | 1 | 0 | 0 | 0 | 23 | 1 | 0 | | 23 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Ablabesmyia mallochi* | 7 | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Ablabesmyia rhamphe* group | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Dicrotendipes* spp. | 2 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Pentaneura inconspicua* | 10 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Stenochironomus* spp. | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Polypedilum beckae* | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 1 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Labrundinia* spp. | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Rheocricotopus* spp. | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Heteroptera | Veliidae | Veliidae spp. | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | Nymphs |
| Arthropoda | Hexapoda | Insecta | Pterygota | Lepidoptera | Crambidae | *Neargyractis slossonalis* | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | | 0 | 0 | 1 | |

## *Table 5 SCI full results for Sample B*

**Stream Condition Index Results for Double Branch Creek SCIB**

| Phylum | Subphylum | Class | Subclass | Order | Family | Taxa | Abundance | Collapsed Abundance | Taxa Presence | Ephemeroptera Taxa | Trichoptera Taxa | 50% Filterer | 100% Filterer | Clinger Taxa | Long-lived Taxa | Dominant Taxa | Tanytarsini | Sensitive Taxa | Very Tolerant Individuals | Specimen Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Annelida | | Clitellata | Oligochaeta | Tubificida | Naididae | *Limnodrilus hoffmeisteri* | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 1 | |
| Annelida | | Clitellata | Oligochaeta | Tubificida | Naididae | *Slavina appendiculata* | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Annelida | | Clitellata | Hirudinida | Rhynchobdellida | Glossiphoniidae | *Helobdella papillata* | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 1 | |
| Mollusca | | Gastropoda | Heterobranchia | Hygrophila | Ancylidae | Ancylidae spp. | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | Damaged, not F. fragilis |
| Mollusca | | Gastropoda | Heterobranchia | Hygrophila | Ancylidae | *Ferrissia fragilis* | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Mollusca | | Gastropoda | Heterobranchia | Hygrophila | Planorbidae | *Menetus dilatatus* | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 3 | |
| Mollusca | | Gastropoda | Caenogastropoda | | Thiaridae | *Melanoides tuberculata* | 3 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 3 | |
| Arthropoda | Crustacea | Malacostraca | Eumalacostraca | Amphipoda | Hyalellidae | *Hyalella* spp. | 9 | 9 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Ephemeroptera | Baetidae | *Baetis intercalaris* | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Ephemeroptera | Heptageniidae | Heptageniidae spp. | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | No Gill 7; Early instar; Maxilla like Stenacron |
| Arthropoda | Hexapoda | Insecta | Pterygota | Ephemeroptera | Heptageniidae | *Stenacron interpunctatum* | 2 | 3 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | | 0 | 1 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Odonata | Coenagrionidae | *Enallagma durum* | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Trichoptera | Hydropsychidae | *Cheumatopsyche* spp. | 4 | 4 | 1 | 0 | 1 | 0 | 4 | 1 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Trichoptera | Hydroptilidae | *Hydroptila* spp. | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Trichoptera | Hydroptilidae | *Neotrichia* spp. | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Coleoptera | Elmidae | *Dubiraphia* spp. | 7 | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | Larvae=5; Adult=2 |
| Arthropoda | Hexapoda | Insecta | Pterygota | Coleoptera | Elmidae | *Stenelmis* spp. | 8 | 8 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | Larvae=7; Adult=1 |
| Arthropoda | Hexapoda | Insecta | Pterygota | Coleoptera | Elmidae | *Microcylloepus* spp. | 8 | 8 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | Larvae=6; Adult=2 |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | Chironomidae spp. | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | Pupa=1 |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | Tanypodinae spp. | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | damaged |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Tanytarsus* spp. | 3 | 3 | 1 | 0 | 0 | 1.5 | 0 | 0 | 0 | | 3 | 0 | 0 | 3 not T or M |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Tanytarsus* sp. M | 1 | 1 | 1 | 0 | 0 | 0.5 | 0 | 0 | 0 | | 1 | 1 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Tanytarsus* sp. T | 9 | 9 | 1 | 0 | 0 | 4.5 | 0 | 0 | 0 | | 9 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Polypedilum scalaenum* group | 9 | 9 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Polypedilum flavum* | 24 | 24 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Rheotanytarsus* spp. | 33 | 34 | 1 | 0 | 0 | 0 | 34 | 1 | 0 | | 34 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Ablabesmyia mallochi* | 6 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Ablabesmyia rhamphe* group | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Dicrotendipes* spp. | 1 | 1 | 1 | 0 | 0 | 0.5 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Diptera | Chironomidae | *Pentaneura inconspicua* | 12 | 13 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | |
| Arthropoda | Hexapoda | Insecta | Pterygota | Heteroptera | Veliidae | Veliidae spp. | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | Nymph |

# Water Quality Assessment

Long-term water quality data is available for Double Branch Creek. The data that is available was collected by the Hillsborough County Environmental Protection Commission on a monthly cycle. The available dataset at station 158 (Double Branch Creek at Twin Branch Acres) begins in 2005 and continues through present. The 2023 USF Water Institute Assessment values fall within the range of the previous data collections. Table 6 provides a summary of the Physical/Chemical conditions recorded at the site.

*Table 6 Double Branch Creek Physical Water Quality (Field)*

| WATER QUALITY | Depth (m) | Temp (°C) | pH (SU) | D.O. (MG/L) | D.O. Sat (%) | Cond. (µmhos/cm) | Salinity (PPT) | SECCHI (m) |
|---|---|---|---|---|---|---|---|---|
| Top: | | | | | | | | 0.73 |
| Mid: | 0.1 | 15.22 | 8.29 | 6.97 | 67.7 | 587.9 | 0.28 | |
| Bottom: | | | | | | | | |
| Meter ID: | 60 | | | | | | | |

VOB

Total Depth 0.25

The chemical water quality analysis for Double Branch Creek is shown in Table 7 with geometric mean values for the previous 3 years for available parameters. The previous 3-year geometric mean values for Total Phosphorous values were at or above the nutrient region threshold developed by FDEP of 0.12 mg/L in two of the last 3 years with a geometric mean value of 0.126 mg/L (2020), 0.120 mg/L (2021) and 0.062 mg/L (2022). Total Phosphorous values for the available 2023 samples were 0.107 mg/L. Total Nitrogen values were below the nutrient region threshold developed by FDEP of 1.54 mg/L for the previous three year period with a mean value of 0.979 mg/L (2020), 1.016 mg/L (2021) and 1.073 mg/L (2022). The Total Nitrogen value from the available 2023 data was below the threshold with a concentration of 1.141 mg/L. Chlorophyll-a corrected values fall within the site specific evaluation range of 3.2 µg/l to 20 µg/l for the most recent 3-years of samples (2.25 µg/l in 2020, 3.09 µg/l in 2021, 3.78 µg/l in 2022). The available 2023 data has a geometric mean value of 3.55 µg/l. For sites with Chlorophyll-a values in this range, the assessment is inconclusive of conditions reflecting a balance in flora.
An elevated biomass of the bacterial parameters was observed in the 3-year dataset with E. Coli having a geometric mean of 269.1 colonies/100 ml, 368.1/100 ml for Enterococci.

*Table 7 Double Branch Creek Water Quality (Laboratory)*

| Parameter | 2020 | 2021 | 2022 | 2023 | Period of Record | Units |
|---|---|---|---|---|---|---|
| **E. Coli** | 188.6 | 274.2 | 215.8 | 398.1 | 276.8 | #/100 ml |
| **Enterococci** | 306.6 | 584.7 | 217.8 | 363.2 | 478.4 | #/100 ml |
| **Chlorophyll-a** | 3.51 | 4.04 | 5.20 | 4.22 | 5.41 | µg/L |
| **Chlorophyll-b** | 0.44 | 0.32 | 0.40 | 0.28 | 1.13 | µg/L |
| **Chlorophyll-c** | 0.73 | 0.66 | 0.64 | 0.64 | 0.88 | µg/L |
| **Chlorophyll-t** | 4.50 | 4.57 | 5.75 | 4.35 | 6.87 | µg/L |
| **Chlorophyll-a Corrected** | 2.25 | 3.09 | 3.78 | 3.55 | 4.41 | µg/L |
| **Ammonia** | 0.023 | 0.041 | 0.039 | 0.073 | 0.042 | mg/L |
| **Kjeldahl Nitrogen** | 0.888 | 0.913 | 0.937 | 0.964 | 1.029 | mg/L |
| **Total Nitrogen** | 0.979 | 1.016 | 1.073 | 1.127 | 1.141 | mg/L |
| **Nitrates/Nitrites** | 0.067 | 0.085 | 0.122 | 0.168 | 0.092 | mg/L |
| **Total Phosphorous** | 0.126 | 0.120 | 0.062 | 0.107 | 0.102 | mg/L |

# Conclusion

Double Branch Creek at Twin Branch Acres is located in a residential area with many homeowners keeping horses on site. At the time of the habitat assessment, the water levels were normal for the dry season. The 100 meter region where the assessment was conducted was characterized by a natural sinuous channel with vegetation maintenance close to the stream bank. Snag, leaf and fine root were the most common productive habitats present. The Habit Assessment resulted in a marginal score of 74. Disruption to the vegetation community was observed in the results of the Linear Vegetation Survey with the Mean CofC score and Percent FLEPPC metrics both failing. Double Branch Creek met the metrics for the rapid periphyton survey with 5% of samples being ranked between 4 and 6 due in part to the moderate canopy coverage in the region. The recent water quality record for Double Branch Creek showed elevated concentrations of Total Phosphorous and inconclusive Chlorophyll-a corrected values. The results of the SCI sampling indicate that the stream is "healthy" based on the macroinvertebrate community. Table 8 summarizes the results of the nutrient sampling, floristic sampling, habitat assessment and SCI.

*Table 8 Summary of Water Quality, Floristic Surveys and Habitat Assessments*

| Measure | | Double Branch Creek | 2020 | 2021 | 2022 | Threshold |
|---|---|---|---|---|---|---|
| **Total Phosphorous (mg/l)** | | | 0.126 | 0.120 | 0.062 | < 0.49 |
| **Total Nitrogen (mg/l)** | | | 0.979 | 1.016 | 1.073 | < 1.65 |
| **RPS (% Rank 4-6)** | | 5% | | | | < 25% |
| **LVS** | **Avg C of C** | 0.16 | | | | ≥ 2.5 |
| | **FLEPPC %** | 92.3% | | | | < 25% |
| **Chlorophyll-a Corrected (µg/l)** | | | 2.25 | 3.09 | 3.78 | < 20 µg/l |
| **Habitat Assessment** | | 74 | | | | > 34 |
| **SCI** | | 59 | | | | > 34 |