STREAM ECOSUMMARY

Mormon Branch, WBID 2905

Marion County

February 15, 2018 and February 11, 2019



Figure 1. Sampling reach along Mormon Branch in Marion County.

Physical, chemical, and biological sampling was conducted at Mormon Branch (WIN G2CE0052, SBIO MRMNBRANCH) in Marion County on February 15, 2018 and February 11, 2019 by the DEP, Division of Environmental Assessment and Restoration (DEAR), Central Regional Operations Center. This stream was sampled as part of the DEP Ecoregional Reference Stream Survey, which was designed to provide baseline information about the state's highest quality streams and to monitor the water quality and biological community health of these streams through time**.** Overall, the water quality and macroinvertebrate community data indicated that the stream met expectations for a healthy, well-balanced stream.

Background

Healthy, well-balanced stream and river communities may be maintained with some level of human activity, but excessive human disturbance may result in waterbody degradation. Human stressors may include increased inputs of nutrients, sediments, and/or other contaminants from watershed runoff, adverse hydrologic alterations, undesirable removal of habitat or riparian buffer vegetation, and introduction of nuisance (generally exotic) plants and animals. DEP evaluates if human activities have resulted in the condition where a waterbody has exceeded applicable water quality criteria (Chapter 62-302, Florida Administrative Code), including whether adverse impacts to biological communities have occurred. DEP water quality criteria are designed to protect designated uses of the waters of the state (*e.g.,* recreation, aquatic life use support), and exceedances of these criteria are associated with interference with the designated use. Additionally, DEP evaluates the health of floral (plants and algae) and faunal (animal) communities and conducts habitat assessments to diagnose potential physical impacts.

Site Description

The Mormon Branch sampling location (Figure 1) is located in the Ocala National Forest in the Juniper Creek Watershed (WBID 2905, Figure 2). A small third

magnitude spring, consisting of numerous sand boils, feeds it before it runs under Highway 19 and eventually into Juniper Creek. It is a first order stream draining the Central Florida Ridges and Uplands Subecoregion, a subecoregion of the Southern Coastal Plain ecoregion. Mormon Branch has a Landscape Development Intensity (LDI) Index score of 1.14. The LDI is calculated for the 100 m buffer of the waterbody for 10 km upstream of the point of interest. The LDI quantifies the intensity of human activity in the surrounding watershed based on land use and land cover and is normalized on a scale from 1 to 10, where a natural land use has a coefficient of 1.0 and a central business district has a coefficient of 10.0. This site's score of 1.14 suggests minimal human activity in the 100 m buffer surrounding the stream. The WBID is not currently listed on the Verified List of Impaired Waters. Additional information about this WBID is available in the Water Quality Assessments, TMDLs, and BMAPs map application (https://fdep.maps.arcgis.com/home/webmap/viewer.html?webmap=1b4f1bf4c9c3481fb2864a415fbeca77).

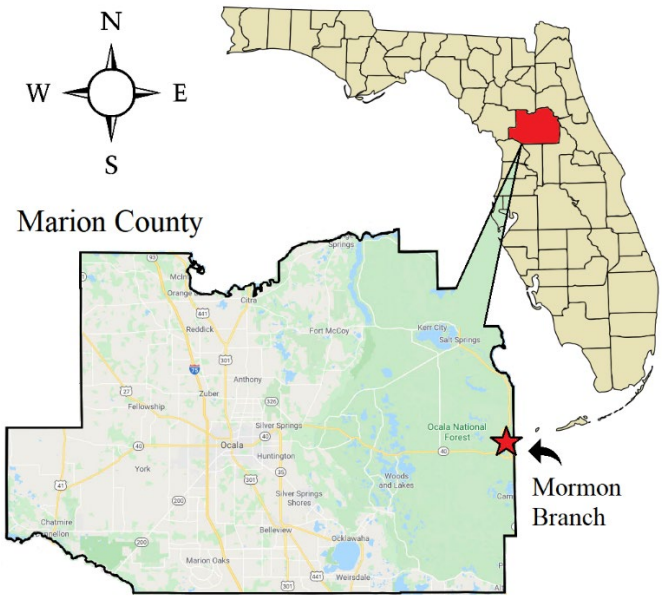


Figure 2. Location of Mormon Branch in Marion County.

Methods

Water Quality

Surface water samples were collected for analysis of alkalinity, turbidity, chloride, color, fluoride, sulfate, total suspended solids, total dissolved solids, *Escherichia coli (E. coli*), chlorophyll, pesticides, herbicides, sucralose, metals, and nutrients following DEP Standard Operating Procedures (SOPs, see https://floridadep.gov/dear/quality-assurance/content/dep-sops for details) and met the requirements of the FDEP Quality Assurance Rule, Chapter 62-160, F.A.C. (https://www.flrules.org/gateway/ChapterHome.asp?Chapter=62-160). Results were compared with applicable Class III water quality criteria contained in 62-302, F.A.C., including nutrients, dissolved oxygen, and other indicators.

Chapter 62-302.531, F.A.C., provides that Numeric Nutrient Criteria are achieved in streams if: Information on chlorophyll *a* levels, algal mats or blooms, nuisance macrophyte growth, and changes in algal species composition do not indicate an imbalance in flora or fauna; AND EITHER

The average score of at least two temporally independent Stream Condition Indices (SCIs) is 40 or higher, with neither of the two most recent SCI scores less than 35, OR

The nutrient thresholds (expressed as annual geometric means) are not exceeded more than once in a three-year period. The nutrient thresholds are region-specific. This sampling site is in the Peninsula nutrient region. The floral and faunal measures are described below.

Dissolved Oxygen

Rule 62-302.533 (1), F.A.C., states that no more than 10 percent of the daily average percent dissolved oxygen (DO) saturation values shall be below 67 percent in the Panhandle West bioregion, 38 percent in the Peninsula and Everglades bioregions, or 34 percent in the Northeast and Big Bend bioregions. This site is in the Peninsula region for DO criteria assessment. Percent saturation incorporates factors

such as temperature, atmospheric pressure, and salinity.

The daily average freshwater DO criteria is preferentially assessed using daily average values calculated from full days of diel (collected over a 24 hour period) monitoring data. If diel monitoring data are not available (as was the case for this report), instantaneous samples are used to assess the DO criterion by comparing the instantaeous value with a time-of-day-specific translation of the daily average criterion (subsection 62-303.420(9), F.A.C.).

Habitat Assessment

The Stream and River Habitat Assessment was conducted per DEP SOP FT 3100. The Habitat Assessment is a rapid field method in which a sampler scores eight in-stream and riparian components to estimate the influence of habitat factors on the resident aquatic organisms. Habitat Assessment scores range from 11-160 and overall habitat quality is assigned to one of four categories: Optimal (120-160 points), Suboptimal (80-119 points), Marginal (40-79 points), and Poor (11-39 points).

Floral Assessment

Evaluations of stream flora include the Rapid Periphyton Survey (RPS, DEP SOP FS 7230), community composition information associated with dominant algal taxa (where applicable), Linear Vegetation Survey (LVS, DEP SOP 7320), and chlorophyll *a*. The RPS assesses the extent and thickness of algae in the stream reach, while the LVS assesses how closely the in-stream plant community resembles a minimally disturbed condition. Results are assessed as described beginning on page 8 of "*Implementation of Florida's Numeric Nutrient Standards*," dated April 2013, using evidentiary thresholds derived from a population of minimally disturbed reference sites.

Faunal Assessment

The Stream Condition Index (SCI) assesses how closely the macroinvertebrate community (*e.g.*, aquatic insects, clams, crayfish) of a stream resembles the macroinvertebrate community of an undisturbed or "reference" condition. The SCI was sampled and calculated per DEP SOP SCI 1000. For the SCI, ten measures of macroinvertebrate health are calculated and summed to yield a final score from 0-100. Average SCI scores ≥ 40 are considered "Healthy" (as long as neither of the latest two SCI scores were < 35) with scores ≥ 64 considered "Exceptional." The SCI is part of the numeric nutrient standard for streams, as described above, and serves as a biological health assessment tool in Chapter 62-303, F.A.C., DEP's Impaired Waters Rule.

Evaluation of Stream Exclusions for Applying Nutrient Criteria

When assessing a stream for compliance with numeric nutrient criteria (NNC) in Rule 62-302.531, F.A.C., it is important to note that several waterbody types are excluded from the stream definition in Rule 62-302.200(36), F.A.C. These include lake-like portions of rivers (where the lake NNC apply) and ditches/canals used for water management purposes, non-perennial streams, wetlands, and tidally fluctuating areas (where the narrative criterion, "no imbalances in natural populations of aquatic flora or fauna," continues to apply). The NNC in Rule 62-302.531, F.A.C., were applicable to Mormon Branch.

Results

Water Quality

The water quality results are shown in Table 1. Based on the laboratory results, water quality criteria were not exceeded for any of the parameters. Pesticides, herbicides and sucralose were not detected during either sampling event.

NNC Threshold Assessment

Based on these two sampling events, the stream met the numeric nutrient thresholds for the Peninsula Bioregion; however, the thresholds represent annual geometric mean concentrations (minimum of four samples) not to be exceeded more than once in any three calendar year period, and are used in combination with floral and faunal information. Therefore, even though the thresholds were not exceeded, additional nutrient sampling may be needed to meet data sufficiency requirements to

calculate and assess attainment of the water quality standard.

Floral Assessment

Results of the floral metrics show that this site is within the reference stream distribution and therefore attains the floral component of the NNC (Table 2). All floral measures must pass for the stream to attain the NNC.

Table 1. Water quality results from February 15, 2018 and February 11, 2019 at Mormon Branch.

Analyte	Result 2/15/18	Result 2/11/19	Applicable Class III Water Quality Criteria
Field Temperature (°C)	19.8	20.7	N/A
Field pH (SU)	7.1	7.2	Within 1 unit of natural background
Field Dissolved Oxygen (% saturation)	79	80	*38 % for 2/15/18, 44% for 2/11/19
Field Specific Conductance (µmhos/cm)	195	199	50% above background or 1275, whichever is greater
Alkalinity (mg $CaCO_3$/L)	49	50	Shall not be depressed below 20 (or if natural alkalinity is low, shall not be reduced by more than 25%)
Color (PCU)	84	53 A	N/A
Total Phosphorus (mg/L) as P	0.03	0.03	0.12
Nitrate+Nitrite (mg/L) as N	0.01 I	0.01	0.35 for spring vents only
Ammonia (mg/L) as N	0.004 I	0.002 I	***4.59 for 2/15/18, 4.11 for 2/11/19
Total Kjeldahl Nitrogen (mg/L) as N	0.19 I	0.12 I	N/A
Total Nitrogen (mg/L) as N	0.20	0.13	1.54

* Instantaneous DO criterion calculated per DO Saturation Calculator and adjusted for time of day.

** Annual geometric numeric nutrient threshold for Peninsula nutrient region, used in combination with information on flora and fauna.

*** Total ammonia criterion calculated per Total Ammonia Nitrogen Calculator, for single sample maximum.

A Qualifier: Value reported is the arithmetic mean (average) of two or more determinations.

I Qualifier: The reported value is greater than or equal to the laboratory method detection limit but less than the laboratory practical quantitation limit.

Table 2. Floral and faunal assessment results from February 15, 2018 and February 11, 2019 at Mormon Branch.

Floral/Faunal Metric	Evidentiary Threshold of No Imbalances	Result 2/15/18 Sample 78235	Result 2/11/19 Sample 79203
LVS C of C	Site average ≥ 2.5	4.4	4.9
LVS FLEPPC (%)	Site average ≤ 25%	0	0
RPS (%)	≤ 25% rank 4-6 (algae > 6 mm thick) coverage. If 20 to 25 % rank 4-6 coverage, evaluate algal species	8	6
Chlorophyll *a* (corrected; µg/L)	< 3.2 ug/L. If 3.2 to 20 ug/L, site specific evaluation	0.55 U	0.99 I
Algal Community Composition	No adverse shifts in dominant taxa	N/A*	N/A*
SCI	Average ≥ 40	78	72

*Periphyton not collected due to RPS results =<20% cover.

U Qualifier: Material was analyzed for but not detected. The reported value is the method detection limit for the sample analyzed

Habitat Assessment

The stream and river habitat assessment scores were 119 on February 15, 2018, which is the highest score in the suboptimal range, and 123 on February 11, 2019, which is in the optimal range. The typical velocity measured was 0.21 m/s, which resulted in a suboptimal score for stream flow. Fish and aquatic insects require enough water velocity to maintain high dissolved oxygen concentrations in the stream; in this case the dissolved oxygen was 79-80% saturation. The average width within the assessment stretch was 4 meters. The banks were well-armored and low with a gradual slope, providing a good connection with the surrounding floodplain. The bank stability scores, as a result, were in the optimal range for both sampling events. Four major productive habitats were noted: woody debris/snags, undercut banks/tree roots, aquatic vegetation, and leaf packs, which comprised roughly 3.6% of the stream area. Aquatic macrophytes are generally sparse in the stream, making them a less productive habitat (Figure 3). Snags/woody debris provided the bulk of the productive habitat on both sample dates (Figure 4).



Figure 3. Example of typical aquatic macrophyte in Mormon Branch, *Nasturtium floridanum*, showing some periphyton smothering.



Figure 4. Example of a snag in Mormon Branch, showing some sand smothering.

Faunal Assessment (SCI)

The average SCI score for this site for these two samples was 75 out of a possible 100 points, corresponding with an "exceptional" designation (Table 2). These results are within the range of previous scores for this site, which ranged from 56 to 92 from 2011-2019. (Table 3). SCI scores at Mormon Branch are generally expected to be high due to its designation as a reference stream and minimal human disturbance at the site. While some periphyton and sand smothering was observed, it did not appear to negatively affect the productivity.

Table 3. SCI scores at Mormon Branch, 2011-2019.

Date	SCI Score
5/23/2011	74
4/17/2012	87
4/11/2013	83
12/11/2015	56
7/6/2016	64
12/7/2016	92
2/15/2018	78
2/11/2019	72
12/12/2019	61

Conclusions

Sampling at Mormon Branch indicates that the stream met applicable State Water Quality Criteria.

Habitat Assessment data indicated a near optimal physical condition of the creek with little disturbance in the watershed. Stream Condition Index data indicated the presence of a "healthy" macroinvertebrate community with sensitive and long-lived taxa that are indicative of good water quality conditions. The Linear Vegetation Survey and Rapid Periphyton Survey indicated vascular plant and algal communities, respectively, that are consistent with expectations for minimally disturbed sites.

Thank you for your interest in maintaining the water quality of Florida's aquatic resources. Please contact us if you have any questions.

Contact and resources for more information

Kathryn March
407-897-4174
kathryn.w.march@floridadep.gov

DEP biological assessment resources:
https://floridadep.gov/dear/bioassessment

Freshwater Algal Bloom information:
https://floridadep.gov/dear/algal-bloom