STREAM ECOSUMMARY

Econfina Creek at Scott Road

Bay County, WBID 553

January 22, 2015 and February 9, 2017



Figure 1. Econfina Creek above Scott Road in Bay County, February 9, 2017.

Physical, chemical, and biological sampling were conducted at Econfina Creek (STORET 32030023, Nickname EconSctRef) in Bay County on January 22, 2015, and February 9, 2017, by members of the Aquatic Ecology and Quality Assurance section of the DEP Tallahassee Office. 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. The water quality and macroinvertebrate community data indicated that the stream met all water quality standards and the 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 water quality criteria (Chapter 62-302, Florida Administrative Code), including whether adverse impacts to biological communities have occurred. DEP water quality standards are designed to protect designated uses of the waters of the state (*e.g.,* recreation, aquatic life use support), and exceedances of these standards 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

Econfina Creek at Scott Road (Figure 1) is about 30 miles north of Panama City in the Choctawhatchee – St. Andrew Watershed (WBID 553, Figure 2). The creek is a fourth order stream at Scott Bridge draining the Dougherty Plains, a sub-ecoregion of the Southeastern Plains ecoregion. Econfina Creek flows into Deer Point Lake and eventually into the North Bay of St. Andrews Bay. Econfina Creek has a Landscape Development Intensity (LDI) Index score of 1.62. The LDI quantifies the intensity of human activity in the surrounding area 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 1.62 suggests minimal human activity in the 100m buffer surrounding the stream. The WBID is not listed for any

parameters on the most recent Impaired Waters Verified List (10/21/16).

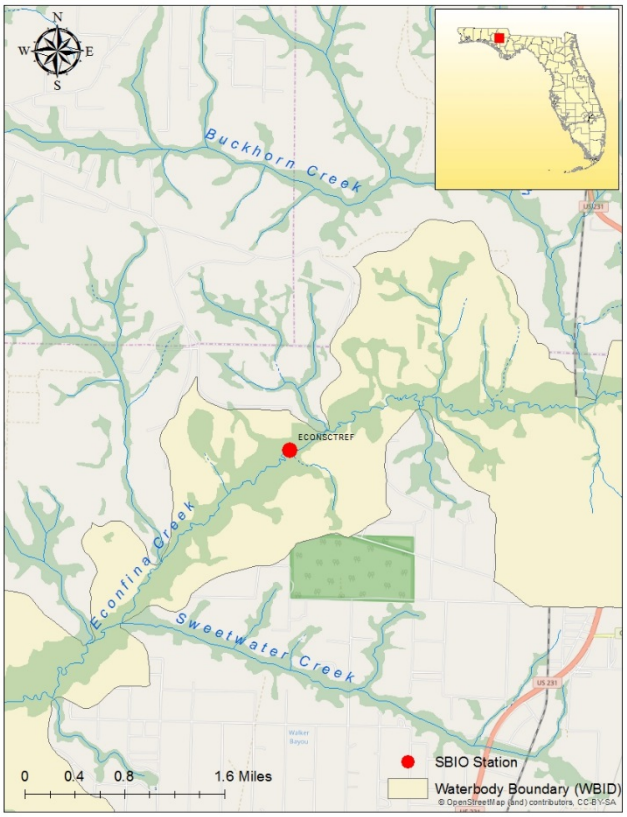


Figure 2. Sampling location on Econfina Creek in Bay County.

Methods

Water Quality

Surface water samples were collected for chlorophyll-*a*, turbidity, alkalinity, color, ammonia, nitrate+nitrite, total phosphorus, total Kjeldahl nitrogen, microbiological indicators, total organic carbon, total dissolved solids, and total suspended solids. All sampling followed DEP Standard Operating Procedures (SOPs, see http://www.dep.state.fl.us/water/sas/sop/index.htm 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 Index samples (SCIs) is 40 or higher, with neither of the two most recent SCI scores less than 35, OR the numeric nutrient thresholds (expressed as annual geometric means; Table 1) are not exceeded more than once in a three-year period. The numeric nutrient thresholds are region-specific. This sampling site is in the Panhandle West nutrient region. The floral and faunal assessments 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 bioregion, which includes the Econfina Creek. Use of percent DO saturation factors in 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 instantaneous value with a time-of-day-specific translation of the daily average criterion (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. Some growth of algae (typically diatoms) is expected in a fully functioning stream, but an overabundance of algae (especially filamentous algae) may reduce habitat quality (from smothering) and lead to excess organic matter production (and decomposition), which can harm fish and invertebrates. 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 (see Table 2).

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 was < 35) with scores ≥ 64 considered "Exceptional." The SCI is part of the NNC evaluation for streams, as described above, and serves as a biological health assessment tool in 62-303, F.A.C., DEP's Impaired Waters Rule.

As one of the original Ecoregional Reference Sites, this location has been sampled for the Stream Condition Index (SCI) 24 times between 1992 and 2017. The SCI_1992 version was applied for the first ten samples, all of which received a score in the "Excellent" range. A single SCI_2004 sample was considered "Good." The three most recent samples, done with the latest SCI_2012 version, were considered "Exceptional" with an average score of 83 points. This report focuses on the two most recent samples as they represent current conditions at the site.

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 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). Econfina Creek is a natural stream, and does not fall into any of the above categories; therefore, the NNC in Rule 62-302.531, F.A.C., were applicable to Econfina Creek.

The water quality results are shown in Table 1. Based on these sampling events, the stream met the nutrient thresholds for the Panhandle West; 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.

Results

Water Quality

The water quality results are shown in Table 1. Recent rains prior to the February 9, 2017 sampling event resulted in higher water levels (1.2m vs. 0.6m), color, specific conductance, organic carbon, and total dissolved solids from surrounding lands compared to corresponding levels on January 22, 2015 (Table 1). There were no exceedances of applicable Class III Water Quality Standards.

NNC Threshold Assessment

Based on these sampling events, the stream met the nutrient thresholds for the Panhandle West; 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.

Habitat Assessment

The average stream and river habitat assessment score for the two sampling events was 130, which is in the mid-Optimal range. Typical velocity measured 0.33 m/s, which resulted in an optimal score for stream flow. Fish and aquatic insects require high dissolved oxygen concentrations, which are maintained by sufficient water velocity in a stream. For the 2015 and 2017 sampling events, the dissolved oxygen measured 96% and 91% saturation, respectively. The average width within the assessment stretch was 6 meters. The banks were well-armored, but relatively steep, potentially leading to instability during high flow events (Figure 3). The bank stability scores, as a result, were in the marginal range. Three productive habitats were noted: woody debris, leaf packs, and roots, which together comprised roughly 5% of the stream area.



Figure 3. Steam-bank along the Econfina Creek, February 9, 2017.

Table 1. Water quality results from January 22, 2015, and February 9, 2017, at Econfina Creek.

Analyte	Result 1/22/15	Result 2/9/17	Applicable Class III Water Quality Criteria
Field Temperature (°C)	12.6	21.9	N/A
Field pH (SU)	4.61	4.46	Within 1 SU of natural background
Field Dissolved Oxygen (% saturation)	96	91	*70%
Field Specific Conductance (µmhos/cm)	34	19.7	50% above background or 1,275 µmhos/cm, whichever is greater
Color (PCU)	67	96	N/A
Total Dissolved Solids (mg/L)	27	34	N/A
Total Organic Carbon (mg/L)	5.6	8.6	N/A
Total Phosphorus (mg/L) as P	0.004 I	0.007	**Panhandle West: 0.06 mg/L
Nitrate+Nitrite (mg/L) as N	0.049	0.022 I	0.35 mg/L for spring vents only
Ammonia (mg/L) as N	0.008	0.003 I	***
Total Kjeldahl Nitrogen (mg/L) as N	0.2	0.31 I	N/A
Total Nitrogen (mg/L) as N	0.0.25	0.33	*Panhandle West: 0.67 mg/L

* Instantaneous DO criterion calculated per DO Saturation Calculator.
** Annual geometric numeric nutrient threshold for Panhandle West nutrient region, used in combination with information on flora and fauna.
*** Total ammonia criterion calculated per Total Ammonia Nitrogen Calculator.
I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

Floral Assessment

The results of the floral survey from January 22, 2015 are shown in Table 2. Due to the elevated water level during the February 2, 2017 event, a RPS survey was not conducted, however, according to the Physical-Chemical Characterization Field Sheet, no attached

periphyton was observed in the stream during sampling. A second sample is required to confirm the findings, but the results of the January 22, 2015 sampling event and observations in February 9, 2017, indicate that the stream achieves the floral component of the NNC. The stream was moderately to heavily shaded, so thick algae growth would not be expected. No aquatic plants were observed during either sampling event; thus, the site also achieves the LVS component of the NNC floral metrics.

Table 2. Biological assessment results from January 22, 2015, and February 9, 2017, at Econfina Creek.

Floral/Faunal Metric	Evidentiary Threshold of No Imbalances	Result 6/25/14 Visit ID 73135	Result 5/4/16 Visit ID 76155
LVS C of C	Site average ≥2.5	Pass (<2m^2)	Pass (<2m^2)
LVS FLEPPC (%)	Site average ≤25%	Pass (<2m^2)	Pass (<2m^2)
RPS (%)	≤ 25% rank 4-6 (algae > 6 mm thick) coverage. If 20 to 25 % rank 4-6 coverage, evaluate algal species	0	-
Chlorophyll *a* (corrected; µg/L)	< 3.2 µg/L. If 3.2 to 20 µg/L, site specific evaluation	0.99	0.93
Algal Community Composition	No adverse shifts in dominant taxa	N/A	N/A
SCI	Average ≥ 40	87	84

Stream Condition Index (Fauna)

The average SCI score for this site was 86 out of a possible 100 points, corresponding with an "Exceptional" designation (Table 2). In the January 22, 2015, SCI sample, 20 sensitive taxa were identified including the mayfly, *Eurylophella doris*, which was the dominant taxon. The black fly, *Simulium jonesi*, was the dominant taxon, and was one of 18 sensitive taxa in the February 9, 2017, sample.

Conclusions

Econfina Creek meets applicable State Water Quality Criteria. Habitat Assessment data indicated a near optimal physical condition 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 did not indicate nuisance vascular plant or algal growth due to nutrients.

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

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DEP biological assessment resources:
http://www.dep.state.fl.us/water/bioassess/index.htm