STREAM ECOSUMMARY

Lloyd Creek, WBID 791A

Jefferson County

April 10, 2024 and April 23, 2025

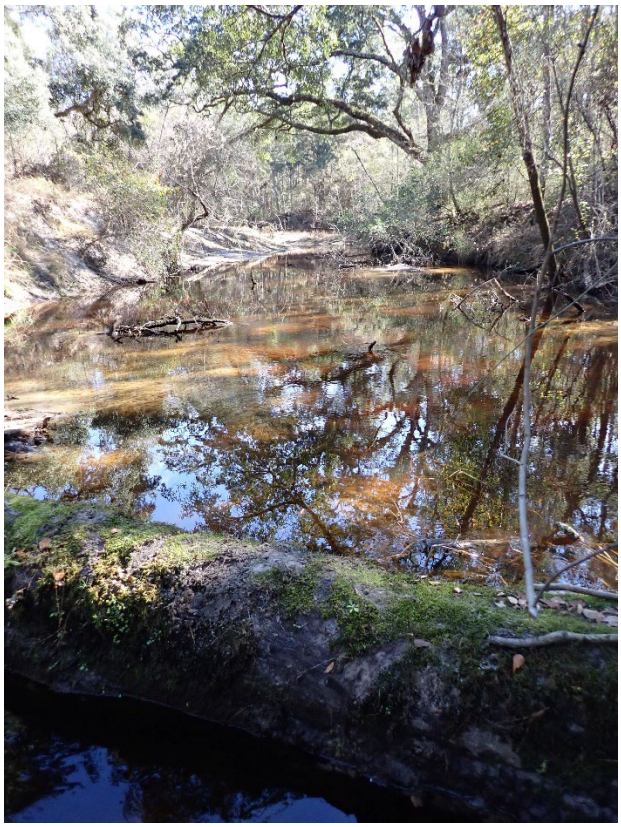


Figure 1. Sampling reach along Lloyd Creek in Jefferson County.

Physical, chemical, and biological sampling was conducted at Lloyd Creek (WIN 22030061, SBIO Lloyd*Ref) in Jefferson County on April 10, 2024, and April 23, 2025, by the DEP Division of Environmental Assessment and Restoration (DEAR), Aquatic Ecology and Quality Assurance Section (AEQAS). 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 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 [F.A.C.]), 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 Lloyd Creek sampling location (Figure 1) is located near the western boundary of Jefferson County in the Lloyd Creek Watershed (WBID 791A, Figure 2) within

the Ochlockonee-St.Marks Basin. The Lloyd Creek sampling location is a third order stream draining the Tifton Upland/Tallahassee Hills subecoregion, a subecoregion of the Southern Coastal Plain ecoregion Lloyd Creek forms when Lang Branch and Cuba Branch combine. Approximately 8 miles from that confluence, Lloyd Creek flows into Lake Miccosukee. Lloyd Creek has a Landscape Development Intensity (LDI) Index score of 1.42. 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 1.42 suggests minimal human activity in the 100m buffer surrounding the stream. The WBID is not currently listed for any parameters on the Impaired Waters Verified List. Additional information about this WBID is available in the Water Quality Assessments, TMDLs, and BMAPs application: (https://fdep.maps.arcgis.com/home/webmap/viewer.html?webmap=1b4f1bf4c9c3481fb2864a415fbeca77).

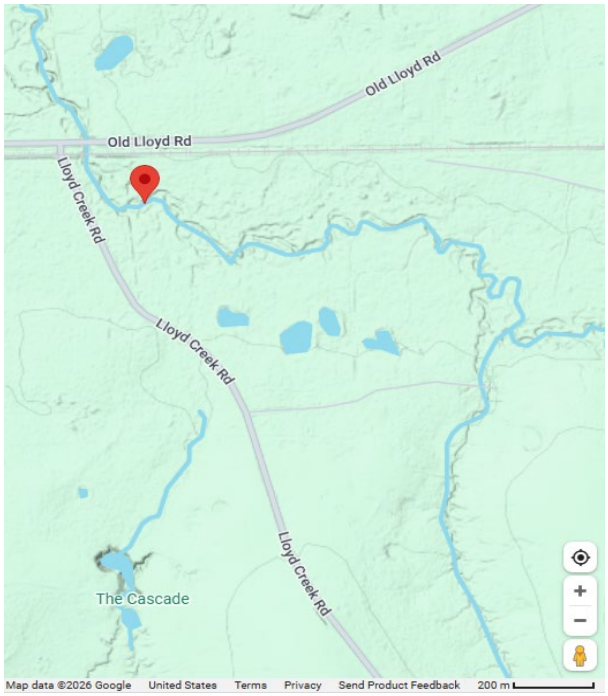


Figure 2. Location of Lloyd Creek in Jefferson County.

Methods

Water Quality

Surface water samples were collected for analysis of alkalinity, turbidity, chloride, color, fluoride, sulfate, total dissolved solids, total suspended solids, nutrients, chlorophyll, *Escherichia coli* (*E. coli*), pesticides, herbicides, sucralose, and metals 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 Panhandle East nutrient region. The floral and faunal measures are described below.

*Dissolved Oxygen*Subsection 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, 38 percent in the Peninsula and Everglades bioregions, or 34 percent in the Northeast and Big Bend bioregions. This site is in the Big Bend 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 up 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 Lloyd Creek.

Results

Water Quality

The water quality results are shown in Table 1. The field dissolved oxygen result for 2024 (101.0) was J-qualified due to the meter failing the post-trip continuing calibration verification for dissolved oxygen. Historically, the average alkalinity at Lloyd Creek is 14.9. Thus, while 16 and 18 $CaCO_3$/L is below the water quality standard value of 20 $CaCO_3$/L, the system's historic alkalinity levels indicate alkalinity values below 20 $CaCO_3$/L may be due to natural conditions. Total Phosphorus is right at the threshold but does not exceed the criteria. The remaining water quality parameters do not exceed the water quality criteria.

NNC Threshold Assessment

Based on these two sampling events, the stream met the numeric nutrient thresholds for the Panhandle East; 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. There were no instances of attached algae during the 2024 or 2025 sampling events. No aquatic plants were observed and chlorophyll a was not detected during either sampling event. The site achieves the RPS, LVS, and phytoplankton chlorophyll *a* components of the NNC.

Table 1. Water quality results from 4/10/24 and 4/23/25 at Lloyd Creek.

Analyte	Result 4/10/24	Result 4/23/25	Applicable Class III Water Quality Criteria
Field Temperature (°C)	18.3	19.4	N/A
Field pH (SU)	6.59	7.19	Within 1 unit of natural background
Field Dissolved Oxygen (% saturation)	101.0 J	89.5	*35.98% (2024), 31.95% (2025)
Field Specific Conductance (µmhos/cm)	62.2	66.9	50% above background or 1275, whichever is greater
Alkalinity (mg $CaCO_3$/L)	16	18	Shall not be depressed below 20 (or if natural alkalinity is low, shall not be reduced by more than 25%)
Color (PCU)	110	95	N/A
Total Phosphorus (mg/L) as P	0.17	0.18	** 0.18
Nitrate+Nitrite (mg/L) as N	0.30	0.23	0.35 for spring vents only
Ammonia (mg/L) as N	0.021	0.021	***5.86 (2024), 4.50 (2025)
Total Kjeldahl Nitrogen (mg/L) as N	0.41	0.33	N/A
Total Nitrogen (mg/L) as N	0.71	0.56	** 1.03
E. coli Bacteria (MPN/100 mL)	160.7	160.7	≤ 410 Count/100 mL

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

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

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

J: Estimated value.

Table 2. Floral and faunal assessment results from 4/10/24 and 4/23/25 at Lloyd Creek.

Floral/Faunal Metric	Evidentiary Threshold of No Imbalances	Result 4/10/24 Sample 88606	Result 4/23/25 Sample 90708
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	Pass	Pass
Chlorophyll *a* (corrected; µg/L)	< 3.2 µg/L. If 3.2 to 20 ug/L, site specific evaluation	0.93 U	1.3 U

Algal Community Composition	No adverse shifts in dominant taxa	N/A	N/A
SCI	Average ≥ 40	69	77

U: 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 113 and 123, which are in the Suboptimal and Optimal ranges. The typical velocity measured was 0.21 m/s and 0.25 m/s, which resulted in a suboptimal score for stream flow both years. Fish and aquatic insects require sufficient water velocity to maintain high dissolved oxygen concentrations in the stream; in this case the dissolved oxygen was 89.5% saturation in 2024 and 101% saturation in 2025; however, dissolved oxygen was J qualified in 2025. The average width within the assessment stretch was 6 m. The right bank was well-armored, but relatively steep, leading to instability and erosion during high flow events. The left bank was not as well-armored but had a more gradual slope, providing a good connection with the floodplain. The bank stability scores, as a result, were in the suboptimal and marginal ranges. Three major productive habitats were noted: roots, leaves and snags which comprised roughly 6.5% of the stream area. Sand and silt smothering were observed during both sampling events.



Figure 3. Example of the differences between the right and left banks. This photo is positioned from upstream to downstream (right bank on left, left bank on right).

Floral Assessment

The Linear Vegetation Survey (LVS) is considered to pass if there are <2m2 of vegetation in the 100m stream stretch. The Rapid Periphyton Survey (RPS) is considered to pass if algal abundance and periphyton smothering observations show a low amount of algae in the 100m stream stretch. Lloyd Creek had both <2m2 of vegetation and minimal periphyton presence on both sampling dates.

Faunal Assessment (SCI)

The average SCI score for this site was 73 out of a possible 100 points, corresponding with an Exceptional (≥64) designation (Table 2). These results are within the range of the previous scores for this site, which are 69 – 92. SCI scores at Lloyd Creek are generally expected to be high due to its designation as a reference stream and the minimal human disturbance at the site. This site does have some sand and silt smothering, but it has minimal algae. Despite the minimal substrate availability, there is good substrate diversity and water velocity that allows macroinvertebrates to inhabit this stream.

Conclusions

Sampling at Lloyd Creek indicates that the stream met applicable State Water Quality Criteria.

Habitat Assessment data indicated 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

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

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