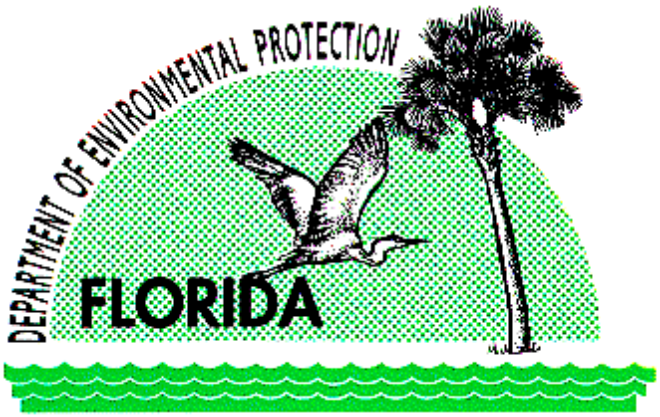


Biological Reconnaissance of

Solite, Jacksonville

Clay County

Sampled January 1998

March 1998

Bureau of Laboratories
Division of Administrative and Technical Services

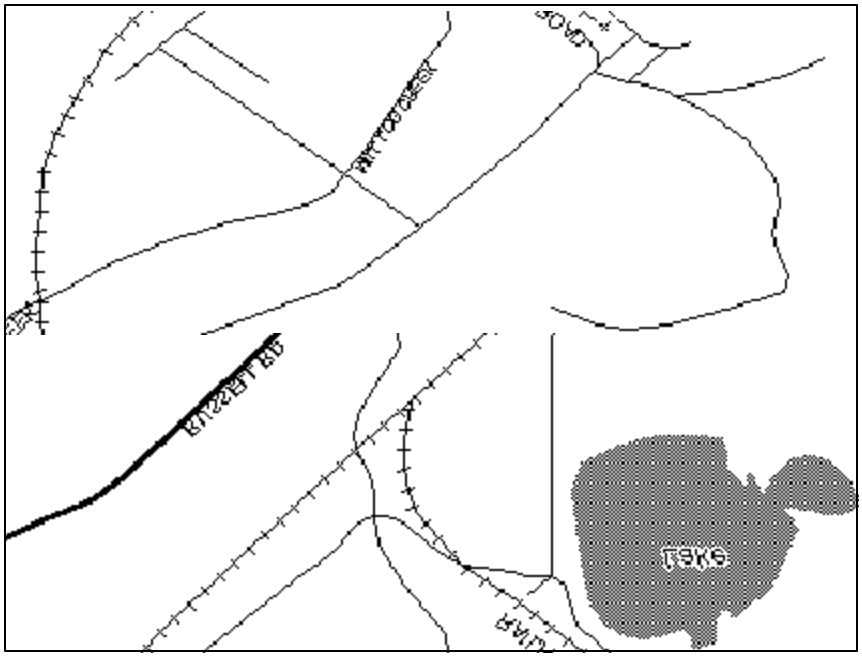
Comprehensive Quality Assurance Plan No. 870346G

Ecological Study at Solite, Jacksonville

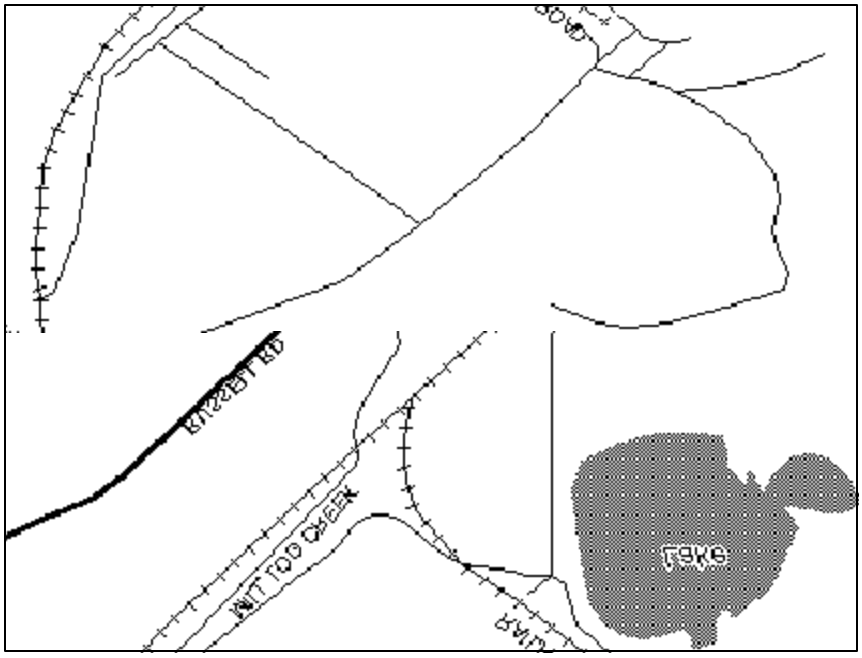
Executive Summary

Department staff conducted an ecological study at Solite Jacksonville to determine potential adverse effects on Mill Log Creek from surface run-off. Due to the dredge and fill activities associated with the observed re-routing of Mill Log Creek near the facility, a subsequent investigation by the FDEP Bureau of Submerged Lands and Environmental Resources appears warranted.

While the reference site passed all three of the Bio-recon metrics, the test site, with a very low EPT score, passed only two out of three. The filter-feeding trichopteran, *Cheumatopysche* sp., was very common at the reference site, but not found at all downstream of the Solite discharge. The mayfly, *Caenis* sp. was collected at the reference site but not at the test site. This decrease in the EPT Index, with the Solite discharge as the only major difference between the two sampling stations, suggests the possibility that some past or present component of the discharge may have eliminated these taxa. A more comprehensive ecological assessment would be valuable in further interpreting effects from the discharge.



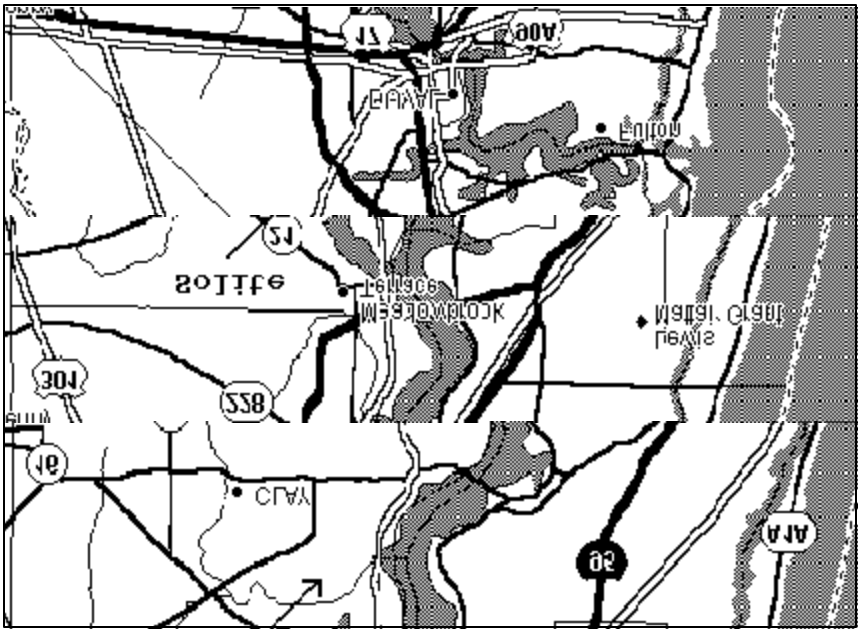
Map 1: Mill Log Ck as it appears on area maps



Map 2: Mill Log Ck as observed during assessment

Introduction

Map 3: Overview of Area



Florida Solite is located in Clay County, Florida (see Map 3). The facility is currently inactive, but has historically produced aggregate materials. Black Creek forms a portion of the northern boundary of the facility. Mill Log Creek, a tributary of Black Creek, flows northward, through the western portion of the facility. Although older maps of the area indicate Mill Log Creek bisects the western segment of the facility, on-site observations and recent maps indicate that substantial portions of the creek have been re-routed (see maps on previus page). This issue may require further investigation by the FDEP Bureau of Submerged Lands and Environmental Resources.

The site contains a variety of solid waste management units (*e.g*., a surface water runoff ditch, an overflow pond, scrap areas, a drum burial area, two brick disposal areas, a septic tank drain field, etc.). Also located within the property boundary of Florida Solite is another closed facility, referred to as the Oldover site. During a previous investigation of the Oldover site in April, 1990, sediments taken from a scrubber pond exceeded the EP toxicity limit for lead. Naphthalene, ethyldimethylbenzene, and ethylmethylbenzene were also detected. In addition, several hazardous waste constituents have been detected in the sediments at other areas on the facility: ethylbenzene, xylenes, chromium, cadmium, copper, arsenic, barium, lead, selenium, mercury, etc. Volatile organic components (*e.g*., trichloroethene, tetrachloroethene, 1,2-dichlorethene, benzene, toluene, ethylbenzene, xylenes) have been detected in the ground water near a drum burial area (Susan Bland, personal communication).

Contaminants in surface waters and sediments from the above mentioned sources throughout this facility may migrate towards Mill Log Creek, the Black Creek floodplain, and Black Creek. The Florida Department of Environmental Protection's (FDEP) Hazardous Waste Regulation Section requested the FDEP Bureau of Laboratories to visit this site and provide information on the health of the biological community in Mill Log Creek. With this goal in mind, a biological reconnaissance (Bio-Recon) was conducted on January 27, 1998.

Bio-Recon is a screening tool, designed to provide preliminary data on stream systems. Depending upon the outcome of the Bio-Recon, it may be appropriate to follow-up with additional sampling for further evaluation.

Methods

The focus of this investigation was to collect biological, habitat, and physical/chemical information from Mill Log Creek at both a test and reference site. The Benthic macroinvertebrate communities were evaluated by performing biological reconnaissance (Bio-Recon) at this site (FDEP 1996, Biology Section Standard Operating Procedure #BA-29).

For Bio-Recon, invertebrates were collected from multiple substrates (*e.g*., snags, leaf packs, and roots) using four discrete dip net sweeps. The resulting samples were field sorted and brought back to the laboratory for identification under the dissecting microscope. A physical/chemical characterization (FDEP 1996b, BA-17) and habitat assessment (FDEP 1996b, BA-18) were also performed at each study site.

Explanation of Measurements of Community Health

Selected measurements of macroinvertebrate community health were employed to assess a site. These are briefly discussed here.

Habitat Assessment: Seven attributes known to have potential effects on the stream biota were evaluated and scored, with 20 points possible for each factor. Based on the sum of these individual scores, overall habitat quality is assigned to one of four categories: Optimal (105-140 points); Suboptimal

(70-104 points); Marginal (35-69 points); and Poor (0-34 points).

Taxa richness: Stress tends to reduce the number of different types of organisms present in a system, although moderate nutrient enrichment may sometimes be correlated with increased algal taxa richness.

Numbers of pollution sensitive taxa: Some organisms become rare or absent as the intensity or duration of disturbance increases. For example, the Florida Index assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990). A site with a high Florida Index score is considered healthy.

Ephemeroptera/Plecoptera/Trichoptera Index: This index is the sum of the number of EPT taxa present. Higher EPT values are associated with healthier systems.

The following personnel were involved in this investigation: Russel Frydenborg, Rebecca Northup, Tom Frick (FDEP Bureau of Laboratories), and; Susan Bland, Camille Stein (FDEP Hazardous Waste Regulation Section). Taxanomic identification and chemical analysis were conducted by the DEP Central Laboratories' Biology and Chemistry Sections, respectively.

Results and Discussion

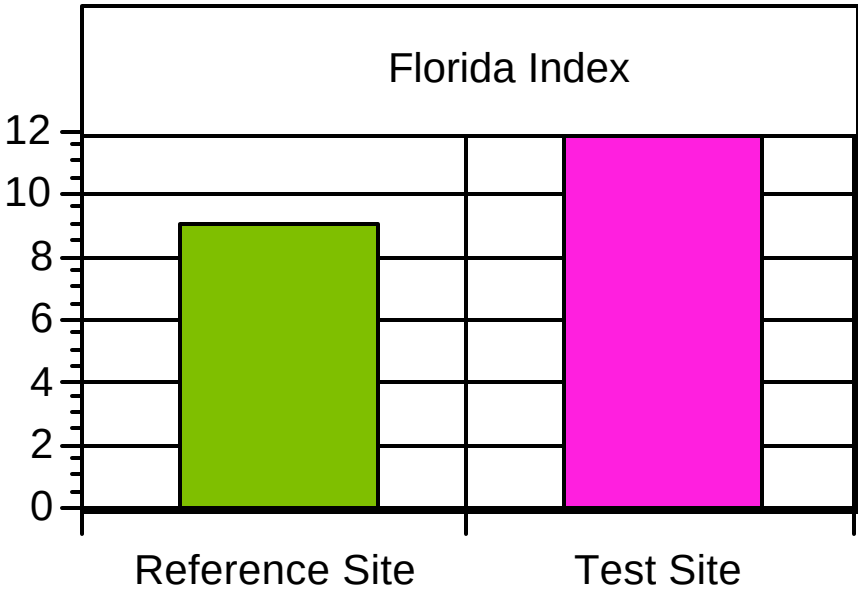
This study's sampling scheme called for the establishment, in Mill Log Creek, of a reference and test site, which bracketed a potentially contaminated intermittent stream. For purposes of this study, the discharge from this potentially contaminated intermittent stream is referred to as the "effluent". Upon arrival at the site, it was observed that Mill Log Creek had been re-routed at a location beginning approximately 75 m downstream of the effluent. At that point, Mill Log Creek is captured by what appear to be mined pits, which are currently choked with aquatic vegetation. The former course of Mill Log Creek is blocked by an extensive dike system, beyond which are a series of ponds. Because of this change in the stream course, the test site was limited to an approximately 50 m segment directly downstream of the effluent, where Mill Log Creek still had measurable water velocity. The dredge and fill activities associated with re-routing the stream may require further investigation by the FDEP Bureau of Submerged Lands and Environmental Resources.

Habitat quality was in the "optimal" category at both test and reference sites (117 and 130 points, respectively). Moderate habitat smothering from the aggregate (pebbles) washing down from the facility site was observed at the test site (see Habitat Assessment sheets in Appendix). During our sampling, there was significant flow entering Mill Log Creek from the facility. Iron/sulfur bacteria was observed in this effluent stream.

There were no major differences in field physical/chemical measurements between the reference and test sites (see Table 1). Dissolved oxygen concentrations, ranging from 8.3 mg/L at the reference site to 10.1 mg/L at the test site, were adequate to support aquatic life. Specific conductance ranged from 102 µmhos/cm at the reference site to 118 µmhos/cm at the test site, while pH (6.6 SU) was identical at both sites.

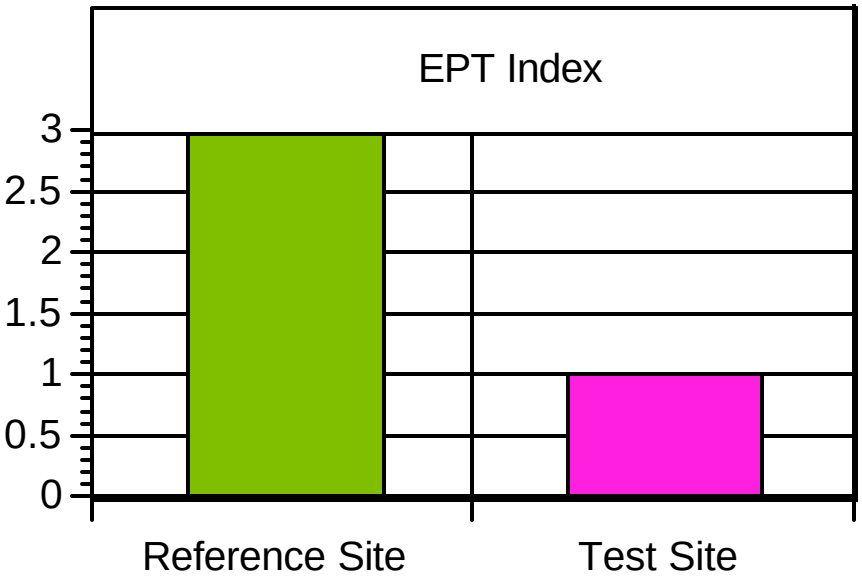
Bio-Recon is a screening tool, utilizing an abbreviated sampling strategy and a purposely limited taxonomic evaluation of the study system. EPT taxa and non-chironomid taxa which receive Florida Index points are emphasized. Bio-Recon appears to be useful in identifying streams where biological health is good, although there is currently limited reference site Bio-Recon data in the northeastern portion of the State. Three measures of community health are calculated from Bio-Recon results (with minimum expected values for Northeastern Florida streams in parentheses): Recon taxa richness (17), Bio-Recon Florida Index (6), and Recon EPT Index (3). Note that the minimum threshold values for these metrics are considered interim, and may be modified as more data are gathered. Currently, if two out of three metrics achieve the minimum thresholds, the





site is considered healthy (FDEP 1996b, #BA-29). If not, the site is suspected to be impaired. Future modifications of the Bio-recon interpretation scheme will probably include the provision that a site must pass all three metrics to be considered healthy.

Macroinvertebrate taxa richness increased from 21 taxa at the reference site to 23 taxa at the test site (Figure 1). Both sites exceeded the current minimum expected threshold for the northeastern Florida. The Florida Index was 9 at the reference site and 12 at the test site. Again, both sites exceeded the expected thresholds. The EPT Index decreased from 3 at the reference site, a marginally low score, to 1 EPT taxon at the test site, which is below the acceptable threshold for this metric. The mayfly, *Labiobaetis* sp. was common at both the reference and test sites. However, the filter-feeding trichopteran, *Cheumatopysche* sp., was very common at the reference site, but not found at all downstream of the Solite discharge. The mayfly, *Caenis* sp. was collected at the reference site but not at the test site. This decrease in the EPT Index, with the Solite discharge as the only major difference between the two sampling stations, suggests the possibility that some past or present component of the discharge may have eliminated these taxa. Additional sampling, including Hester-Dendy and Stream Condition Index methods, would help clarify differences in the benthic populations due to the Solite discharge. Accompanying chemical and toxicological information, such as is typically collected for a 5th year bioassessment, would be valuable in further interpreting potential effects from the discharge.



Conclusions

Due to the dredge and fill activities associated with the observed rerouting of Mill Log Creek near the facility, a subsequent investigation by the FDEP Bureau of Submerged Lands and Environmental Resources appears warranted.

While the reference site passed all three of the Bio-recon metrics, the test site, with a very low EPT score, passed only two out of three. The filter-feeding trichopteran, *Cheumatopysche* sp., was very common at the reference site, but not found at all downstream of the Solite discharge. The mayfly, *Caenis* sp. was collected at the reference site but not at the test site. This decrease in the EPT Index, with the Solite discharge as the only major difference between the two sampling stations, suggests the possibility that some past or present component of the discharge may have eliminated these taxa. Additional sampling, such as is typically collected for a 5th year bioassessment, would be valuable in further interpreting effects from the discharge.

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Ross, L. T. 1990. Methods for aquatic biology. Fla. Dept. Environ. Reg. Tech. Ser. 10(1): 1-47.