EcoSummary

Mill Bayou Creek above Alva Thomas Road

February 27, 2007

FLORIDA AMBIENT

FAIL

BioRecon: A rapid, cost-effective screening mechanism for identification of biological impairment

For samples collected before June 8, 2004
All field and laboratory methods followed FDEP Standard Operating Procedures and met FDEP quality assurance/quality control standards.
For samples collected on or after June 8, 2004
All field and laboratory methods followed FDEP Standard Operating Procedures (SOPs) and met DEP quality assurance/quality control standards.

Purpose



This bioassessment was performed to assess impacts on the biota and wildlife habitat in Mill Bayou Creek from a spill by the Bay County Utility Service (BCUS) water treatment plant (WTP) on Transmitter Road . This monitoring was in response to a request by the FDEP Panama City Branch Office (PCBO). On February 12, 2007 PCBO employees investigated a water quality complaint involving illegal dumping into Mill Bayou Creek. They observed that the stream was dark red with a thick layer of a dark brown substance under the water. The substance was described as similar to "chocolate pudding". The color reminded one of the investigators of ferric sulfate, a coagulant used at wastewater treatment facilities. The discharge was tracked to the BCUS WTP temporary backwash retention pond.

Watershed Characteristics

Mill Creek at the bioassessment site (STORET 32030040) is located about 1.5 miles north of Panama City in Bay County just east of U.S. Highway 231 (N30 degrees 12 minutes 30.1 seconds W85 degrees 36 minutes 2.4 seconds). It is a third order stream draining forest, residential, commercial, and industrial areas in the

Gulf Coast Flatwoods Ecoregion 75a. Its headwaters originate over 2 miles upstream in wetlands above the sample site. Mill Bayou Creek flows into Mill Bayou, North Bay , and St. Andrews Bay before reaching the Gulf of Mexico . Mill Bayou Creek is designated Class III waters for recreation and maintenance of a healthy, well-balanced aquatic community.

Results

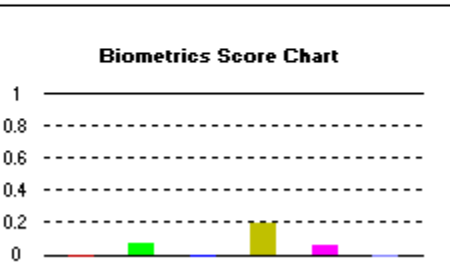
The bioassessment indicated a severely impaired biological community, scoring only 1 out of 10 for the BioRecon Score. All 6 biological indicators failed thresholds established for a healthy aquatic wildlife community:

Biometrics	Metric Score
# TOTAL TAXA	0
# EPHEMEROPTERA TAXA	0.08
# TRICHOPTERA TAXA	0
# LONG-LIVED TAXA	0.2
# CLINGER TAXA	0.06
# SENSITIVE TAXA	0
TOTAL METRIC SCORE :	0.34
/ Correction Factor :	0.6
= BIORECON SCORE :	1

Pass 6 - 10
Fail 0 - 5

MILL BAYOU CREEK ABOVE ALVA THOMAS RD.

BioRegion : Panhandle West
Sample Date : Feb 27, 2007



The macroinvertebrate community consisted of a total of only 9 taxa with only 12 individual organisms collected. Every organism collected in this Mill Bayou Creek sample was kept, and the only 12 macroinvertebrates found in the 100 meter stream reach indicated toxicity and/or sedimentation impacts. Normally in panhandle streams without toxic pollutants, thousands of organisms are collected in a bioassessment of which a representative group of 200 to 300 are brought back to the laboratory for verification. Sedimentation limits productivity by smothering habitat and gills. However, during 78 recent dirt road impact bioassessessments, many with 100% smothering found much high numbers of organisms than found in Mill Bayou Creek. Four biological monitoring reference sites (South Fork Bear Creek, Sandy Creek , Little Crooked Creek, and Econfina Creek) monitored since 1993 are located in Bay County . South Fork Bear Creek, which also flows to North Bay less is than 12 miles northeast of this site up Highway 231 had a typical healthy fish and wildlife community dominated by clean water indicating stoneflies, mayflies, and caddis flies along many darters and shiners.

The Mill Creek Habitat Assessment rated Suboptimal (54%), downgraded by poor conditions of Habitat Smothering (100%), Substrate Diversity (0), and Substrate Availability (0%). Water Velocity, Bank Stability, Right Bank Buffer Zone Width, and

Right Bank Riparian Vegetation Quality rated Suboptimal. Artificial Channelization, Left Bank Riparian Buffer Zone Width, and Left Bank Riparian Zone Vegetation Quality rated Optimal.

The stream channel was completely smothered with slick gel-like red muck sediments that appeared to be ferric sulfate being reduced to a ferrous sulfide material. This muck sediment (0.3-1.0 meters deep in the 3 meter width X 100-meter length bioassessment reach) was anaerobic with hydrogen sulfide/iron odors and covered by flocculent iron/sulfur bacteria. This slippery residue also covered the stream banks as it was deposited during a high water stage. The water was opaque orange (Secchi 0.15 meters) with a metallic iron odor and sheen of iron/sulfur bacteria (Fe/S).

The dissolved oxygen concentration (DO) monitored in a riffle (0.1 meter depth) above Alva Thomas Road at 1515 hours was 5.69 mg/l at 63% saturation. The water temperature was 17.65 degrees centigrade, pH 5.18, and conductivity was 112 umho/cm, elevated about 5 times the normal background of area streams. South Fork Bear Creek at South Fork Bear Creek Road at 1615 hours was clear (Secchi greater than 1 meter) and slightly tannic. The DO was 8.45 mg/l at 86.4% saturation, water temperature 17.57, pH 5.92, and conductivity 21, all typical values of area streams. Periphyton and fish were common and Fe/S bacteria absent in South Fork Bear Creek. This was in contrast to an absence of periphyton, rare fish (1 mosquito fish observed), and an abundance of Fe/S bacteria in this Mill Bayou Creek monitoring site.

Conclusions

This Mill Bayou Creek site did not meet Class III State Water Quality Standards 62-302 for recreation and the propagation and maintenance of a healthy, well-balanced population of fish and wildlife. The spill of ferric sulfate (Fe/S) material used to filter the Panama City potable water supply caused a severely imbalanced biological community and eliminated most of Mill Bayou Creek's fish and wildlife. The pollution load from the chemical treatment material will not only affect Mill Bayou Creek, but will be transported down stream to Mill Bayou, North Bay, and St. Andrews Bay . Nutrients tied up in the Fe/S filter material are expected to cause spring/summer algal blooms that could result in possible fish kills in the estuarine receiving waters. Iron is a contributor to Red Tide blooms in marine waters. High concentrations of iron can disrupt cell membranes and damage DNA of aquatic animals and plants. Iron/sulfur bacteria and the associated precipitated iron smother the gills of fish and wildlife. Sulfate will break down to hydrogen sulfide (rotten egg odor) creating sediment conditions toxic to fish and wildlife. Organic loading and chemical reactions from the spill material are oxygen demanding and are expected to deplete dissolved oxygen downstream in receiving waters especially as temperatures increase. Additionally, the physical aspect of the spilled sediment smothering available habitat affected the ecosystem's fish and wildlife population.

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