EcoSummary

Eleven Mile Creek above Highway 90

May 3, 2006

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

A bioassessment was performed at this site as background to assess the impacts of the closed Klondike Landfill down stream of Highway 90. This BioRecon was in technical support of a compliance action by the FDEP Northwest District's Waste Management Cleanup Section.



Watershed Characteristics

Eleven Mile Creek (STORET 33010013) at the bioassessment site (latitude North 30 degrees 29 minutes 55.2 seconds longitude West 87 degrees 20 minutes 8.7 seconds) is a fourth order stream that drains the Southern Pine Plains and Hills of subecoregion 65f. The site is just inside the Gulf Coast Flatwoods subregion 75a. The United States Geological Survey (USGS) measured flow at U.S. Highway 90 was 66.4 cubic feet/second (cfs) recorded as an annual mean during the 2000 water year, the most recent available data. Eleven Mile Creek headwaters originate from numerous hillside springs around a pulp mill site south of Escambia County Road 186. The watershed flows into Perdido Bay and during the 1970's, Eleven Mile was designated Class III waters for recreation and maintenance of a healthy, well-balanced aquatic community. Eleven Mile Creek had national recognition for its fishing during the 1930's prior to the pulp mill constructed in the 1940's. Eleven Mile

Creek was classified as Class V for navigation, utility, and industrial use prior to the early 1970's.

Results

The BioRecon indicated a severely impaired biological community. All 6 biological indicators (biometrics) failed thresholds established for a healthy stream ecosystem:

Biometrics	Metric Score
# TOTAL TAXA	0.09
# EPHEMEROPTERA TAXA	0.08
# TRICHOPTERA TAXA	0.29
# LONG-LIVED TAXA	0
# CLINGER TAXA	0.26
# SENSITIVE TAXA	0.21
TOTAL METRIC SCORE :	0.93
/ Correction Factor :	0.6
= BIORECON SCORE :	2

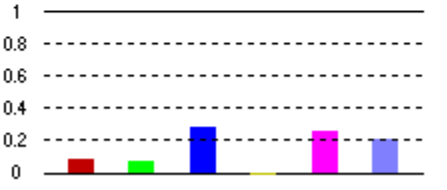
11 MILE CR AT HWY 90 BR

BioRegion : Panhandle West

Sample Date : May 03, 2006

Pass 6 - 10

Fail 0 - 5



This site's macroinvertebrate community was severely degraded. Pollution tolerant hydropsychid caddisflies and midges were dominant. Pollution tolerant taxa comprised most of the sample. The results are consistent with the original bioassessment collected on April 1, 1974 by the Department of Pollution Control, FDEP's predecessor. This 2006 bioassessment indicated that a pollution tolerant aquatic community has adapted to the organic loading from a daily discharge of more than 20 million gallons of pulp mill wastewater. During this bioassessment, the stream substrates had a "gross" odor characteristic of decomposing animals. It appeared the very high productivity of the winter biota fed by the wastewater discharge was dying off as the water (25.7 degrees centigrade) began to approach summer temperatures (29.4 degrees centigrade on June 12, 2006). Bacteriological activity associated with decay was indicated, as total coliform bacteria (4200 #/100 ml) were in violation Florida Administrative Code 62-302.530(7), ("shall not exceed 2400 #/100 ml").

The dissolved oxygen (DO) concentration (4.57 mg/l) was in violation of the Florida Administrative Code 62-302.530(31), ("shall not be less than 5 mg/l"). DO concentration decreases as temperatures rise during the summer (3.2 mg/l on June 12, 2006) and during the night because of the lack of photosynthetic activity. Also, respiration demands from the large amount of biomass (i.e. algae, bacteria, micro/macroinvertebrates) fed by the wastewater deplete DO concentrations (total five day Biological Oxygen Demand = 7.5 mg/l, a violation of Florida Administrative Code 62-302.530(12), ("shall not be increased to exceed values that would cause DO to be depressed below each class, and in no case, shall it be great enough to

produce nuisance conditions"). The percent DO concentration was 56% (43% on June 12, 2006). An adult male blue crab, which had recently died, was observed in shallow water along the stream bank. The only fish observed were two mosquito fish. Sediment odors, in addition to the "dead flesh" odor were anaerobic with hydrogen sulfide indicating low bottom DO concentrations. The water had a pulp mill and musty odor. Previous monitoring in Eleven Mile Creek above State Road 297A and Ten Mile Creek had recorded "putrid" (1989) or "terrible" (1988) water and sample odors. Color (150 platinum-cobalt units) was black-red with a secchi reading of 0.4 meters (turbidity = 12 Nephlometric Units). Periphyton was abundant indicating nutrient enrichments. Conductivity was 929 umho/cm (1290 umho/cm on June 12, 2006, a violation of Florida Administrative Code 62-302.530(23), "shall not be increase more than 50% of background or to 1275, whichever is greater"), compared to less than 50 umho/cm for area streams. The pH was 7.17 (7.44 on June 12, 2006), higher than the normal 5-6 standard unit range for normal background conditions. Florida Administrative Code 62-302.530(52), states "shall not vary more than one unit above and below natural background of predominantly fresh waters and coastal waters..."

Eleven Mile Creek water analyses for metal concentrations were elevated compared to the Klondike Landfill leachate sample. An Eleven Mile Creek tributary, Ten Mile Creek had much lower metal concentrations.

PARAMETER	UNITS	Eleven Mile Creek	Klondike leachate	Ten Mile Creek
Aluminum	ug/l	358	42	na
Antimony	ug/l	0.66	Less than 0.50	na
Arsenic	ug/l	20.4	3	na
Barium	ug/l	1787	55	na
Boron	ug/l	120	366	na
Calcium	ug/l	32.8	22.9	2.6
Iron	ug/l	653	6760	na
Lead	ug/l	0.47	0.08	na
Magnesium	ug/l	13.9	9.7	0.69
Manganese	ug/l	239	492	na
Molybdenum	ug/l	8.3	Less than 2	na
Nickel	ug/l	1.3	Less than 1	na
Potassium	ug/l	3.9	12.8	1.1
Selenium	ug/l	1.2	Less than 0.50	na
Sodium	ug/l	155	43.5	4.7
Strontium	ug/L	80.7	116	na
Tin	ug/l	6	Less than 3	na
Titanium	ug/l	4.4	Less than 0.5	na
Vanadium	ug/l	5.6	Less than 1	na
Zinc	ug/l	3.5	Less than 3	na

The Eleven Mile Creek Habitat Assessment rated a marginal (51%), down-graded by poor conditions of Habitat Smothering, Substrate Diversity, and Substrate Availability. Suspended solids (11 mg/l nonfilterable residue) sludge loading smothered 99% of the fish and wildlife habitat. Right bank Riparian Buffer Zone Width rated a marginal score. Artificial Channelization and Riparian

Zone Vegetation Quality rated suboptimal. Water Velocity, Bank Stability, and left bank Riparian Buffer Zone Width rated optimal. Stream flow was only 41 cfs measured at the USGS gage at Highway 90 this sample date (45 cfs during water sample collection on June 12, 2006). The record low flow previously was 47 cfs. For perspective, the upstream pulp mill discharge was about 30 cfs of wastewater or approximately 73% of Eleven Mile Creek flow at Highway 90.

Significance

This Eleven Mile Creek site did not meet Class III State Water Quality Standards 62-302 for recreation and propagation and maintenance of a healthy well-balanced population of fish and wildlife. The site's macroinvertebrate community was severely degraded because of the 20 plus million gallons per day of pulp mill wastewater load that comprised almost three quarters of the Eleven Mile Creek flow at Highway 90. The pollution tolerant macroinvertebrate community has essentially remained the same since 1974 biomonitoring because of the overwhelming pulp mill wasteload. Eleven Mile Creek's other pollution sources such as stormwater runoff, and closed landfills, Klondike and the Beulah Landfill Superfund site, had little apparent affect on the pollution tolerant macroinvertebrate population as the pollution loading is transferred to Perdido Bay because the stream assimilative capacity has been exceeded by the pulp mill wasteload.

Conclusions

The severity of industrial wastewater impacts to Eleven Mile Creek masked the impact of other sources, such as the landfills and stormwater runoff. However, those sources still exert a pollution load downstream on Perdido Bay . BOD and suspended solids contribute to the oxygen depletion in the Bay, while iron, a nutrient, can stimulate red tide and other algal and bacteria blooms. Bacteria can affect recreational activities and human health from water contact. Metals and other chemicals from industrial wastewater, landfill leachate, and stormwater runoff can exhibit toxicity to the fish and wildlife community and potentially affect health from biomagnification up the food chain.

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