*TMDL STUDIES*

# EcoSummary

**Eleven Mile Creek at SR 297A**
**March 2, 2005**

*VERY POOR*

Stream Condition Index (SCI): The standardized biological assessment tool used by FDEP biologist to indicate ecosystem health and identify impairment as compared to reference (natural) conditions of streams within the various ecoregions of Florida

**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 site failed all three biometrics of a 1997 BioRecon conducted to assess the health of the biota and wildlife habitat in Eleven Mile Creek. For this reason, Eleven Mile Creek was included on the FDEP Basin Rotation Group 5 (Perdido Basin) Planning List of Impaired Waters. The FDEP planning list is an inventory of surface waters or segments for which impairment of one or more parameters is suspected and additional sampling is required to verify the suspected impairment(s). Stream Condition Index (SCI) assessments are required to verify biological impairment of a stream or water body segment (Rule 62-330.330). When biological impairment is verified, the causative pollutants need to be determined, and then TMDLs will be developed, as provided in Subsection 403.067(2) in the Florida Statutes, to determine reductions in the pollutant load to obtain the water body's designated use.

## Watershed Characteristics

Eleven Mile Creek (STORET 33010011) at the bioassessment site (latitude North 30 degrees 32 minutes 51.3 seconds longitude West 87 degrees 19 minutes 46.8 seconds) is a fourth order stream that drains the Southern Pine Plains and Hills of subecoregion 65f. The United States Geological Survey measured a flow of 66.4 cubic feet/second recorded as an annual mean during the 2000 water year, the most recent available data. This flow was recorded at U.S. Highway 90 about ten miles south of the Cantonment industrial pulp mill. Eleven Mile Creek headwaters originate from numerous hillside springs around the pulp mill site south of Escambia County Road 186. The watershed flows into Perdido Bay and is designated Class

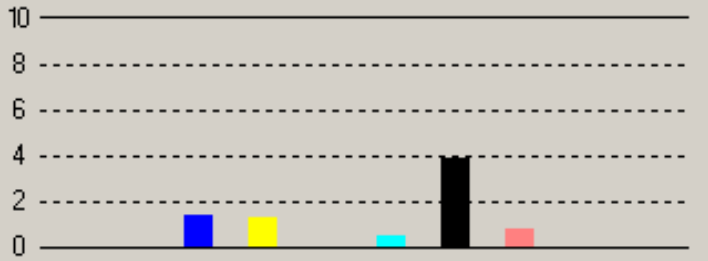
III waters for recreation and maintenance of a healthy, well-balanced aquatic community. Eleven Mile Creek had national recognition for its fishing during the 1930's prior to the pulp mill constructed in the 1940's.

## Results

The SCI scoring system indicated a severely impaired biological community with a very poor condition metric score. The SCI final score of 9 out of a possible 100 index points failed to meet biological indicator thresholds established for a healthy aquatic wildlife community:

**11 MILE CREEK AT SR 297A BR**

**Stream Condition Index Metric Scores**




BioRegion : Panhandle West

Sample Date : Mar 02, 2005

| | |
|---|---|
| Good | 73 - 100 |
| Fair | 46 - 72 |
| Poor | 19 - 45 |
| Very Poor | 0 - 18 |

| Core Metrics | Value | 0 - 10 Points | Metric Score |
|---|---|---|---|
| # TOTAL TAXA | 12 | 16 - 49 | 0 |
| # EPHEMEROPTERA TAXA | 0 | 0 - 6 | 0 |
| # TRICHOPTERA TAXA | 1 | 0 - 7 | 1.43 |
| # CLINGER TAXA | 2 | 0 - 15.5 | 1.29 |
| # LONG-LIVED TAXA | 0 | 0 - 5 | 0 |
| # SENSITIVE TAXA | 1 | 0 - 19 | 0.53 |
| % DOMINANT TAXON | 30 | 43 - 10 | 3.94 |
| % SUSPENSION FEEDERS / FILTERERS | 4.55 | 1 - 45 | 0.81 |
| % TANYTARSINI | 0 | 0 - 26 | 0 |
| % VERY TOLERANT | 87.27 | 36 - 0 | 0 |
| | | TOTAL METRIC SCORE : | 8 |
| | | / Correction Factor : | 0.9 |

Macroinvertebrate Dip Net (20 sweeps, emphasizing most productive substrates)

= SCI FINAL SCORE : 9

Eleven Mile Creek's macroinvertebrate community was severely degraded. Pollution tolerant flies and snails were dominant. The "Very Tolerant" taxa comprised 87% of the sample. Biological trends since the 1970's continued with a pollution tolerant aquatic community adapted to the organic loading from a daily discharge of more than 20 million gallons of pulp mill wastewater. This organic loading from the large wastewater volume discharge (about 30

cubic feet/second) into the stream's headwater cannot be assimilated by such a small stream. The high volume of wastewater discharge was the main contributor to the Creek, although there would be some pollution loading from developed areas in the watershed. The mill's water pollution load to Eleven Mile Creek was the major cause of the very poor biological health. Organic pollution is uncommon for Florida panhandle streams where nonpoint source runoff-caused habitat damage and destruction from sedimentation are the main source of environmental damage. The chart below is a comparison of Eleven Mile Creek water quality parameters to Ten Mile Creek, a major tributary that flows into Eleven Mile Creek a few hundred feet above the sample reach. Eleven Mile Creek water quality was impacted by a large point source discharge in comparison to Ten Mile Creek that was affected by large quantities of nonpoint source runoff from suburban growth. Increased runoff volume from an increase in impervious surface reduced Ten Mile Creek's fish and wildlife habitat.

| PARAMETER | UNITS | Eleven Mile Creek | Ten Mile Creek |
|---|---|---|---|
| Water Temperature | Degrees C | 16.09 | 13.86 |
| Turbidity | NTU | 20 | 3 |
| Color | Pt-Co | 200 | 50 |
| Conductivity | Umho/cm | 1787 | 55 |
| Dissolved Oxygen | Mg/l | 5.93 | 13.76 |
| % DO Saturation | % | 60 | 100 |
| BOD 5 day | Mg/l | 17.2 | 0.6 |
| pH | Units | 7.39 | 5.75 |
| Residue, nonfilt. | Mg/l | 18 | 8 |
| Alkalinity | Mg/l CACO3/L | 380 | 4.7 |
| Chloride | Mg Cl/L | 140 | 7.9 |
| Calcium | Mg/l | 64 | 2.6 |
| Fluoride | Mg/l | 0.21 | 0.05 |
| Magnesium | Mg/l | 7.8 | 0.69 |
| Potassium | Mg/l | 10 | 1.1 |
| Sodium | Mg/l | 334 | 4.7 |
| Sulfate | Mg SO4/L | 310 | 3.5 |
| Ammonia-N | Mg/l | 4.1 | Less than 0.01 |
| Un-Ammonia-N | Mg/l | 0.0357 | Less than 0.01 |
| N02N03-N | Mg/l | 0.16 | 0.18 |
| Kjeldahl Nitrogen | Mg/l | 6.9 | 0.24 |
| Organic Carbon | Mg/l | 45 | Detection limit 4 |
| Total Phosphate | Mg/l | 0.38 | Less than 0.02 |

The Eleven Mile Creek Habitat Assessment rated suboptimal, down-graded by poor conditions of Habitat Smothering and Substrate Availability. The suspended solids (non-filtered residue) loading (18 mg/l) smothered 95% of the fish and wildlife habitat. Substrate Diversity, Bank Stability, and Riparian Zone Vegetation Quality rated suboptimal. Water Velocity, Artificial Channelization, and Riparian Buffer Zone Width rated optimal. Water quality rather than stormwater runoff quantity affected Eleven Mile Creek habitats. Suspended solids from the non-assimilated organic load smothered woody debris, leaf pack, and undercut banks/roots fish and wildlife habitat. The Eleven Mile Creek habitat assessment score would have rated optimal if not for smothering by the suspended solid load's fine particulate organic matter.

## Significance

Biological impairment is verified by this SCI. TMDL development to reduce pollutant loading will proceed according to the Impaired Waters Rule, Chapter 62-303, Florida Administrative Code. Eleven Mile Creek 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. Organic loading from water pollution (Organic Carbon, Kjeldahl Nitrogen, Ammonia, Total Phosphate, increased Water Temperature, Biological Oxygen Demand [BOD], and Residue, Nonfilterable) lowered the percent Dissolved Oxygen (DO) saturation and DO concentration. While the site met DO standards in this winter time frame, the Dissolved Oxygen concentrations are typically below State Water Quality Standards of 5 mg/l in Eleven Mile Creek during the warmer months of the year. Conductivity (1787 microhms/centimeter) did not meet the State Water Quality Standard of 1250 umho/cm. Brackish water conditions from high conductivity created by the pulp mill wastewater's dissolved salts and metals (i.e. calcium, chloride, fluoride, magnesium, potassium, sodium, and sulfate) are lethal to freshwater invertebrate communities. Un-ionized ammonia (0.0357mg/l) did not meet the State Water Quality Standard of 0.02mg/l. Un-ionized ammonia is toxic to most fish and aquatic macroinvertebrates. Turbidity and color in the wastewater load prevents growth of submerged aquatic vegetation and increases water temperature by absorption of sunlight.

## Suggestions

Removal of the industrial point source discharge or constructing an advanced wastewater treating facility to clean the discharge to ambient conditions (see chart above -Ten Mile Creek parameters) are suggestions to restore Eleven Mile Creek's designated use for recreation and propagation and maintenance of a healthy well-balanced population of fish and wildlife. The mill's withdrawal of groundwater for industrial use at the head of Eleven Mile Creek could reduce the stream's natural base flow if the wastewater discharge is removed as current plans indicate. Studies by the Florida Geological Survey found a large drawdown of more than 42 feet from 1941 to 1956 in a Cantonment well used by the pulp mill. Groundwater withdrawals should be monitored to prevent a drawdown that reduces natural spring flow to Eleven Mile Creek.

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