EcoSummary

TMDL STUDIES

Bayou Marcus Creek below Longleaf Road

March 8, 2005

FAIR

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 2005 SCI bioassessment was performed to verify biological impairment documented by a 1997 Bayou Marcus Creek Watershed Total Maximum Daily Load (TMDL) BioRecon. This site failed two of three biometrics of that 1997 BioRecon conducted to assess the health of the biota and wildlife habitat in Bayou Marcus Creek. For this reason, Bayou Marcus Creek (WBID 697) 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 of 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 impairment is verified, a TMDL will be developed, as provided in Subsection 403.067(2) in Florida Statutes, to determine reductions in the pollutant to obtain the water body's designated use.

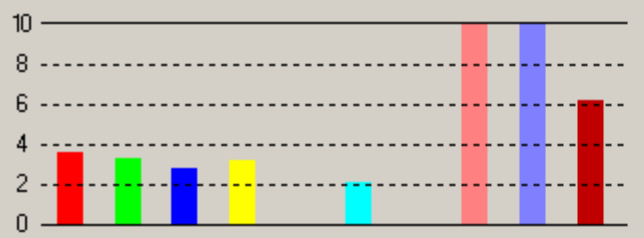
Watershed Characteristics

Bayou Marcus Creek (STORET 33010021) at the bioassessment site (latitude North 30 degrees 29 minutes 10 seconds longitude West 87 degrees 17 minutes 18 seconds) is a third order stream that drains the Gulf Coast Flatwoods of subecoregion 75A. Its headwaters begin along U.S. Highway 29 (Pensacola Boulevard) and just above Interstate 10, Escambia County. Bayou Marcus Creek above this SCI site on Long Leaf Drive is urbanized, but also has many strip mine operations. The watershed flows into Perdido Bay and is designated Class III waters for recreation and maintenance of a healthy, well-balanced aquatic wildlife community.

Results

The SCI Final Score indicated a biological community with a fair condition Metric Score of 46 of a possible 100 index points that was one point above poor.
The individual Metric Score of the Core Metrics rated poor to very poor for seven out of ten biological indicator thresholds established for a healthy aquatic wildlife community:

MARCUS CR W ARM LONGLEAF RD



BioRegion : Panhandle West

Sample Date : Mar 08, 2005

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

Core Metrics	Value	0 - 10 Points	Metric Score
# TOTAL TAXA	28	16 - 49	3.64
# EPHEMEROPTERA TAXA	2	0 - 6	3.33
# TRICHOPTERA TAXA	2	0 - 7	2.86
# CLINGER TAXA	5	0 - 15.5	3.23
# LONG-LIVED TAXA	0	0 - 5	0
# SENSITIVE TAXA	4	0 - 19	2.11
% DOMINANT TAXON	44.34	43 - 10	0
% SUSPENSION FEEDERS / FILTERERS	70.75	1 - 45	10
% TANYTARSINI	48.11	0 - 26	10
% VERY TOLERANT	2.83	36 - 0	6.27
		TOTAL METRIC SCORE :	41.44
		/ Correction Factor :	0.9
		= SCI FINAL SCORE :	46

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

However, maximum Metric Scores of 10 for % Suspension Feeders/Filterers and % Tanytarsini enabled this site to pass by one point. Filterers, the midge Rheotanytarsus (45) and hydropsychidae caddisflies (20) comprised 65 of the 106 total individuals counted. Both are abundant below dam outfalls, which was the case at this site. The Dominant Taxon core metric scored zero because of the abundance of Rheotanytarsus. However, since it is a Tanytarsini, this taxon also put the % Tanytarsini metric score at the maximum 10. The co-dominate Cheumatopsyche, a hydropsychidae, are common in the panhandle's impaired flowing waters, as Rheotanytarsus are dominant in sediment enriched streams. The biological community had essentially the same pollution tolerant macroinvertebrate population as found in 1997. Stoneflies were conspicuously missing from the well-balanced aquatic insect community that is characteristic of panhandle streams. Stoneflies, Florida's most sensitive aquatic macroinvertebrate order and an important fish food, need cool, highly oxygenated flowing water for their survival. Stoneflies and the now rarely found armored mayflies were found in a 1953 Florida State Board of Health biological survey of Bayou Marcus Creek. Water quality parameter (i.e. alkalinity 17 mg/l, conductivity 100 umho, calcium 6.5 mg/l, sulfate 5.1 mg/l, ammonia 0.029-0.062 mg/l, and total

270-2100/100ml, and fecal 162-440/100ml, coliform bacteria, and water temperature 15.65 degrees C) values collected with this SCI sample were elevated over typical Perdido Basin waters. The dissolved oxygen concentration (7.39 mg/l) and percent dissolved oxygen saturation (74.3) were also below typical Perdido Basin conditions during this winter period. During other sampling events, the dissolved oxygen concentration failed to meet the State Water Quality Standards (5 mgl/l). Those dates were 03/03/05 (4.17 mg/l) and 09/22/05 (4.14 mg/l). The site's pH had risen to the 7 range compared to historical and background values of 5.5 standard units. The reason for the higher pH was an increase in calcium and alkalinity concentrations. An iron/ sulfur bacteria bloom was present, leaving sheen on the water's urface, seen in the above

photograph. The water had a musty odor. The stream site was littered with urban trash - tires, shoes, cans, bottles, buckets, and plastic items. A forest cover of invasive Asian species was dominant. The streamside canopy was mainly the Chinese privet shrub and Chinese tallow trees. Japanese climbing fern and Japanese honeysuckle dominated the under story vegetation. The stream channel in the upper reached had widened by 2 meters since 1997 and its banks were bare mud. The lower reach was extensively braided by sediment, which filled the stream channels. Beavers, encouraged by the sediment reducing flow, built small dams on two of the downstream braided channels. Beavers had also constructed dams above Long Leaf Drive in the vicinity of a mining pit/landfill. Note the watershed's numerous mining pits/former mining pits-ponds/ landfills on the attached 2004 aerial photograph. The Habitat Assessment rated marginal at 37% due to poor ratings of Substrate diversity, Available Substrate (1%), Habitat Smothering (99%) by silt, and left bank Riparian Buffer Zone Width. Water Velocity, Bank Stability, and Riparian Zone Vegetation Quality rated marginal. Right bank Riparian Buffer Zone Width rated suboptimal. Artificial Channelization at this reach rated optimal.

Significance

Biological impairment at this site was not verified by this SCI, although failing seven out of 10 biometrics very negatively affected Bayou Marcus Creek's propagation and maintenance of a healthy, well-balanced population of fish and wildlife. The wildlife community structure shifted to a community dominated by two pollution tolerant filterers commonly found in abundance below dams. The tolerant Rheotanytarsus and Cheumatopyche taxa took over, replacing the sensitive stonefly community and severely reduced the mayflyand caddisfly taxa that naturally comprise Perdido Basin stream samples. In addition to man-made dams on its tributaries, Bayou Marcus Creek downstream of this site was dammed to form Crescent Lake. As they age, dams have greater affect on watershed water quality. Additional impacts from sewage lift station failures, golf course fertilization, mining, and urban development have occurred in the watershed below Long Leaf Road. Water quality impairment has been documented by dissolved oxygen concentrations below State Water Quality Standards in the Bayou Marcus Creek. Increased alkalinity, pH, calcium, and sulfate may result from construction debris disposal like drywall (calcium sulfate), concrete, and other materials that leached or ranoff into Bayou Marcus from landfills. The watershed's landfills also maybe a source that fed the abundant iron/sulfur bacteria found in the sample reach. Acid rain and the Perdido Basin's acid groundwater readily leach metallicmaterial into the sand and gravel aquifer and surface waters.

Suggestions

Restore wetlands and mined areas in the watershed and re-design the stormwater runoff infrastructure to allow natural detention and water quality treatment before discharging to Bayou Marcus Creek. Restore riparian buffer zones along Bayou Marcus Creek and its tributaries. Prevent landfill debris from contacting rain or groundwater and prevent contaminants from leaching into groundwater and/or discharging in stormwater runoff. The Bayou Marcus Creek corridor's hydrologic and geomorphic conditions along with the biological and chemical characteristics in this report should be analyzed to make appropriate restoration decisions. *Stream Corridor Restoration: Principles, Processes, and Practices* is a recommended technical reference manual that details stream corridor restoration techniques that can help improve streams considered degraded from erosion, sedimentation and excess nutrients. This manual by the Natural Resources Conservation Service, Washington, DC contains field-tested methods and approaches.

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For more information on the DEP Bioassessment programs, please visit our web site at http://www.dep.state.fl.us/water/bioassess

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