EcoSummary

McDavid Creek below Tung Oil Road
February 15, 2005

POOR

TMDL STUDIES

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 McDavid Creek BioRecon. This site failed all three biometrics of that 1997 BioRecon, which was conducted to assess the health of the biota and wildlife habitat in McDavid Creek to assist an Escambia County dirt road paving project. For this reason, McDavid 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 in 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

McDavid Creek (STORET 33010118) at the bioassessment site (latitude North 30 degrees 50

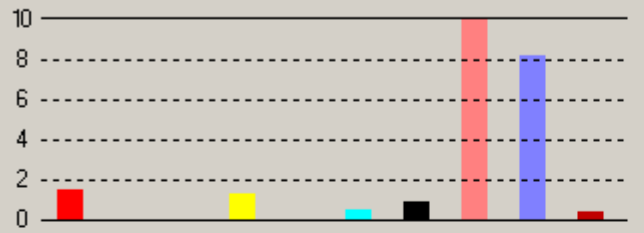
minutes 34.1 seconds longitude West 87 degrees 27 minutes 10 seconds) is a third order stream that drains the Southern Pine Plains and Hills of subecoregion 65f. Its headwaters begin along County Road 97 and County Road 99 Road about three miles east of Walnut Hill, Escambia County. McDavid Creek above Tung Oil Road is about four and half mile southeast of Walnut Hill. This area of the watershed is predominantly agriculture. Many former riparian wetlands were farmed and original stream channels were dredged to drain the land. The watershed flows into Perdido River and then Perdido Bay and is designated Class III waters for recreation and maintenance of a healthy, well-balanced aquatic wildlife community.

Results

The SCI score indicated an impaired biological community with a poor condition metric score. The SCI final score of 25 of a possible 100 index points failed to meet biological indicator thresholds established for a healthy aquatic wildlife community:

MCDAVID CR @TUNG OIL RD

Stream Condition Index Metric Scores



BioRegion : Panhandle West

Sample Date : Feb 15, 2005

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

Core Metrics	Value	0 - 10 Points	Metric Score
# TOTAL TAXA	21	16 - 49	1.52
# EPHEMEROPTERA TAXA	0	0 - 6	0
# TRICHOPTERA TAXA	0	0 - 7	0
# CLINGER TAXA	2	0 - 15.5	1.29
# LONG-LIVED TAXA	0	0 - 5	0
# SENSITIVE TAXA	1	0 - 19	0.53
% DOMINANT TAXON	40	43 - 10	0.91
% SUSPENSION FEEDERS / FILTERERS	48.57	1 - 45	10
% TANYTARSINI	14.29	0 - 26	8.26
% VERY TOLERANT	30.48	36 - 0	0.42
	TOTAL METRIC SCORE :		22.93
	/ Correction Factor :		0.9
	= SCI FINAL SCORE :		25

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

McDavid Creek's macroinvertebrate community was very degraded. Midges and tolerant

organisms replaced the sensitive stonefly, mayfly, and caddisfly community found naturally in panhandle streams. Agricultural nonpoint source runoff and habitat destruction were the main source of anthropogenic impairment. Water quality parameter (i.e. alkalinity, conductivity, calcium, chloride, fluoride, magnesium, potassium, sodium, sulfate, ammonia, Kjeldahl nitrogen, organic carbon, total phosphorus, and total and fecal coliform bacteria) values were elevated over typical panhandle waters. See chart below for comparison of McDavid Creek that drains agricultural land, which had much worse water quality than Churchhouse Branch with its silviculture and landfill impacts and Ten Mile Creek affected by urban runoff.

PARAMETER	UNITS	Ten Mile Creek	Churchhouse Branch	McDavid Creek
Date		3/2/2005	3/9/2005	2/15/2005
Water Temperature	degrees C	13.86	12.98	15.1
Turbidity	NTU	3	2	27
Color	Pt-Co	50	28	100
Dissolved Oxygen	mg/l	13.76	8.24	7.49
% DO Saturation	%	100	77.9	74.1
pH	units	5.75	5.56	6.53
Conductivity	umho/cm	55	28	273
Alkalinity	mg/l CACO3/L	4.7	less than 0.65	24
Calcium	mg/l	2.6	0.84	8.1
Fluoride	mg/l	0.05	less than 0.05	0.11
Magnesium	mg/l	0.69	0.51	2.6
Potassium	mg/l	1.1	0.71	6.3
Sodium	mg/l	4.7	2.62	35.4
Sulfate	mg SO4/L	3.5	2.2	4.7
Ammonia-N	mg/l	less than 0.01	less than 0.01	0.018
Kjeldahl Nitrogen	mg/l	0.24	0.18	1.2
Total Phosphate	mg/l	less than 0.02	less than 0.02	0.1
Chloride	mg Cl/L	7.9	4.3	59
Total coliform	#/100 ml	52	72	1909
Fecal coliform	#/100 ml	36	23	189
Chlorophyll a	ug/l	less than 5	less than 5	13
Chlorophyll a corr	ug/l	less than 5	less than 5	9.3

Dry weather conditions prevailed for the two weeks prior to sampling, except for a half-inch rain two days before the sampling event. McDavid Creek at the Tung Oil Road site appeared to be serving as a local dumping ground. Rotting deer carcasses, full garbage bags, freezer bags full of food, a freezer, a hot water heater, tires, and an abandoned turbidity curtain were discarded in the stream and its wetland riparian zone. The stream sediments were anaerobic with a hydrogen sulfur odor. The water was turbid and grey-green in color with the transparency only a 0.4-meter seechi reading. Algae were abundant, smothering substrates. Note the McDavid Creek chlorophyll *a* at 13 micrograms per liter (ug/l); in the naturally low nutrient panhandle streams, chlorophyll *a* values were always below the detection limit of 5 ug/l. Fish and aquatic macrophytes were absent. The Habitat Assessment rated marginal at 49% due to poor ratings of Available Substrate (3%), Habitat Smothering (95%) by algae and fine particle organic matter, and Riparian Buffer Zone Width for the left bank, which was clear-cut to two meters of the stream since the 1997 sample. Left bank Riparian Zone Vegetation Quality rated marginal. The invasive Chinese privet was a dominant under story shrub. Substrate diversity, Water Velocity, and Bank Stability rated suboptimal.

Artificial Channelization at this reach and right bank Riparian Buffer Zone Width rated optimal. The downstream sample reach however, was braided by sedimentation. Note the attached 2004 aerial photograph map, which indicated a lack of riparian buffer zones along many McDavid Creek headwater reaches. This lack of streamside buffer zones was confirmed during fieldwork. Riparian wetlands were converted to primarily cotton row crop or catfish ponds and field/pastures. Many stream channels were ditched to lower the water table to drain and remove the formerly forested wetland. This eliminated the wetland's buffering capacity to filter fertilizers, pesticides, and herbicides runoff. It also increased stream temperature by removing shade and reduced the stream's fish and wildlife habitat of woody debris, leaf pack, and undercut banks/roots by removal of the forest canopy.

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. McDavid Creek in this reach 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. Destruction of the stream corridor upstream of this site by agricultural land use without regard for stormwater impacts to the McDavid Creek fish and wildlife community are the main reasons for the biological impairment. Components of agricultural nonpoint source runoff (i.e. sediments, fertilizers, trace nutrients, bacteria) and habitat alteration and destruction resulted in McDavid Creek at this site not meeting its designated use. This site at Tung Oil Road was originally monitored as part of a County road-paving project to prevent sediment runoff to protect water quality. However, road paving could not overcome effects of row crop and fish farm impacts to water quality in McDavid Creek's upper watershed around Walnut Hill.

Suggestions

Restore riparian wetlands in the watershed and re-design the stormwater runoff infrastructure to allow natural detention and water quality treatment before discharging to McDavid Creek. Former stream channels converted to drainage ditches can be restored and riparian buffer zones re-vegetated. Portions of the watershed experience flash flooding because extensive land clearing occurred in the upper watershed and in areas that were originally wetlands. Catfish farm pond discharges should be monitored for chemical and bacterial components to determine their affect on McDavid Creek's water quality. McDavid 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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