EcoSummary

Jackson Creek, Escambia County
July 30, 1999

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

Introduction

Jackson Creek is a first order tributary of Bayou Chico in southern Escambia County. This urban stream was placed on the total maximum daily load (TMDL) list as a result of high coliform bacteria levels, dissolved oxygen (DO), nutrients, total suspended solids (TSS) and turbidity. Total maximum daily load is the maximum quantity of a pollutant that can be discharged into a water body without violating water quality standards. A resultant TMDL on a water body will determine the allocation of a pollutant that can be discharged. To detect potential pollution effects on the stream health, a determination of the condition of the biological community (macroinvertebrates) was conducted. This assessment consisted of three major components: macroinvertebrate community (bugs living on or in the sediments and habitat in the water column), habitat availability and quality, and physicochemical measurements determined in the field or analyzed in the Northwest District chemistry laboratory. This area of southern Escambia County has been urbanized consisting of both medium density residential neighborhoods and commercial development. In the past treated (secondary) effluent from Pen Haven wastewater treatment facility was discharged into Jackson Creek via a ditch just north of West Jackson Street. This facility ceased discharge in the middle 1970s. The watershed is urbanized primarily (90 percent) of medium density residences with commercial establishments the balance of land use. The stream has been highly altered and canalized. In the upper reaches, the riparian zone vegetation has been removed and replaced with concrete. The lower reaches of the stream banks are altered by urban encroachment. Methods employed in this assessment followed the standard operating procedures of Florida DEP. A Hydrolab multiparameter probe was used to measure conductivity, dissolved oxygen (DO), temperature and pH, in situ. Water for chemical analyses and bacteriological assays was collected and stored on ice. The in-stream habitat type and quality was determined visually and semi-quantitatively by measuring each

habitat type in the area of interest. The extent and quality of the riparian zone vegetation was determined based on the expected plant community of the area. The physical characteristics of the stream were noted, for example, channel sinuosity. The macroinvertebrate community was sampled using D-frame dipnets to sweep through the habitat. Also, when practical, large woody debris was visually inspected and representatives of the associated macroinvertebrate community were collected. The macroinvertebrates were picked in the field while identifications were verified under a dissecting scope in the laboratory.

Results and Discussion

Chemical data indicated the stream was altered from ambient waters in the region. Specific conductance was elevated about four times above typical streams in the area; also, pH was high, more than 1 SU above ambient waters. Dissolved oxygen was low, creating a stressful environment for organisms that have passive (closed trachea) respiratory systems or have high oxygen demands. Total coliform levels were high, nearly twice the acceptable concentration for Class III waters; the fecal coliform concentrations were below minimum detection limit of 10 colonies/100mL. The stream habitat assessment, consisting of eight components, averaged in the marginal (the second lowest ranking) category. One of the most damaging effects on a stream is loss of native riparian zone vegetation. This loss is compounded in low order streams (orders 1-4) such as this one since the ecology of these streams is based on energy (food) inputs to the system. Evident in the accompanying photo, the stream banks were highly disturbed by urbanization and the exotic plant wild taro was common. Other exotic plants were alligator weed, popcorn tree or Chinese tallow, wild yam and Chinese privet. Small areas of the riparian zone had native plants such as sweet bay, red maple and sycamore. However, due to hydrologic alterations, heavy rainfall events may not be mediated with the loss of a forested riparian zone. This exacerbates the erosional process and is obvious by the loss of soil, the numerous sandbars and the filling of the channel with sand and silt. Another effect from the loss of a well-developed riparian zone is the loss of sinuosity. The meandering of the stream channel allows the system to dissipate energy from flow and helps maintain important habitat zones in low to medium gradient streams, principally a series of pools and riffles. A stream with high biotic diversity will have these zones; important communities of macroinvertebrates occupy these habitats of eroding and depositing substrata. Canalization of the stream has occurred and the upper half of the stream channel is defined by concrete walls. Storm water input to this stream is heavy as it drains many parking lots and roads along its course. The macroinvertebrate community reflected the severe impacts of the stream. This depauperate condition had only 11 total taxa and no EPT (mayflies, stoneflies and caddisflies). The trophic structure of the community was primarily composed of scrapers and predators. The loss of a natural riparian zone supplying food and habitat to the system and soil stability precludes a significant proportion of organisms that can inhabit such streams. The exotic snail, faune melania, was dominant in this stream. This exotic is significant because they out compete native snails where introduced. Another snail adapted to living in areas of low DO (Planobellidae) was also found in this bioassessment.

Conclusions

Jackson Creek is highly impacted from urban land uses and physical alterations of the stream channel. Loss of habitat and associated pollution from roads and parking lots has contributed to the decline of stream health. The influx of organics, for example silt, has increased oxygen demands in the system and resulted in low DO. The DO concentration was not compliant with Class III water quality standards (Florida Administrative Code 62-302.530(31)). The high total coliform levels were not in compliance with surface water quality standards (62-302.530(6)). Also, this stream cannot support the usage criteria of Class III waters (Florida Administrative Code 62-302.400(1)). It is recommended this stream remain on the impaired water body list.

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