



EcoSummary

Weekly Bayou, Escambia County
August 4, 1999



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

Introduction

Weekly Bayou is a 1st order blackwater rivulet in extreme southwest Escambia County; it is a tributary to Perdido Bay. This stream flows through a wetland hardwood system where pine plantations grow to within several meters of the riparian zone in some instances. Other reaches have an extensive coverage of this natural wetland hardwood ecosystem. The freshwater stream reach is about two-thirds of the length of the system; the lower one-third is brackish. The



length of this small system is approximately 2 km or 3 mi. This stream has an extremely low gradient (0.13 %) from headwaters to discharge. The watershed is small and drains an area defined by silvicultural practices and natural forest. The land surrounding the stream reach is part of the Department of Environmental Protection's land acquisition for the Perdido Pitcher Plant Prairie. Weekly Bayou (the lower reach) was placed on the total maximum daily load (TMDL) list as a result of low dissolved oxygen (DO) 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. 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 the containers 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 was typical for small streams draining cypress swamps. Dissolved oxygen was adequate from 0.3 m deep to the bottom at 1.0 m deep. The stream was clear and the Secchi was greater than the depth of 1.3 m. Turbidity was 0 NTU at this location. Total and fecal coliforms were low, 600 colonies/100mL and 20 colonies/100mL, respectively. The stream habitat assessment, consisting of eight components, averaged in the suboptimal category (the second highest ranking). Water velocity was the physical parameter that brought the overall habitat score down. The low velocity scored in the poor category. This low velocity may be a contributor to the lack of leaf pack habitat, allowing leaf litter to settle out of the water column. The three productive habitats were, in order of abundance, aquatic vegetation, woody debris and undercut banks/roots. Aquatic vegetation was the significant habitat, comprising about 34 percent of the available habitat. The most common aquatic plant was road-grass. Woody debris and undercut banks/roots, combined, contributed just over five percent of the available habitat. The stream was narrow, about 3-4 m wide and the channel sinuous. Typical of natural stream channel, a series of pools and riffles were present, creating eroding and depositional substrata. The riparian zone was diverse and relatively intact, the most common species were bald cypress, sweet bay and black gum; however, these trees were immature, less than 30 years old. The area of least buffer vegetation was about 4 m wide. Just downstream of the 100 m sample reach, the stream has been altered by bridge construction creating a large, wide pool; this is the upstream extent of tidal influence. The bioassessment yielded 19 total taxa, only two of which were members of the EPT (mayflies, stoneflies and caddisflies) group. This group of insects is generally considered sensitive to human induced pollution (e.g., nutrient enrichment, siltation, etc.). One of those two, a mayfly, is adapted to living on substrate in silty areas. The food web was simple, composed primarily of predators and generalists. Interestingly, this blackwater stream is chemically and physically different in two significant ways, the very acidic conditions (pH 3.7 SU) and low gradient. Nearly all ambient waters in the western panhandle are acidic, but typically the pH is above 4.5 SU. Discussion of several studies that have concentrated on the effects pH has on macroarthropods, algae and bacteria may be found in Allen, 1995 and Stevenson, et. al 1996. Changes in the water chemistry and alterations of available food have shown to exclude many taxa in low pH waters (exclusion of bacteria that start the conditioning of leaves for shredders). Research suggests that the mayfly *Baetis* avoids depositing eggs in very acidic waters. Studies have shown that taxa richness and density of macroinvertebrate larvae, and particularly mayflies, are adversely affected by increasing acidity. The slow velocity of this stream precludes some species adapted in streams that are dependent on swifter waters.

Conclusions

The freshwater stream portion of Weekly Bayou had good levels of DO from top to bottom and no turbidity. Coliform bacteria were low and chlorophyll levels were below detection. Stream flow was very slow; the relief in this watershed changes only 20 ft from source to mouth over a distance of approximately 3 mi. The brackish portion (where data was collected which resulted in the bayou being listed as impaired waters) of the system had quite high levels of chlorophyll a (31.9 ug/L). With the high density housing on the bayou, nitrification can be expected as a result of loss of buffer vegetation and intensive lawn maintenance. The water body did not support Florida Administrative Code 62-302.530(31) for dissolved oxygen. Data obtained during this assessment and subsequently does warrant the bayou remain on the 303(d) list. Based on the ecology of many of the rheophilic indicator organisms, the stream's extreme low gradient and the very low pH, I do not consider the freshwater stream section to be impaired, although it failed the biorecon metrics. Further investigation is needed principally nutrient data and bioassessment in the brackish environment. Literature Cited Allen, J. D. 1995. Stream Ecology structure and function of running waters. London: Chapman & Hall. Stevenson, R. J., M. L. Bothwell and R. L. Lowe. 1996. Algal ecology freshwater benthic ecosystems. San Diego: Academic Press, Inc.

For more information, please contact:

Randall Payne

DEP Northwest District 160 Government Center Pensacola, FL

32501

(850) 595-8300

email: randall.payne@dep.state.fl.us

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