A Report by the Ecosystem Management Water Quality Assessment Section
#98-005

Stevenson Creek, Pinellas County
A BioRecon Assessment
March 10, 1998
Greater Tampa Bay EMA

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

A BioRecon was performed on Stevenson Creek in order to gain further information on the biological health of the watershed for use in the administration of Florida's Ecosystem Management and Total Maximum Daily Loads programs. Surface water samples were also collected for analysis of parameters of concern.

Methods

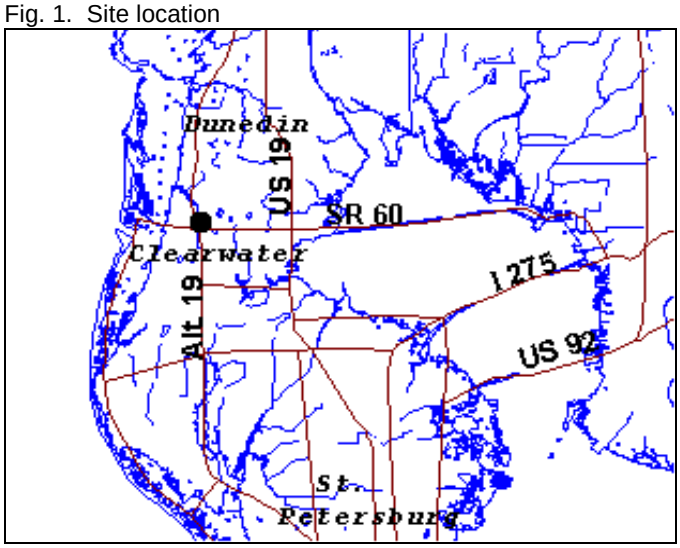
BioRecons are based on three measurements of the aquatic invertebrates present in the stream: the total number of different species (Total Taxa), the number of 'good water quality' indicator species (Florida Index) and the total number of Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) species present. A stream scoring above the threshold value for all three of these measurements is considered healthy. If two of the values are reached, the stream's health may be considered ecologically suspect. If one or none of the thresholds are reached, an impaired condition is concluded.

Basin Characteristics

Stevenson Creek is located in western Pinellas County, between Clearwater and Dunedin. The stream flows into Clearwater Harbor. The sampling site (Fig. 1) was located below the Drew Street bridge, as the stream emerged from residential development to flow through a golf course. The riparian zone and streambed have been highly altered. In the residential area, it is sea-walled. The golf course segment has gunnite banks. Nevertheless, some emergent vegetation and submerged roots have managed to establish, providing limited instream habitat for macroinvertebrates.

Stevenson Creek is a sandy-bottom stream, shallow with consistent rapid velocity. Land use in the basin consists solely of high density residential development. No permitted domestic or industrial waste discharges occur upstream of the sampling site.

Fig. 1. Site location



Results

The stream was clear and its velocity was 0.4 m/s. Dissolved oxygen was 8.3 mg/l. Conductivity was 400 umho/cm. pH was 6.78 SU and temperature was 18.31 ^{o}C. The habitat assessment score was in the low marginal range (Fig. 2). Water chemistry results are shown in Fig. 3. Nutrients were high, as compared to typical values statewide[2], particularly ammonia and nitrate-nitrite nitrogen, and total phosphorus. Turbidity was moderately low, but coliforms were present in excessive amounts: total coliform colonies were too numerous to count, and fecal coliforms exceeded the single day State standard.

This site on Stevenson Creek failed all three measurements of the BioRecon (Fig 4). This indicates that the stream did not support a healthy macroinvertebrate community and did not meet its designated use at the time of sampling. An unbalanced invertebrate community may result in an inadequate food web for the support of vertebrate animals, such as fish and birds.

Suggestions

Habitat destruction for residential development alone may be responsible for the poor ecological rating. However, Pinellas County has invested a considerable amount of money in improving those areas of the stream that were not completely seawalled long ago. Their permitted projects have included improved flow, erosion control and habitat restoration. Therefore, even though the stream functions as stormwater conveyance, its habitat is much better than it used to be.

The chemical parameters analyzed indicate that some nutrients and excessive coliforms were being introduced into the stream at the time of sampling, most likely due to residential runoff such as lawn fertilizer, and contribute to the pollutant loading to Clearwater Harbor. These levels are not responsible for the degraded macroinvertebrate community. However, it is possible that heavy metals and/or pesticides and herbicides, which can be toxic to invertebrates, are present in the urban runoff. It is therefore recommended that these parameters and the source of the coliforms be investigated.

For more information, contact Peggy Morgan, FDEP Southwest District, 3804 Coconut Palm Dr., Tampa, FL 33619; (813) 744 - 6100

Figure 2. Habitat Score

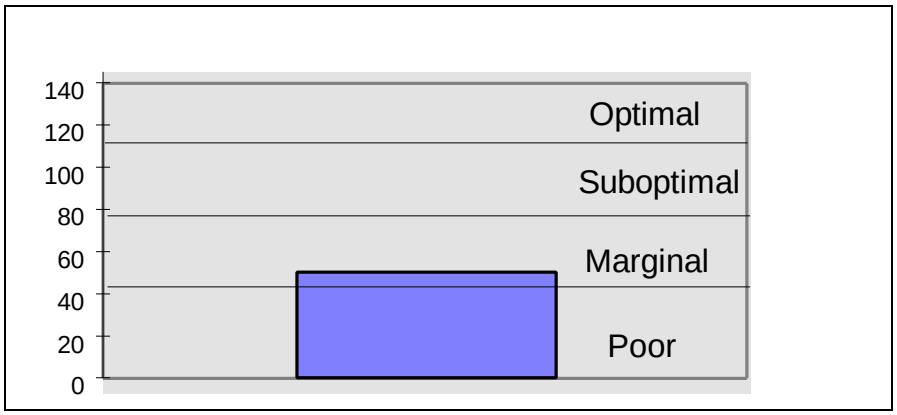
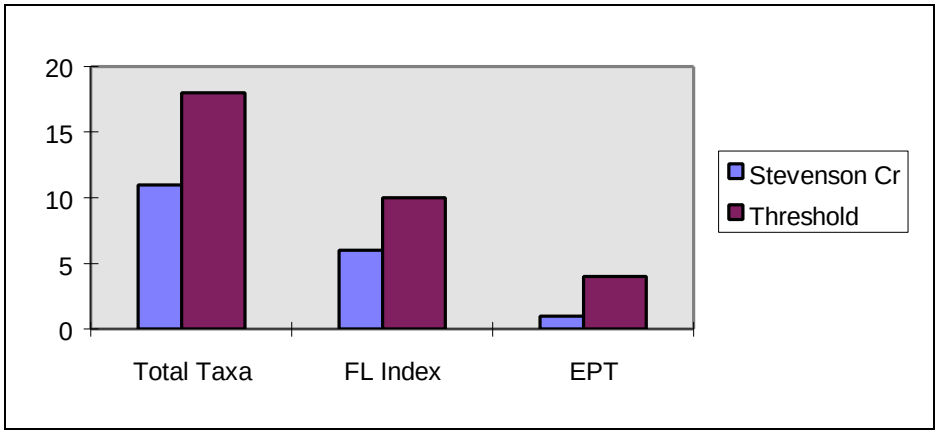


Figure 3. Water Chemistry results.

Chloro-phyll-a	Chloride	Sulfate	Ammonia -N	Nitrate-Nitrite	Kjeldahl Nitrogen	Total Phos-phorus	Ortho-phosphate	Total Organic Carbon
Tg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
1.12	41	24	0.11	0.26	0.77	0.14	0.074	11

Turbidity	Total Coliforms	Fecal Coliforms
NTU	#colonies/100 ml	#colonies/100 ml
4.3	700	108

Figure 4. Biorecon results



[1]State of Florida Department of Environmental Protection. 1993. Standard Operating Procedures Manual (Draft). Benthic Macroinvertebrate Sampling and Habitat Assessment Methods: 1. Freshwater Streams and Rivers. FDEP Contract No. WM385. EA Engineering, Science and Technology, Inc., Carrollton, Texas.

[2] State of Florida Department of Environmental Protection. 1989. Friedemann, M. and J. Hand. Typical water quality valies for Florida's lakes, streams and Estuaries. Standards and Monitoring Section. Bureau of Surface Water Management.