*A Report by the Surface Water Assessment and Monitoring Program (SWAMP)*
#98-002

# Biological Assessment of the Anclote River Watershed, March 5, 1997

## Purpose

Water chemistry and aquatic invertebrate samples were collected in order to provide data for a preliminary impact assessment of the Anclote River watershed. Standard methodology developed by SWAMP was utilized[1].

## Basin Characteristics

A relatively short river, the Anclote arises east of Land O' Lakes and flows west to the Gulf of Mexico at Tarpon Springs. The headwaters are in SWFWMD's Starkey Wellfield and Pasco County's Wilderness Park, which consists of natural forested land with a small amount of agriculture. The rest of the basin is residentially and commercially developed. Locations of study sites are shown in Fig. 1. Land use is shown in Fig. 2.

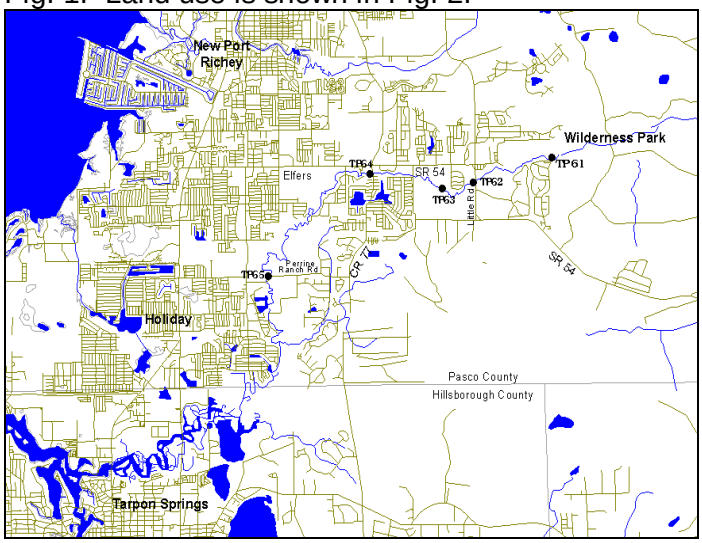


Fig. 1. Approximate location of Sites.

The Anclote River is subject to spates and varying water levels. At the time of sampling, there had been no recent rain and the headwaters in Wilderness Park were dry. TP61, intended as a background station for comparison of potential urbanization impacts, was located just upstream of Seven Springs Country Club and golf course community. Construction activity was ongoing downstream of the site. The downstream sites, TP62, TP63, TP64 and TP65, were all located in highly developed areas. TP65, furthest downstream, was a brackish water site.

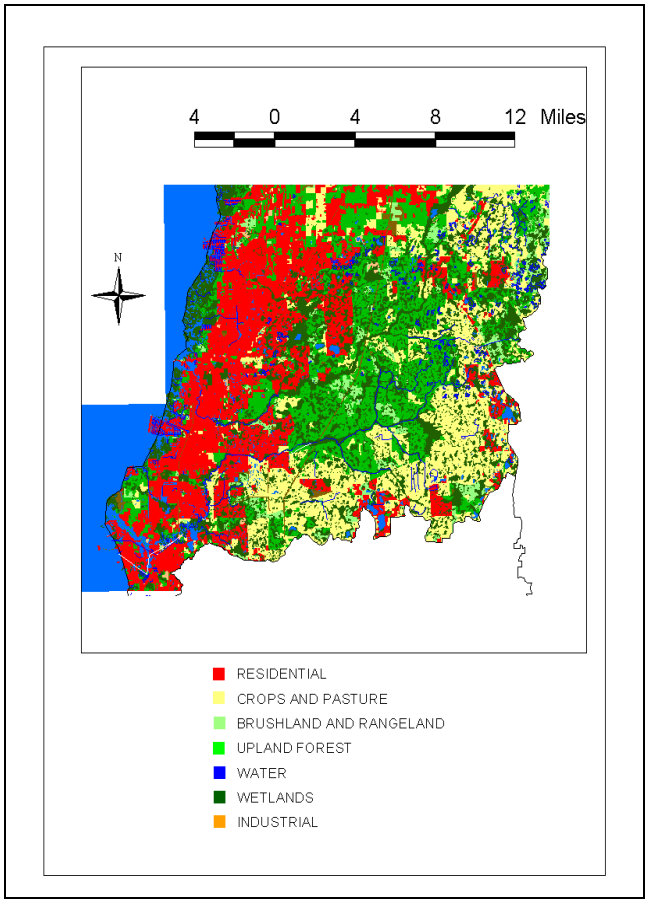


**Fig. 2. Land usage in the** watershed**.**

## Results

Habitat scores were variable. All were 'sub-optimal', due mainly to slow water velocity and reduced riparian buffer zone. These habitat parameters scored poorest at TP64, in a heavily developed area.

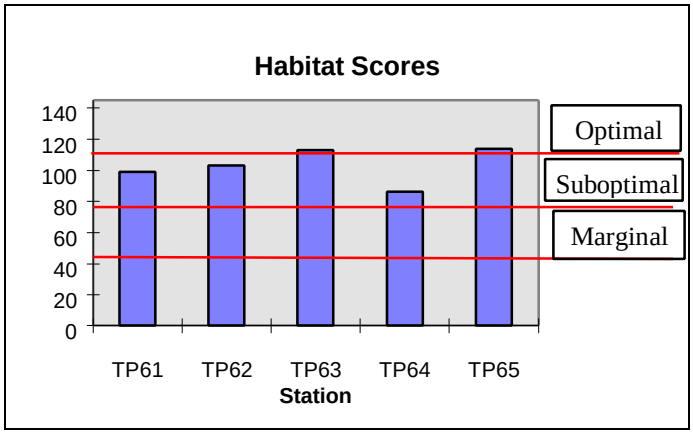


Fig. 2. Habitat scores

The Anclote River obtains most of its baseflow from the surficial aquifer, particularly during the dry season. This was substantiated by the

physicochemical measurements (Fig. 3 ), including lowered dissolved oxygen, and relatively high pH and conductivity.

| | DO (mg/l) | pH (std.unit) | cond (umho/ cm) | temp ($^{o}$ C) | Salinity (ppt) |
|---|---|---|---|---|---|
| TP61 | 4.02 | 7.21 | 412 | 22.1 | --------- |
| TP62 | 3.01 | 7.23 | 421 | 23.4 | --------- |
| TP63 | 3.93 | 7.2 | 403 | 23.2 | --------- |
| TP64 | 3.5 | 7.08 | 420 | 23.69 | -------- |
| TP65 | 4.45 | 7.1 | 8175 | 25.22 | 4.6 |

Fig. 3. Physiocochemical values (at water surface).

The water chemistry results indicated that the Anclote had very low nutrient levels in its headwaters (Fig. 4). Nitrate-nitrite nitrogen, although low at all sites, increased by an order of magnitude at stations TP62 and TP63. This is likely due to stormwater runoff from developed land, and/or the Seven Springs golf course. Elevated turbidity at the lower sites may also be evidence of urban runoff.

| | Turb (NTU) | NH4 (mg/l) | $N0_2NO_3$ (mg/l) | TKN (mg/l) | TP (mg/l) |
|---|---|---|---|---|---|
| TP61 | 0.9 | 0.015 | 0.006 | 0.18 | 0.071 |
| TP62 | 0.3 | 0.027 | 0.077 | 0.21 | 0.073 |
| TP63 | 0.3 | 0.01 | 0.077 | 0.2 | 0.072 |
| TP64 | 2.6 | 0.026 | 0.045 | 0.31 | 0.078 |
| TP65 | 1.2 | 0.015 | 0.004 | 0.46 | 0.086 |
| Blank | 0.1 | 0.015 | 0.004 | 0.06 | 0.015 |

Fig. 4. Selected water chemistry results.

The biological analysis revealed changes in the community structure of aquatic macroinvertebrates (Appendix 1). TP65 was not included in the comparisons since it was tidal and supported an entirely different estuarine fauna.

The relative percentages of fly and midge larvae (Diptera), caddisflies (Trichoptera) and mayflies (Ephemeroptera) decreased in the downstream sites, while oligochaete worms, snails (Gastropoda) and amphipods and isopods (Crustacea) increased (Appendix I, Figs. 1 and 2). This is often observed as the size of a river increases as it progresses downstream, becoming more open. More light is thus provided for the growth of vegetation, and habitat types change importance. Snails and amphipods are herbivore grazers and therefore tend to be more plentiful in large rivers. However, the freshwater study sites were very similar in size, light input and habit type, so such a dramatic change in community would not be expected.

Fig. 3, Appendix I, illustrates four parameters that reflect biological integrity in streams: number of taxa, Florida Index of sensitive species, the EPT, which is the number of Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) and the Stream Condition Index (SCI). All of these measurements tend to decrease with increased impairment. Such a decrease was found at TP62, but showed little change, if any, at TP63, which had the highest habitat score. The levels of all 4 parameters at TP64 were much less than those of the background site . This suggests impairment has occurred as the river flows downstream.

## Conclusions

A river naturally low in nutrients, such as the Anclote, may be particularly vulnerable to minimal additions of nutrients. Small, but elevated levels of nitrate-nitrite nitrogen were found in the vicinity of the developed area in central Pasco County. And, indeed, the macroinvertebrate data revealed a definite impairment at TP64, with a change in community structure and marked decrease in the SCI from 'very good' rating to a 'fair' rating. This was likely due to a combination of stormwater runoff, habitat alteration and low flow conditions.

## Suggestions

The upper, freshwater section of the Anclote River may be already losing its clean water species assemblage. Monitoring should be expanded to include parameters focusing on assessing the impact of nutrient addition, such as Algal Growth Potential (AGP). Preservation and restoration of riparian zones and instream habitat throughout the urbanized portions of the water shed should be encouraged. Special concern needs to be given to the minimum flow levels needed to maintain a healthy river, as it affects the management of the Starkey wellfield in the headwaters.

## References

[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.

For more information, contact Peggy Morgan, FDEP Southwest District, 3804 Coconut Palm Dr., Tampa, FL 33619; (813) 744 - 6100 X 490

# Appendix I

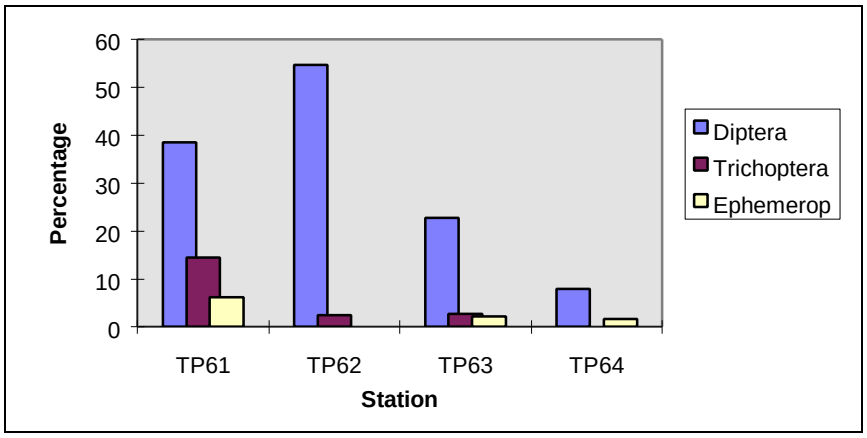



Fig. 1. Percentages of Diptera, Trichoptera and Ephemeroptera.

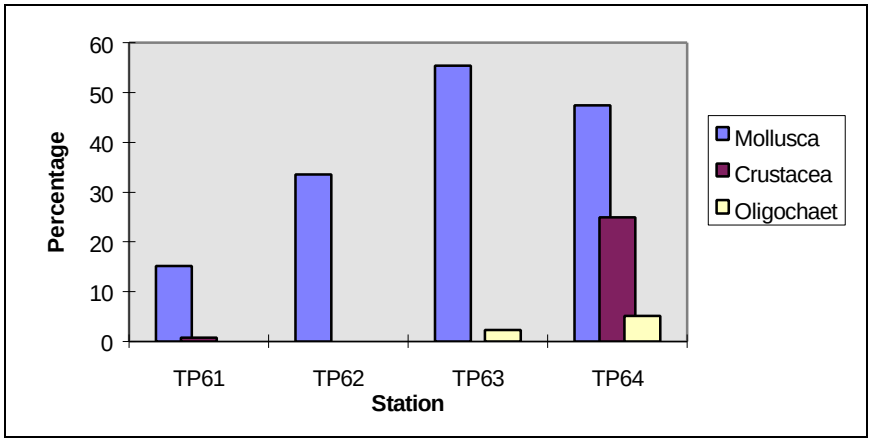



Fig. 2. Percentages of Mollusca, Crustacea and Oligochaeta

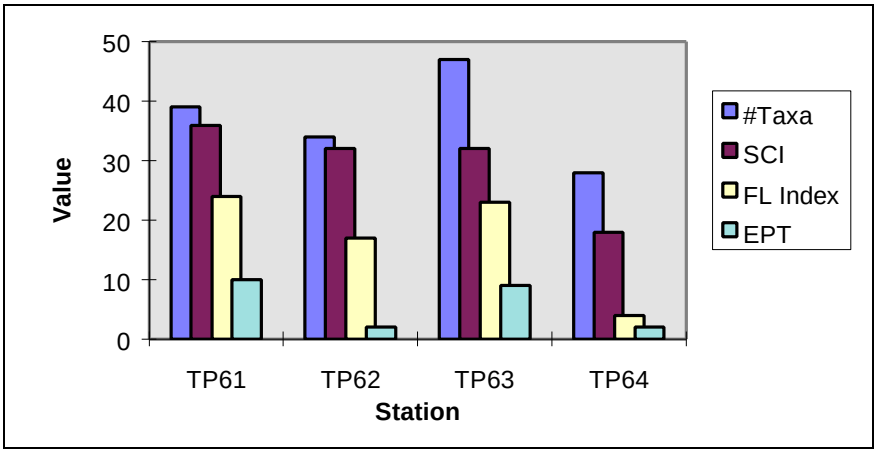



Fig. 3. Values for Total taxa, SCI, Florida Index and EPT.