THE BIOLOGICAL VIEW

Hillsborough River System, Summer 1995

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Southwest District, Tampa
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To Whom It May Concern;

This document contains results from the first Biorecon performed for the upper Hillsborough. It was performed during the rainy season. The conclusions herein are not complete. They apply to the condition of the system during periods of high water volume and velocity (the rainy season). The overall assessment of the biological health of these sites in the upper Hillsborough River watershed cannot be finalized until a second Biorecon is performed during the dry season.

Please feel free to contact me or Dana Denson for more information. If you know of others who would like to see this report, please pass it on or refer them to me at (813) 744-6100 ext. 490.

Thank you,

Peggy Morgan

In August 1995, biologists in FDEP's Southwest District Surface Water Ambient Monitoring Program initiated a study aimed at determining the ecological health of the Hillsborough River ecosystem based on the aquatic invertebrates living there. Eleven sites on the river itself or on various tributaries were sampled using a field bioassessment procedure called Biorecon (short for "bioreconnaissance"). This troubleshooting technique provides preliminary detection of potential impacts to streams. Once potential problem areas are identified, a more detailed investigation can be undertaken.

The eleven sites sampled ranged from the headwaters of the Hillsborough River near the Pasco/ Polk county line to the edge of the Tampa city limits (see map). Stream size varied from very small tributaries to broad areas of the river proper. Known impacts to the streams ranged from minimal to relatively severe.

Invertebrates were collected using dipnets and identified to species, if possible. Because some animals are indicators of good water quality and some of bad, evaluations of stream health could be made from the invertebrates present. The relative amount of stream habitat that supports a healthy aquatic community was also noted at each site.

The evaluation of whether a stream is considered healthy or impacted according to biorecon methods is based on three measurements: the total number of different species present, the number of good water quality ("Florida index") indicator species present, and the total number of mayfly, stonefly, and caddisfly species present (EPT). A stream scoring above a designated value for two or more of these measurements is considered healthy. If less than two values are reached, an impacted condition is suspected. Results are shown below.

STREAM NAME	TOTAL # SPP (Healthy: >12)	# FL INDEX SPP (Healthy: >8)	# EPT SPECIES (Healthy: >4)	STREAM STATUS
Flat Ford	45	9	3	healthy*
HR at SR 39	41	14	13	healthy
HR at Crystal Spr.	29	11	7	healthy
Southside Branch	31	16	10	healthy
Itchepack. Creek	26	10	6	healthy
Blackwater Creek	36	23	7	healthy
Two Hole Branch	24	3	3	suspected impaired *
Holloman's Branch	35	7	7	healthy *
Flint Creek	18	3	3	suspected impaired
New River	24	13	6	healthy
Trout Creek	32	9	6	healthy

* Possibly an intermittent stream.

☺ ☺ Evaluation of sites ☹ ☹

The Hillsborough River and its tributaries are, for the most part, sluggish, blackwater streams with low dissolved oxygen, particularly in the summer months. Blackwater Creek and the Hillsborough River in the upper State Park are exceptions. This is where the river flows off the Florida central highland area onto the coastal lowlands. Sampling for this study was done during the rainy season and the water at each site was deeper and flowing faster than at other times of the year. Water velocity was similar at all sites, ranging from maximum rates of 0.33 m/s to 0.50 m/s. Each site contained the same habitats for aquatic colonization, though usually in differing proportions. These habitats were submerged roots, snags, leaf packs and bottom detritus.

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☺ **Flat Ford**. This site is located on SWFWMD's Upper Hillsborough River Management Area off SR 54, just below Fish Hatchery Drain (also known as Fox Branch). The area is just downstream of the source of the Hillsborough River, in the Green Swamp, and probably does not flow strongly throughout the whole year. The river was quite flooded on the day of sampling, but not inaccessible. While a large number of species were collected (45) and the Florida Index score was 9, both falling in the healthy range, only 3 species of mayflies and caddisflies were found. This was surprising because there are few obvious sources of pollution present. There may be runoff from some distant citrus groves and minimal residential build-up, but we do not think these inputs would be likely to impact the EPT animals so strongly.

It is suspected that the river at this point may not flow year round, possibly limiting the kinds of animals that colonize the river there. Repeat invertebrate sampling in the dry season and water chemistry sampling is recommended in order to further assess the status of this headwater site.

☺ **Hillsborough River at SR 39**. This site is located downstream of the SR 39 bridge, where the river is flowing at all times of the year. It is south of the Green Swamp and Flat Ford, but east of Zephyrhills and north of Crystal Springs, so it receives very little urban impact. Surrounded by cypress wetland and upland forest, there is plenty of good quality habitat. This site is probably the least impacted by man of all the permanently flowing sites we visited.

We found the highest score for EPT at this site, and the second highest for Florida Index, indicating a very healthy ecosystem here. There were 8 species of mayflies and 5 species of caddisflies, the most diverse of all our sites for these sensitive animals.

☺ **Hillsborough River at Crystal Springs**. This site is located immediately upstream of the bridge on Crystal Springs Road, Crystal Springs. This is a forested, swampy section of the river, normally very sluggish, although the water was flowing fairly rapidly at the time of sampling. The bottom tends to be a mixture of fine detritus and larger woody debris. The site, southeast of Zephyrhills, has modest residential development in the immediate vicinity,

and a moderate amount of agriculture or dairy activity. Nutrient values have been high in the past, and the suspected sources are dairies and urban runoff. However, the surrounding forested wetlands are quite extensive, and may help to buffer pollutants that would enter the system with stormwater runoff.

A total of 29 species were collected. The Florida Index value was 11, indicating a healthy invertebrate community. Six species of mayflies were present, but only one species of caddisfly (EPT of 7). While these three values point to good water quality overall, the low number of caddisfly species in comparison with some of the other sites in the Hillsborough River watershed may suggest a subtle impact.

☺☺ **Blackwater Creek.** Our sampling site on Blackwater Creek is located on Two Rivers Ranch, at the first bridge. The Creek was ditched several years ago for drainage purposes, but has been allowed to re-naturalize. The banks now support native vegetation providing habitat for aquatic invertebrates. At this location, Blackwater Creek flows from central highlands to coastal lowlands. Thus water velocity is increased and has eroded limestone rocks, which provide a unique habitat.

Dischargers into Blackwater Creek, or tributaries or ditches leading to it,include CF Industries (mining), Alpha Owen Corning (resins manufacturer) and CSX-Winston Yard (phosphate loading and shipping). The Creek also receives runoff from rangeland, though, as previously mentioned, a buffer zone of vegetation may help to decrease this impact.

The Blackwater Creek site had the highest Florida Index score (23) and the second highest EPT (7) of all our sampling sites. The increased flow, with associated increased dissolved oxygen, and exposed limestone rock habitat is most likely responsible. This site supports a very healthy invertebrate community, indicating that the primary aspects of a good quality ecosystem are present.

☺ **Itchepackasassa Creek**. The sampling site is located on the Cone Ranch, north of Plant City, where the dirt farm road formerly crossed the creek. The Itchepackasassa has been extensively ditched to drain cattle pasture and farmland. Consequently, it does not have a lot of high quality habitat for aquatic invertebrates. It also was obviously highly turbid where we sampled. Extensive clearing for cattle has removed a lot of bordering trees that serve to buffer runoff. The creek also has received various industrial and domestic waste water outfalls in the past, some of which have ceased, or have been cleaned up. The companies currently disposing into Itchepackasassa Creek include Florida Juice, a pesticide packing and shipping company, Pine Valley Dairy, and tropical fish farms. Historical water quality data has shown levels indicating degraded conditions, including high phospherous levels and low dissolved oxygen levels.

Despite these obvious sources of pollution, historical water quality data and the lack of quality habitat, our biorecon found the Itchepackasassa site to be healthy in terms of the animals living there. It scored a Florida Index

value of 10, and an EPT of 6, though it included only one species of caddisfly.

☺☺ **Southside Branch**. This tributary flows into the Hillsborough River just upstream of the Crystal Springs site. The two sites are nearly identical in flow and habitat. The stream originates northwest of Zephyrhills and flows through the city; therefore, the main source of impact is expected to be urban runoff. There is also a good deal of range and dairy land in the upper and lower reaches. However, there is extensive forested wetlands where it meets the Hillsborough, which may function as a buffer zone to pollutants.

The biorecon showed exceptional invertebrate diversity and health. Southside Branch had the second highest scores for Florida Index species (16) and EPT animals (10). Four species of caddisflies were found, including *Chimarra* sp.. This is remarkable because we have only found this animal in rocky rapid areas, such as the rapids area in the Hillsborough River State Park, and Blackwater Creek. Such habitat is not found in Southside Branch, so the presence of this specialized, sensitive animal may be suggesting that the water quality is exceptionally good. We cannot otherwise explain the apparent absence of this species 50 ft downstream from where the tributary meets the Hillsborough River.

☹ **Two Hole Branch**. This site, which flows toward the Hillsborough from the east, is located where Highway 301 crosses the stream. Two Hole Branch is a small tributary, flowing strongly at the time of sampling, although during much of the year it is dry, or nearly so, never reaching the Hillsborough. There is moderately adequate habitat present and the immediate banks are wooded. The primary impacts are from rangeland and loss of habitat and buffering protection due to tree clearing.

Two Hole Branch failed our biorecon. Although plenty of animals were collected, the Florida Index and EPT scores were both only 3. However, we feel that the runoff impacts alone can not account for this impairment. The intermittent nature of the stream undoubtedly limits the kind of invertebrates that can live there to some degree. Water chemistry sample collection and a second Biorecon study in the dry season are needed to help clarify the situation.

☺ **Hollomon's Branch**. We sampled this tributary on Highway 301, about one mile south of Two Hole Branch. It, too, may be an intermittent stream. The main impact is rangeland and possibly tree clearing, although the banks were well wooded where we sampled. Water velocity was swift and there was plenty of good quality habitat present, particularly snags.

Hollomon's Branch barely passed the biorecon. Many different kinds of animals were collected, and the EPT score was 7. But the Florida Index score was only 7. The fact that the stream probably does not flow throughout the year, like Two Hole Branch and Flat Ford, may influence the invertebrate community living there. Repeat invertebrate sampling in the dry season and water chemistry sample collection is needed to help clarify the situation.

☹ **Flint Creek**. We sampled this creek just upstream of the bridge on Highway 301. Flint Creek flows out of Lake Thonotosassa, a highly eutrophic, green water lake. The Plant City Waste Water Treatment Plant contributes significant phosphorous loading, indirectly, to the lake. This discharge is scheduled to end by 1997. Crystal International also discharges to the system via Pemberton and Baker Creeks. In addition, the lake is surrounded by citrus groves which undoubtedly introduce fertilizers and pesticides to the water column.

Flint Creek is typically very swampy at this site, bordered by cypress wetlands. The water was flowing fairly quickly at the time of sampling and was visibly turbid. Moderately adequate habitat was present. Although a large number of animals were collected, they were not very diverse nor were they representative of good water quality. The Florida Index value (3) and the EPT score (3) were below the thresholds defining "healthy".

Flint Creek will continue to be a source of nutrient impact to the Hillsborough River until Lake Thonotosassa is cleaned up.

☺ **New River**. New River is another possibly intermittent tributary of the Hillsborough River, flowing from the northwest. We sampled it where it flows under Morris Bridge Road. The creek had been quite flooded, but the water level had dropped drastically by the time we sampled it. The stream is shallow, clear, and has a clean sand bottom. It meanders through rangeland, but apparently the banks have not been cleared of trees completely, leaving a narrow buffer zone as far as we could see. Water velocity was fairly rapid, but quality habitat was minimal.

There were a lot of good water quality indicators present, although not abundant. The Florida Index score was 13, and EPT was 6. Despite the potential inputs and lack of abundant habitat, this locality on New River was found to be healthy in terms of the aquatic invertebrate community.

☺ **Trout Creek**. This site is located in Flatwoods Park, a Southwest Florida Water Management District land management area. Trout Creek flows toward the Hillsborough from the northwest, passing south of Hunter's Green golf course community, and receiving indirect discharge from Pebble Creek Waste Water Treatment Plant. The creek is bordered by upland forest for most of its length.

The biorecon indicated a fairly healthy system. The Florida Index score was 9, and the EPT was 6. These are passing scores, though not as impressive as those found in some of the more northern tributaries.

Ecosystem Management Recommendations.

1**. Point-source impacts.** Most of the facilities discharging into the Hillsborough River watershed have cooperated, or are currently cooperating, with the FDEP to improve the quality of their effluent, and in some cases remove it from surface water. Permits for these facilities should include continued monitoring of these discharges and seasonal monitoring of aquatic invertebrates to evaluate overall health of the receiving stream.

2. **Non-point impacts**.

a) Rangeland and dairies. A cooperative effort with ranchers and dairies is needed in order to decrease the impacts associated with runoff. This is where the cornerstone of stewardship is crucial. Cattle use of streams must be limited and wooded buffer zones re-established, either naturally or enhanced, through a collaborative effort between citizens and government.

b) Citrus and Row crops. There has been little documentation of pesticide and fertilizer runoff from agricultural fields. Because runoff is dependent on rainfall, the impact occurs sporadically, not continuously. This makes it difficult to examine. Studies must be performed during storms, preferably one inch rainfall events. In addition, pesticide analysis is expensive. While it is likely that pesticide-related toxic impacts occur with heavy rainfall, periodically killing aquatic invertebrates and fish, there isn't much actual data to support it. In order to justify the need for the stewardship of farmers, these events must be documented. We want to perform such studies, but we need the allocation for the pesticide analysis.

Through stewardship with agricultural landowners, best management practices designed to decrease runoff, or contamination of runoff, could be implemented on a watershed basis. In addition, forested buffer zones, wetlands and stream habitat could be enhanced so that overall ecosystem health is maintained.

3. **Urban runoff**. Municipal stormwater treatment pracices should be continued and further developed.

4. **Education** is an underlying force for the success of environmental stewardship, and thus the success of ecosystem management. Fostering in people a love and respect for the importance of their natural environment will accomplish results which a regulating agency could never impose.

5. **Further studies to assess ecological health and management success**. The Biorecon study of the Hillsborough River watershed will be repeated during the dry season to assess ecological health during periods of diminished flow, and repeated a second year to determine if these results are consistent.

We plan on eventually assessing all the watersheds in our district with the Biorecon methodology.