BASIN ASSESSMENT

Lower Peace River, Myakka River

October 1983 - September 1984

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I. INTRODUCTION

FLORIDA BASIN 25

The South Florida Branch office at Punta Gorda undertook in FY-84 an evaluation of the lower Peace River drainage basin (Basin 25) as it's first basin assessment project. This basin is one of the largest and most important in the southwest Florida area and it is of interest since it is the primary source of flow to Charlotte Harbor, an area of current environmental concern within our district. It is also of great interest since the pressures of growth within the surrounding counties will undoubtedly effect the water quality of the basin. The Lower Peace River, besides being a source of aesthetic value, also serves as a potable water resource for thousands, and higher demands will surely be placed on it in the future.

The assessment is of a limited (one year) duration and because of manpower restraints does not study in great detail any one particular problem with large amounts of data and numerous sampling stations; instead we attempt to characterize the water quality of the system with a select number of stations on important mainstream areas and tributaries.

The basin has a high potential of being affected by increasing phosphate strip mining activities in the near future and by increased population densities. We believe that these data will be a benchmark for this time period and will serve as background information on water quality when a similar assessment will be made of the same area approximately five years from now.

II. GENERAL DESCRIPTION OF STUDY AREA

For the purposes of the study we included the Myakka River, the Peace River south from Zolfo Springs to Charlotte Harbor and also the main tributaries to the lower section of the Peace River. These included Horse Creek, Brushy Creek, Charlie Creek, Shell Creek, Prairie Creek, Alligator Creek and the Elkam Waterway in Port Charlotte.

A general descripton of the Myakka and Peace River Basins is given in the Section 305(b) Report Water Quality Inventory for the State of Florida - June 1984. "The headwaters of the Myakka River arise from marshes in Hardee County in southwestern Florida. The river tranverses approximately 54 miles, draining roughly 540 square miles prior to discharging to Charlotte Harbor. The average flow of the Myakka River at Myakka City is estimated at 130 cfs. A salt wedge extends upstream from Charlotte Harbor during periods of low flow. Rangeland (46%) and agriculture (26%) are the major land uses in the relatively undeveloped Myakka River Basin. There are no major urban areas in the Myakka River Basin; however, the City of Sarasota is located just west of this basin.

The Peace River originates in Green Swamp in Central Polk County and flows generally southwest for approximately 105 miles, entering the Gulf of Mexico at Charlotte Harbor. The drainage area encompasses over 2,300 square miles. Numerous lakes and large areas of poorly drained swamps, in the headwaters of the Peace River, act as an important recharge area for the Floridan aquifer. The mean flow of the Peace River at Arcadia is recorded as 900 cfs 36 miles upstream from the mouth. Primary tributaries of the Peace River include Peace Creek, Saddle Creek, Charlie Creek, and Shell Creek. The major urban areas in the basin include: Lakeland, Port Charlotte and Punta Gorda. Land use in the upper portion of the Peace River Basin includes predominantly agricultural land use. An additional large percentage of barren land (25%) reflects the extensive phosphate mining activities in this reach of the river. In the lower portion of the Peace River Basin, land use consists primarily of agriculture and range-land. Pollution sources in the Peace River Basin include domestic sewage discharges, heavy industrial discharges from phosphate mining activities, chemical and citrus processing plants, and surface runoff from urban, agricultural, range and barren (mined) areas."

A map is attached of the overall study area (Map 1), outlining the drainage basins and also showing the Chemical and Biological sampling stations. Individual station locations are given in more detail on county maps (Maps 2 through 7) - see Appendix A. We are not including the Charlotte Harbor area in this report since it is currently still under study as a "Special Study" and will be covered under a seperate report.

III. CHEMISTRY

i Analytical Methods

A total of thirty-four stations that were considered representative of the two main rivers and the basin tributaries were selected for sampling. Sampling was conducted at these stations on a quarterly basis throughout the year for the following chemical parameters: conductivity, pH, temperature, dissolved oxygen, turbidity, color, minerals, nutrients, fecal coliform, chlorophyll-A and a limited metal scan. These results have been stored in the STORET data system where there is also in some cases a considerable volume of historical information from previous years.

The methodology was performed as per the 14th Edition of "Standard Methods" and/or E.P.A. "Methods for Chemical Analysis of Water and Wastes - 1979."

Samples collected in the field were immediately preserved by ice and/or chemically fixed. Lab holding times of samples were consistently within the suggested E.P.A. ranges.

The following outline shows current quality assurance limits and capabilities for these and other parameters.

Measurement	STORET Code	S.O.P.	95% Confidence Limits Accuracy	95% Confidence Limits Precision	Detection Limits
Dissolved Oxygen	299	SM[1] 422F	-	-	0.1 mg/l
Dissolved Oxygen	300	SM[1] 422B	-	-	0.1 mg/l
Turbidity	70	SM[1] 214A	-	-	25 JCU
Turbidity	76	SM[1] 214B	11.3, -3.7	-	1.0 NTU
Specific Conductance	94	SM[1] 205	-	-	1.0 umho
pH	400	EPA[2] 150.1	-	-	0.1 pH
Temperature	10	SM[1] 212	-	-	0.1° C
Lab pH	403	EPA[2] 150.1	-	-	.01 pH
Color	80	EPA[2] 110.2	-	-	5. pt.co.
Total Solids	500	EPA[2] 160.3	-	6.0	-
Suspended Solids	530	EPA[2] 160.2	-	23.0	-
B.O.D.	310	SM[1] 507	-	18.8	0.5 mg/l

Measurement	STORET Code	S.O.P.	95% Confidence Limits Accuracy	95% Confidence Limits Precision		Detection Limits
C.O.D.	340	EPA[2] 410.4	+13.5, -11.5	23.7		5.0 mg/l
Free Chlorine	50064	SM[1] 409F	8.3, -17.7	-		0.1 mg/l
Chlorine - Total	50060	SM[1] 409B	-	-		0.1 mg/l
Sulfate	945	SM[1] 427C	+11.2, - 9.9	<20 13.6 >20 5.1		2.1 mg/l*
Fluoride	951	SM[1] 414B	+ 8.3, - 6.6	6.1		.17 mg/l*
Chloride	940	SM[1] 408A	+ 6.4, - 4.1	7.7		3.2 mg/l*
PO_4-P Ortho	70507	EPA[2] 365.2	+12.8; - 7.3	<.02 18.3 >.02 12.2		.003 mg/l*
PO_4-P Total	665	EPA[2] 365.2	+ 8.1; -10.7	<.05 16.7 >.05 8.6		.01 mg/l*
NO_2	615	EPA[2] 354.1	+ 3.2; -29.2	<.03 7.4 >.03 4.1		.006*
NO_3	620	SM[1] 419D	+10.8; -12.5	<.30 13.1 >.30 7.5		.06 mg/l*
NH_3	610	EPA[2] 350.2	+15.6; -19.8	27.5		.02 mg/l
TKN	625	EPA[2] 351.3	+ 5.6; -13.0	<1.0 16.8 >1.0 10.5		.07 mg/l*
MF Coli	31501	SM[1] 909A	-	-		1 colony/ 100 ml
MF Fecal	31616	SM[1] 909C	-	50.2		1 colony/ 100 ml
Chlorophyll A	32211	SM[1] 1002G	-	13.7		-
Alkalinity	00410	EPA[2] 310.1	-	-	FLAME	MIBK EXTRACTION
Calcium	916	EPA[2] 215.1	9.4, - 8.7	11.9	0.1 ug/l	-
Magnesium	927	EPA[2] 242.1	8.4, - 6.6	9.4	0.1 ug/l	-
Sodium	929	EPA[2] 273.1	-	-	0.1 ug/l	-
Potassium	937	EPA[2] 258.1	-	-	0.1 ug/l	-
Iron	1045	EPA[2] 236.1	+43.7, -22.6	51.5	50 ug/l	5 ug/l
Zinc	1092	EPA[2] 289.1	+39.8, -76.5	25.4	25 ug/l	5 ug/l
Lead	1051	EPA[2] 239.1	+45.3, - 9.7	22.2	250 ug/l	25 ug/l
Copper	1042	EPA[2] 220.1	+58.6, -34.9	47.1	50 ug/l	5 ug/l
Nickel	1067	EPA[2] 249.1	+66.0, -16.3	23.3	100 ug/l	10 ug/l

Measurement	STORET Code	S.O.P.	95% Confidence Limits Accuracy	95% Confidence Limits Precision	Detection Limits FLAME	Detection Limits MIBK EXTRACTION
Manganese	1055	EPA[2] 243.1	-	-	50 ug/l	-
Chromium	1034	EPA[2] 218.1	-	-	250 ug/l	-
Mercury	71900	EPA[2] 245.1	+ 4.8, -25.9	93.1	0.2 ug/l (FLAMELESS)	-
Cadmium	1027	EPA[2] 213.1	+43.0, -13.2	-	10	2 ug/l
Oil & Grease	556	EPA[2] 413.1	-	-		5.0 mg/l
Lead-Sediment	Digest Then	EPA[2] 239.1	+ 7.8; - 7.6	7.7	2.5 mk/kg	-
Copper-Sediment	Digest Then	EPA[2] 220.1	+ 8.7; -14.6	10.0	0.5 mk/kg	-
Zinc-Sediment	Digest Then	EPA[2] 289.1	+14.7; -14.2	12.3	0.25 mk/kg	-
Iron-Sediment	Digest Then	EPA[2] 236.1	+14.0; -18.9	11.5	0.5 mk/kg	-
Mercury-Sediment	Digest Then	EPA[2] 245.5	+48.9; -55.4	52.4	0.2 mk/kg	-

SM[1] - Standard Methods for the Examination of Water & Wastewater - 14th Edition

EPA[2] - Methods for Chemical Analysis of Water & Wastes. March 1979

The statistical limits were determined in the following manner;
Accuracy - is defined as the percent recovery compared to a known value. The value of zero (0) indicates complete recovery (100%). The statistical limits for free chlorine, turbidity, and all metals were determined against known EPA samples that were analyzed in evaluation series run since 1981. All other accuracy figures were determined internally by running spiked samples.

The 95% confidence limits were evaluated by the following formula;
95% confidence limits = $x \pm 1.96$ x standard deviation.

Precision - All values were determined by running replicates internally in our lab. Precision is determined as

$$\frac{V_1 - V_2}{\left(\frac{V_1 + V_2}{2}\right)} \times 100$$

here the 95% confidence limits = $x + 1.96$ x standard deviation.

Minimum detection limits - Values marked with an asterisk * were determined experimentally by running a series of replicates and defining the minimum detection limit as twice the standard deviation. Other minimum detection limits are the values of the lowest standard normally run or the lower limit of the measuring device.

ii Myakka River

The Myakka River is one of the more pristine streams in south Florida. It flows through many large undeveloped tracts, including Myakka River State Park, and is directly affected by no major urbanized areas. Minor pollution inputs include low density cattle grazing operations, small citrus groves, and a few plant and tree farms.

As expected, the water quality of this river is characterized as "good". Dissolved oxygen levels in the upper reaches are somewhat depressed due to natural influences of the surrounding swampy marshlands from which its tributaries originate. Total phosphate levels are relatively high, probably due to vegetation decay and natural phosphate deposits, but these levels moderate somewhat downstream.

A total of eight stations in the river were sampled for chemical and physical parameters, and two of these were monitored for biological parameters. In addition a major tributary, Big Slough, was sampled for chemical and physical parameters. Sample dates were 10/19/83, 01/03/84, 04/10/84, and 07/09/84, attempting to represent seasonal stream flow conditions. A station list is found below.

Station Number	Location*
25030011	State Road 70
25030009	State Road 70 (Biologists Only)
25030008	Northern Entrance to Myakka River State Park
25030404	State Road 72
25030403	Border Drive
25030402	U. S. Highway 41
25030413	Big Slough at U. S. 41
25030401	State Road 771

* See Site Location Maps, Appendix A.

The upstream most station in this study, number 25030011, is located just west of the hamlet of Myakka City. The surrounding and upstream area affecting this site is swampy, with some cattle rangeland and citrus groves on the higher lands.

Station 25030008, located at the northern boundary of Myakka River State Park, exhibits somewhat poorer water quality than the other stations in the study. Dissolved oxygen (mean 4.8 mg/l) is lower and nutrients are slightly higher at this station than at the stations immediately upstream or downstream. Probable causes include numerous small tributaries draining extensive cattle ranches to the southeast of the river and a large marsh to the northwest.

Downstream the river flows into Myakka River State Park, which is undeveloped except for picnic areas and primitive campgrounds. A large manmade impoundment, Upper Myakka Lake, is located here and is nearly choked with dense hydrilla growth. The river below the dam also has a significant hydrilla problem.

Station 25030404 is located at State Road 72, approximately the midpoint of the state park. At this station dissolved oxygen has rebounded somewhat, total phosphorous has declined, white nitrogen levels remain constant.

Between the above station and the station downstream, number 25030403, the watershed is almost completely undeveloped, with some unimproved rangeland for "wild" cattle. Nutrients here are lower than upstream, while fecal coliform counts increase significantly.

Station 25030402 is located at the U. S. 41 bridge. During periods of low flow, this station is sometimes tidally affected. Sample data reveals a slight lowering of total phosphate levels, while fecal coliform counts remain high.

In connection with this study, a major trubutary of the Myakka River, Big Slough, was also sampled. Big Slough (station 25030413) drains the developed and undeveloped parts of North Port Charlotte. Somewhat surprisingly, nutrient, dissolved oxygen, and fecal coliform data at this station were quite similar to that of the Myakka River station at U. S. 41.

The final site, number 25030401, is a marine station located at the State Road 771 bridge. Influences at this station include tidal exchange with Charlotte Harbor and runoff from the small communities of Gulf Cove and El Jobean. Total phosphate levels are higher at this station than upstream because of tidal exchange with waters affected by the Peace River.

Three stations were sampled once for metals analyses. Only iron was present in significant amounts. Variations in iron levels at the three sites are likely the result of flow conditions.

For complete chemical data see Appendix B, figures 1 and 2. For graph of nutrient levels by site, see Appendix C, figure 8.

The general water quality of the Myakka River is much better than that of the Peace River, and its potential for adversely affecting Charlotte Harbor in the near future is small. The upper reaches are likely to remain undeveloped for the foreseeable future. However, in the Gulf Cove - El Jobean area, extensive residential development is planned which will impact the marine areas of the river in the future.

iii Peace River

The section of the Peace River studied in this report is from Zolfo Springs southward to Punta Gorda. Historically this part of the river has had relatively good water quality when compared to the severe nutrient and dissolved oxygen problems of the upper portions from Lake Hancock through the phosphate mining areas. However, the lower river is now threatened by planned phosphate mining in one of its major tributaries, Horse Creek.

The study area is sparsely populated, consisting primarily of swampy wooded areas, improved and unimproved cattle rangeland, and citrus groves. Urban impacts are Zolfo Springs (population 2,000), Arcadia (population 6,000), and, in the lower marine area, Punta Gorda (population 10,000) and Port Charlotte (population 45,000). Pollution sources include agricultural and urban runoff, domestic sewage effluent discharges and landspreading, septic tank pollution, and nursery and tree farm operations. It should be noted that much of the nutrient load, especially phosphates, is from mining activities upstream of the study area, and from naturally occurring phosphate deposits in stream beds of the river and many of its tributaries.

Seven stations in the Peace River were sampled for chemical and physical parameters, four of which were also biological monitoring stations. Chemical samples were collected on 11/08/83, 02/06/84, 05/01/84, and 09/17/84. A station list follows.

Station Number	Location*
25020531	State Road 64 bridge, near Zolfo Springs
25020459	1.25 miles west of Gardner
25020401	Brownville Road bridge, near Brownville
25020004	State Road 70 bridge, near Arcadia
25020003	County Road 760 bridge, near Nocatee
25020002	County Road 760 bridge, near Lettuce Lake
25020001	U.S. Highway 41 bridge at Punta Gorda

* See Appendix A for site location maps.

The Zolfo Springs station (25020531) is affected by upstream influences, urban runoff from Zolfo Springs, and light agricultural and ranching activities. As expected from its being the farthest upstream sample in this study, total phosphate levels (mean 2.19 mg/l) are highest at this station.

Downstream from Zolfo Springs to the next station near Gardner (25020459), the surrounding watershed is the least developed area of this Peace River study. Land use on the eastern side of the river is primarily rangeland, much of it wooded, interspaced with small citrus groves. The western side is much the same, but with a greater proportion of groves. The Gardner station is affected by Charlie Creek, which enters the river just upstream. (Charlie Creek is discussed later in the "Tributaries" section of this report). Because of the dilution effect of this major tributary and numerous smaller ones, nutrient levels are slightly lower at this station than at Zolfo Springs.

Between Gardner and the Brownville station (25020401), the watershed remains relatively undeveloped, and is used for light ranching and citrus grove operations. There are no important tributaries in this section of the river, consequently the chemical data of this station is much the same as at Gardner.

Downstream from Brownville there is a marked increase in citrus farming, especially on the western side of the river along County Road 661. Extensive groves interspaced with small areas of cattle pasture extend along this road to the intersection with State Road 70. The eastern area becomes more developed as it approaches Arcadia, but the primary use is light agricultural activities.

The Arcadia station (25020004) is located at State Road 70 at the west central edge of the city's urbanized area and so is influenced by sources in the northern half of the city, including runoff and domestic sewage effluent leachate. In spite of these influences, nutrient concentrations remain fairly constant with the upstream station at Brownville. Fecal coliform counts, however, are significantly higher than at the other Peace River stations.

The area between Arcadia and the station near Nocatee (25020003) is moderately urbanized along U.S. 17 on the eastern side of the river, while the western side is primarily wooded rangeland and citrus groves. Runoff from the Desoto County landfill off County Road 661 is another possible source in this section. This station is affected by the input of Joshua Creek (see "Tributaries report, sec. v), which joins the river just upstream. Nutrient and mineral levels here are similar to those of the Arcadia station.

A significant decrease in nutrient levels occurs between the Nocatee station and the one at County Road 761, near Lettuce Lake (25020002). This station is downstream of the Horse Creek influence, and the surrounding area is swampy with many small tributaries adding to the flow.

Downstream of the Lettuce Lake station, the river rapidly becomes wider and a gradually increasing tidal influence begins. The most downstream station, at Punta Gorda (25020001), is basically marine in nature, but can be quite fresh in times of exceptionally heavy river flow. This station is influenced by flow from the Peace River, tidal exchange with Charlotte Harbor, and sources in the Punta Gorda - Port Charlotte urbanized area. These sources include runoff from domestic sewage effluent land spreading, urban runoff, septic tank pollution, and extensive dead-end canal systems of very poor water quality. This station is also included in the Charlotte Harbor water quality study, of which a separate report will be forthcoming.

As expected because of the dilution effect of tidal influences, nutrient levels are much lower at this station than those upstream. However, total phosphate concentrations (mean .51 mg/l), are still significantly high.

In addition to nutrient, mineral, physical and biological parameters, three stations were sampled for metals analyses. Two stations, Zolfo Springs (25020531) and Lettuce Lake (25020003), were sampled for metals on one occasion only, while Arcadia (25020004) was sampled twice. Iron concentrations seem to increase slightly downstream, due perhaps to source or natural influences, or possibly due to flow conditions as the stations were sampled on different dates.

The Arcadia station was sampled for metals more extensively in studies conducted during fiscal years 1982 and 1983, again with iron being the only heavy metal detected in significant concentrations. The FY82 mean concentration of 337 ug/l and the FY83 mean of 485 ug/l compare similarly with the 321 ug/l mean iron concentration in this study.

For complete site by site chemical data summaries, see Appendix B, figures 3 and 4.. For a graph comparing nutrient levels at the various stations, see Appendix C, figure 9.

To summarize, water quality in the section of the Peace River covered by this report is characterized by high nutrient levels (especially phosphate and nitrate) resulting in periodic algae blooms, generally satisfactory dissolved oxygen, and area-normal mineral concentrations. A gradual downstream reduction in nutrient levels indicates that pollution sources in the study area are not as important as those upstream, although the local phosphate load is quite significant due to naturally occuring phosphate deposits. The receiving estuary of Charlotte Harbor is able to assimilate this nutrient load because of its pristine nature south of the Punta Gorda area. However, extensive residential development pressures cause concern for the future of this productive estuarine system.

iv Horse Creek

Horse Creek has been the subject of an ongoing study for some three years, because Amax Corporation controls a large area in the creek's watershed and plans to mine phosphate there in the future. Since Horse Creek is a major tributary of the lower Peace River, the report of the fiscal year 1984 findings will be included in this study.

Horse Creek originates near the northeast edge of Manatee County and flows generally southward through western Hardee County and most of Desoto County, entering the Peace River approximately one mile north of the State Road 761 bridge. It was sampled on 12/12/83 and 06/04/84 at six locations, and Brushy Creek, a tributary, was also sampled. The following is a list of these stations.

Station Number	Location*
25020530	Brushy Creek at State Road 64, Hardee County
25020428	Horse Creek at State Road 64, Hardee County
25020430	Horse Creek at County Road 663, Hardee County
25020427	Horse Creek at County Road 665, Hardee County
25020423	Horse Creek at State Road 70, Desoto County
25020111	Horse Creek at State Road 72, Desoto County
25020420	Horse Creek at State Road 761, Desoto County

*See Appendix A for site location map.

Land use in the Horse Creek watershed is primarily cattle rangeland and citrus groves, with a scattering of other small agricultural activities. Brushy Creek is similar but with less intensive usage. Because of natural phosphate deposits in their stream beds, these creeks are high in total phosphate. Brushy Creek exhibits somewhat depressed dissolved oxygen, low minerals, and normal nitrogen levels.

Dissolved oxygen is also low at station 25020430 in Horse Creek. This part of the creek, known as Goose Pond, is very swampy, and a large plug of water hyacinths exists above the sampling site. Total phosphate, minerals, and nitrate are lower here than the other stations, while total kjeldahl nitrogen is somewhat higher.

Downstream from Goose Pond, dissolved oxygen recovers quickly and nutrient levels increase. Minerals, especially sulfate, are also higher. The lower three stations (25020423, 25020111, and 25020420) have similar values for all parameters.

For complete data summaries, see Appendix B, figure 5. For a graph of Horse Creek nutrients, see Appendix C, figure 10.

v Peace River Tributaries

In addition to Horse Creek, several other tributaries of the Peace River and of northeastern Charlotte Harbor were sampled. Below is a list of these stations.

Station Number	Location*
25020534	Charlie Creek at S.R. 66
25020005	Charlie Creek at U.S. 17
25020406	Joshua Creek at S.R. 31
25020404	Joshua Creek at U.S. 17
25020433	Prairie Creek at S.R. 761
25020120	Shell Creek
25020124	Shell Creek (Biologist Only)
25020526	Elkam Waterway at Hillsborough Ave
25020473	Elkam Waterway at U.S. 41
25010061	Alligator Creek, North Fork
25010008	Alligator Creek, South Fork
25010011	Alligator Creek, (Biologist Only)

* See Appendix A for site location map.

Charlie Creek was sampled in two locations, at State Road 66 and downstream at U.S. 17. The watershed affecting the upstream site is primarily rangeland with some citrus groves. Downstream toward U.S. 17 citrus groves become more numerous and extensive, but the primary use is still rangeland. Due to the marshy nature of the creek and its tributaries, the water is darkly colored and low in dissolved oxygen. Total phosphate increases between S.R. 66 (mean .38 mg/l) and U.S. 17 (mean .51 mg/l), probably due in part to increased agricultural activity. Total nitrogen levels are similar, with TKN values higher at S.R. 66 and nitrate higher at U.S. 17.

Joshua Creek, which joins the Peace River south of Arcadia was also sampled in two locations, at S.R. 31 and at U.S. 17. Above the S.R. 31 station, the surrounding area consists of rangeland, small citrus groves, and low density housing developments. Between S.R. 31 and U.S. 17, there is intensive agricultural land use, primarily citrus groves. Because of this activity, nutrient levels, especially nitrogen, are significantly higher at the downstream station.

Shell Creek joins the Peace River five miles northeast of Punta Gorda, and is the potable water source for this city. This creek and its major tributary, Prairie Creek, drain areas primarily used for rangeland, with some citrus groves, vegetable farms, and low density housing developments. Both creeks have good water quality. Prairie Creek has somewhat higher nitrogen levels due to more intensive agricultural activities, while Shell Creek has periodic high chloride levels because of the influence of uncapped artesian wells used for irrigation.

The Elkam Waterway was chosen as representative of many similar drainage canals that empty into the upper Charlotte Harbor - Peace River confluence from the Port Charlotte area. The uppr two-thirds of the canal drains an area with paved roads and lots platted for development, but with few houses. Through the lower one-third of the canal length toward U.S. 41, the area becomes gradually more developed. At the downstream sampling site just northeast of U.S. 41 the surrounding area is heavily urbanized.

Two sites were sampled on this canal. Station 25020473 is located near the upstream dead end of the canal, above any urban influence. The downstream station 25020473, located in the center of the most urbanized part of Port Charlotte. In comparing the two we find that minerals are higher at the upper station (probably due to groundwater influence), nutrient levels are similar, and fecal coliform and chlorophyll A concentrations are higher at the lower station.

Alligator Creek flows into Charlotte Harbor just south of Punta Gorda. It was sampled in its two main branches, the North and South Forks. The North Fork drains sparsely developed areas just east of Punta Gorda, and is channelized at the sample site. The South Fork drains cattle rangeland and citrus groves.

The North Fork was found to have depressed oxygen levels (mean 2.8 mg/l) and relatively low nutrient levels. The South Fork has a less severe dissolved oxygen problem (mean 4.1 mg/l) and slightly higher nutrient concentrations.

Metals analyses were performed on samples from Joshua Creek (25020005) and the Elkam Waterway (25020473). Iron was found in concentrations similar to other area streams, while other metals concentrations were low.

Complete summaries of chemical data are found in Appendix B, figures 6 and 7. A graph of tributary nutrient levels is in Appendix C, figure 11.

Generally, the water quality of these tributaries is fairly good, the most significant problems being high nitrogen in Joshua Creek and low dissolved oxygen in Alligator Creek. However, future development and planned phosphate mining raises concerns for the well-being of the lower Peace River and Charlotte Harbor.

i Methods

The Department has proposed that qualitative collecting be the method employed to sample freshwater benthic macroinvertebrates for the Basin Assessment program. The reason for this is that qualitative sampling (as opposed to quantitative sampling, either natural or artificial substrates) is considered to be a cost-efficient technique, primarily because (1) a great amount of time is saved in sample processing (sorting), and (2) multiple habitats can be sampled effectively at the same time. The underlying assumption is that the qualitative method will be at least comparable to the quantitative method in terms of its ability to detect changes in the invertebrate fauna due to changes in water quality.

Qualitative sampling was employed in our biological assessment of the lower Peace River/Myakka River watershed, conducted October 1983 through September 1984. However, it was not presumed a priori that the method would yield data useful for their intended purpose; therefore, our program was designed in such a way to aid in evaluating its efficacy.

Perhaps the greatest advantage of quantitative sampling, aside from quantitative estimates of community structure, is the standardization of sampling device, sample unit size, and substrate type. It is this standardization that makes the method so amenable to comparisons of samples taken through time or space. For that reason, we attempted to standardize, to the maximum extent possible, those parameters of the qualitative method known to influence the number of taxa collected:

(1) Gear - A standard D-frame aquatic dip net, mesh size approximately 900 um, was the principal collecting method, although rarely a ponar grab and/or 350 um sieve were also used. The net was worked vigorously into the sediment and vegetation of all habitats and water types (runs, riffles, pools, littoral, etc.) in the study section. Net contents were dumped unceremoniously into shallow, white enamel pans and picked through with forceps and eyedroppers until no new species were found. In addition, large substrate components (e.g., rocks, logs, boards, bottles, cans, palm fronds, hyacinth, algae clumps) were carefully examined individually. Organisms were field-preserved in 80% ethanol. Undoubtedley, the use of additional types of gear (e.g., artificial substrates, drift nets) would collect additional taxa; however, time constraints precluded their use.

(2) Station - Biological assessments were conducted at 14 stations; 2 on the Myakka River, 4 on the lower Peace River, and 8 on Peace River tributaries. The numerical designators for these stations can be found in Table D-1, and their locations are indicated precisely on the attached county maps (Appendix A). Criteria for station selection were (1) obtain coverage of the watershed, and (2) avoid mixing zones. In general, each station comprised a 65m stretch of stream. Station photographs are on file at this office. Historical benthos data exist for the following stations: 25010011, 25020004, 25020005,

25020111, 25020124, 25020404 (at nearby 25020524), 25020428, 25020459, and 25030403.

(3) <u>Time spent</u> - Two or three biologists sampled the study section simultaneously and, on average, 2.8 manhours were spent at each station (n=56, range 2-4.5). This seemed sufficient time to sample all habitats adequately with the gear used, and to reach asymptote of the species accumulation curve (10-20 minutes would elapse between addition of species).

Parameters not standardized that could affect the number of taxa collected in a qualitative sample were date of sampling and station habitat diversity. Although habitat diversity could not be standardized among stations, it was quantified in the following manner: A stream qualitative checklist (Figure D-1) was completed at the time each sample was collected. One point was assigned to each "Flotsam" and "Substrate" type (considered microhabitats), and 2 points were assigned to each "Water Type" (considered habitats). For each station on each sample date, the applicable points were summed, and the total value was recorded as a crude quantification of habitat diversity. During this study, station values ranged from 8 (station 25020004) to 28 (25010011, 25020404).

All specimens were identified to the lowest possible taxonomic level (usually species). Qualitative samples were analyzed in terms of total taxa (species richness) and the Florida Biotic Index (FBI) of 1977 - slightly modified to reflect changes in taxonomic nomenclature (Table D-2). Individual sample analyses are on file at this office and in Tallahassee.

ii Results and Discussion

341 benthic macroinvertebrate taxa were collected during the study (Table D-3), of which 64 were Florida Index organisms (total points = 100). Except for stoneflies, which do not occur in this district for reasons unrelated to water quality, representatives of all major orders of aquatic insects were collected, as well as planarians, nematomorphs, nemerteans, annelids, isopods, amphipods, decapods, branchiurans, mysidaceans, hydracari and molluscs. The most diverse insect orders were Diptera (107 taxa), Coleoptera (53), Odonata (31), Hemiptera (21), Trichoptera (20), and Ephemeroptera (18). The dipteran family Chironomidae contained the greatest number of taxa (77). The good representation of Florida Index organisms among the mayflies, dragonflies, damselflies, caddisflies and midges indicates that overall water quality in the lower Peace River Basin and Myakka River Basin is good at the present time.

The entire range of temporal and spatial distributions was encountered (Table D-3): some organisms were found at every station (15 or 4%) or in every quarter (128 or 38%), whereas others were found at only one station (82 or 24%) or only one quarter. The 15 species found at every station were also present in every quarter and certainly must be considered ubiquitous within the lower Peace River/Myakka River basin; they are:

- *Limnodrilus hoffmeisteri*, worm
- *Hyalella azteca*, amphipod
- *Palaemonetes paludosus*, prawn
- *Caenis diminuta*, mayfly
- *Centroptilum viridocularis*, mayfly
- *Argia sedula*, damselfly
- *Enallagma cardenium*, damselfly
- *Nectopsyche exquisita*, caddisfly
- *Dineutus serrulatus*, beetle
- *Dubiraphia quadrinotata*, beetle
- *Cryptochironomus fulvus*, true midge
- *Paralauterborniella nigrohalteralis*, true midge
- *Polypedilum halterale*, true midge
- *Tanytarsus* sp. I - Cantrell, true midge
- *Corbicula fluminea*, Asiatic clam (exotic)

In terms of total taxa, there was no evidence for a quarterly (seasonal) preference. Of the total number of records collected (one record is a specific taxon collected on a specific date at a specific station; in other words, the total number of entries in Table D-3 is 3009), 26% occurred in January - March, 26% in April - June, 24% in July - September, and 24% in October - December. The same was true for most of the various groups of macroinvertebrates (Table D-4), although damselflies (Zygoptera) and orthocladiine midges were under-represented in July - September, and tanypodine midges and "other Diptera" were under-represented in October - December. Individual species displayed various patterns. For example, 13 records exist for *Baetis pygmaeus*, none of which occurs in July - September. Where few records exist for a species it is difficult to ascertain whether the organism is seasonally restricted, rare or uncommon, or both. 834 records were tabulated for Florida Biotic Index organisms, and were distributed as follows: 233 (28%) in January - March, 213 (26%) in April - June, 192 (23%) in July - September, and 196 (23%) in October - December.

On average (n=4), among stations, species richness ranged from 30 taxa at station 25020002 on the lower Peace River to 84 on the upper Myakka River (25030009) (Table D-5). The average FBI ranged from 8.5 on the lower Peace River (25020002) to 32.5 on the upper Myakka River (25030009) and Horse Creek (25020428). The most diverse (105 taxa, 54 FBI) and least diverse (22 taxa, 2 FBI) individual samples also occurred at stations 25030009 and 25020002, respectively. Values were also lower at the Prairie Creek station and in the Myakka River at station 25030403. The range in richness and FBI values is attributed more to differences in habitat diversity than to differences in water quality. The two stations mentioned above that had high taxonomic richness were also characterized by relatively high habitat diversity values (Table D-1) and submerged vegetation, whereas station 25020002 was depauperate in both.

The positive relationships between habitat diversity and total taxa, and total taxa and the FBI are illustrated in Figure D-2. These relationships are not surprising, but do illustrate (1) the amount of information gained from a station is maximized when habitat diversity is high; therefore habitat diversity should be an important criterion for selecting sampling stations within the river segment of interest, (2) the importance of considering, and ideally quantifying, habitat diversity when comparing results between stations, and (3) the need to set spatial limits for a station, and to sample the same station using the same techniques when the basin assessment is repeated. The above points become more important when qualitative sampling is the only biological method being employed to detect and assess changes in water quality. Interestingly, FBI values were relatively high at Charlie Creek and in the Peace River at station 25020004, despite low habitat diversity.

Individual station values (total taxa and FBI) were generally higher in January through March and April through June (Table D-5), as were the quarterly distribution of records for the major macroinvertebrate groups (Table D-4). However, differences among quarters were not great, and it is possible that biannual sampling would generate conclusions regarding water quality not much, if any, different from those based on quarterly sampling.

Even though all stations are sampled during the same quarter, many weeks can separate sample dates. Therefore, short term episodic factors such as storm events and natural population fluctuations could affect collection results and influence interstation comparisons. For example, high water in December 1983 probably depressed total taxa values at stations sampled in that month, as well as 25030403 in April and 25020124 in May. In June 1983 all the Peace River stations had low water and a heavy bloom of *Microcystis* which literally turned the water green. It is not known what effect, if any, this had on the invertebrate fauna.

Some organisms definitely appeared to be restricted to only one station or group of stations. For example, the exotic snail *Melanoides tuberculata* was found only in Alligator Creek and was present throughout the year (Table D-3). Among the mayflies, Eurylophella trilineata was found only in upper Horse Creek, Centroptilum hobbsi was collected only from Charlie Creek and Shell Creek, and Hexagenia munda elegans was present in the Myakka River and some Peace River tributaries but not in the Peace River itself. Table D-3 contains much data and the reader is referred there for information on other taxa. As previously stated, where there are few records for a species, it is difficult to tell whether the species is in fact spatially restricted or simply rare in occurence.

The presence of Exosphaeroma sp., Sphaeroma terebrans, Corophium louisianum, Taphromysis bowmani, Gammarus sp., and Neritina reclivata in the lower reaches of the Myakka (25030403) and Peace (25020002) Rivers indicates some tidal influence, at least during the dry season.

The blue crab Callinectes sapidus (not listed in Table D-3) was observed alive at station 25020404 in September, and dead at stations 25020002 and 25020459 in December.

iii Summary, and Further Comments on Method

In summary, the Myakka River Basin and lower Peace River Basin have generally good water quality based on total taxa and the FBI. No serious trouble spots were evident based on the stations sampled. The FBI was highest on the upper Myakka River, upper Horse Creek, and Charlie Creek due to good water quality and habitat diversity. The FBI was lowest on the lower Peace River, lower Myakka River, and Prairie Creek but this probably reflects reduced habitat diversity rather than degraded water quality. However, the algae bloom noted in the lower Peace River in June is cause for concern. This is not considered to be a naturally occurring event, and may be related to the discharge of water from Lake Hancock near the river's headwaters, and extensive agricultural uses of the surrounding watershed. Differences among quarters were slight, but values did tend to be higher in January through March (a period of lower water levels, cooler temperatures and higher dissolved oxygen).

Importantly, it does appear that the qualitative method provided sufficient information for a preliminary classification of the benthic macroinvertebrate communities of the streams in this study. What is more difficult to establish is whether differences in values reflect variation due to water quality, or variation due to differences in habitat diversity or merely differing degrees of difficulty in catching each taxon under variable (e.g., flood) conditions.

Our use of a qualitative checklist to aid in quantifying habitat diversity was an attempt to increase the precision of the qualitative method. It appeared to work adequately, although in future basin assessments the following changes are recommended: (1) include a category to rate the abundance and diversity of submerged vegetation, and (2) avoid extending sampling too far into the mouths of tributaries, ditches, swales or even backwaters where water quality may not reflect that present in the subject stream.

Lastly, I strongly suggest that the Florida Biotic Index be updated. It is eight years old and considerable new information exists regarding the ecological requirements of various benthic macroinvertebrates. Certainly, one of the most valuable parameters provided by qualitative sampling is the Florida Biotic Index.

V. CONCLUSION

To briefly summarize, the waters of the lower Peace River Basin are generally of good quality, at the present time. There are however, variations within that range.

The waters of the upper Myakka for instance are currently quite pristine while some areas such as lower Charlie Creek and Joshua Creek show signs of the influence of man. Where this occurs the effects are usually from agricultural pursuits such as runoff from grazing pastures or from small urban areas and show up as a slightly increased nutrient load. There is little, if any industrial pollution.

The lower Peace River Basin does however lie just to the south of an area containing extensive natural phosphate deposits, and therefore phosphate concentrations are higher than normal in most of the rivers and major tributaries; such as the Peace River, the Myakka River and Horse Creek.

The Peace River to the north is also the recipient of urban, domestic and phosphate wastes which, although considerably diminished by the time it reaches Charlotte Harbor, is still evident. Periodic spring and summer Algal blooms in the river are probably the result of these high nutrient concentrations and releases from the headwaters at Lake Hancock.

The Myakka River and Horse Creek are as yet untouched by phosphate mining but will probably not remain so for very long. The potential for pollution of these streams exists when phosphate mining occurs. The mining is already planned for some time in the future.

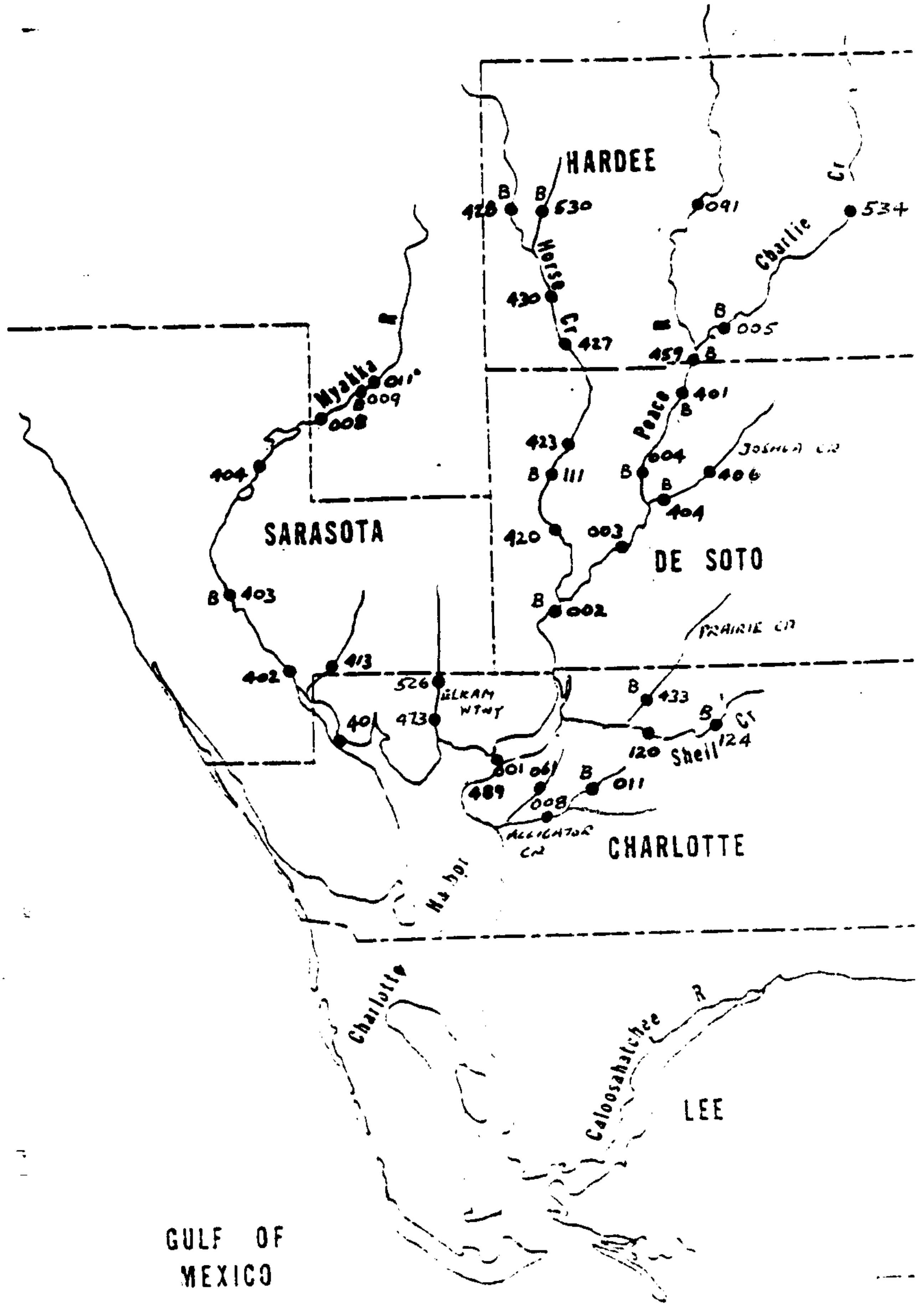
The other threat to the basin is from rapid urbanization of the surrounding counties, which are some of the fastest growing, population-wise, in the State; particularly in the Port Charlotte - Punta Gorda area.

The Peace River and its tributaries are also the potable water source for much of this urban area. It is essential that we maintain the quality of this vital resource.

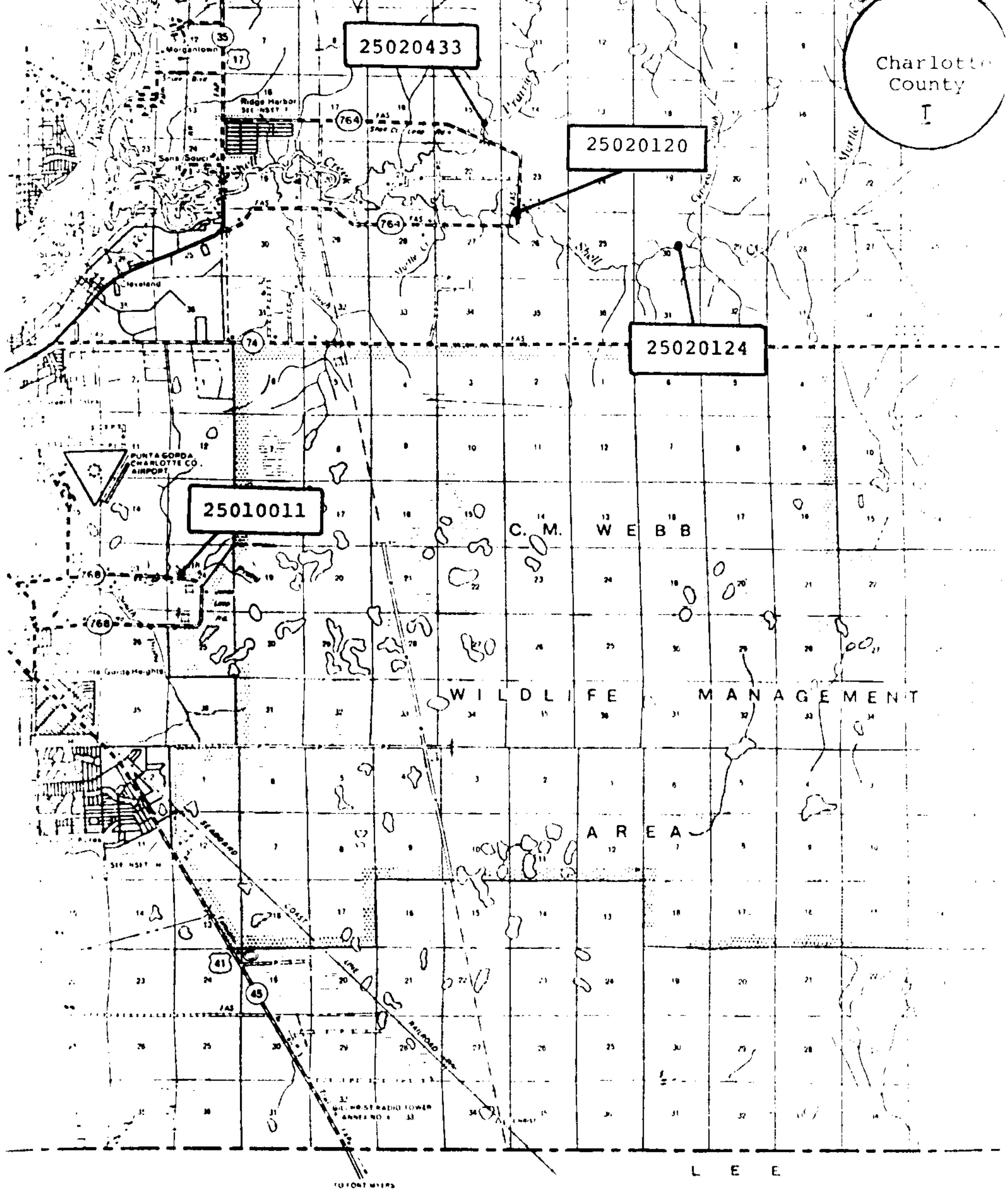
VI. APPENDICES

Appendix A

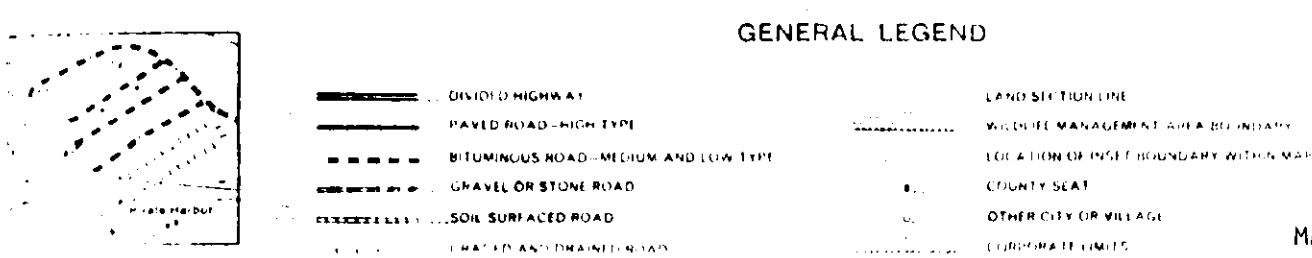
Site Location Maps



PEACE RIVER BASIN (25)
SAMPLING STATIONS . MAP 1

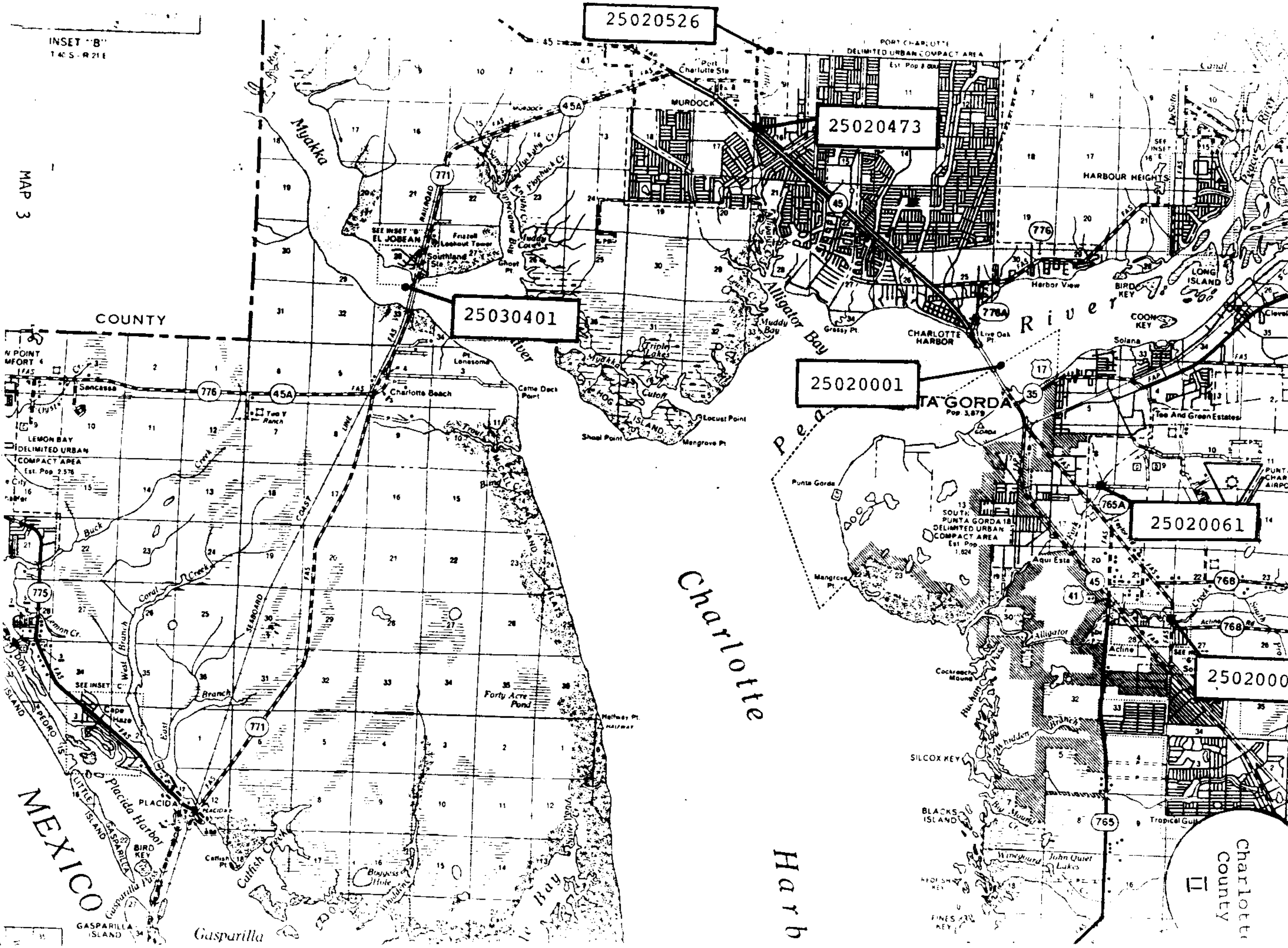


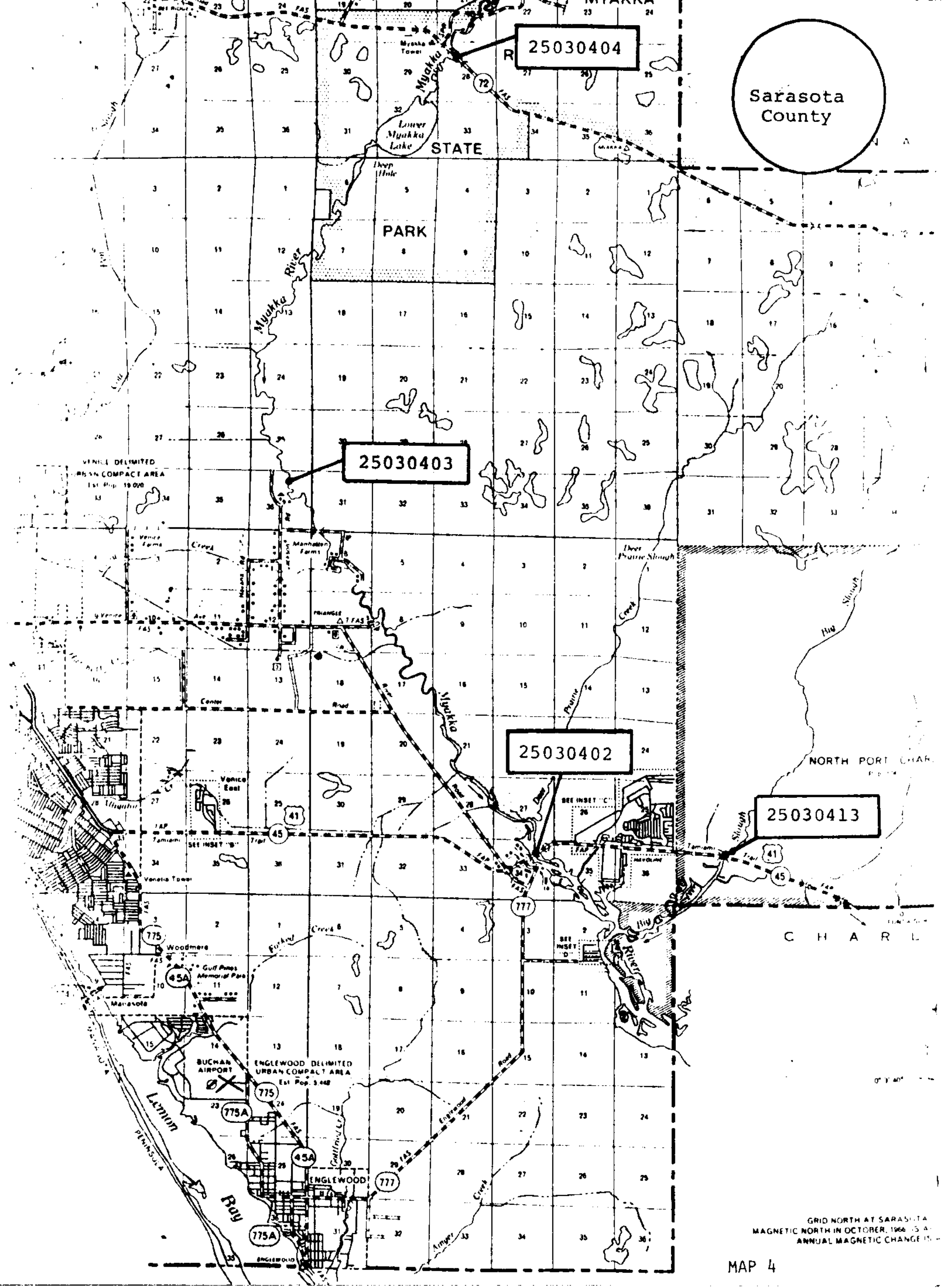
Charlotte County
25020433
25020120
25020124
25010011
Morgantown
Ridge Harbor
Sans Souci
Cleveland
PUNTA GORDA CHARLOTTE CO. AIRPORT
Punta Gorda Heights
C. M. WEBB
WILDLIFE MANAGEMENT
AREA
SEABOARD COAST LINE RAILROAD
LEE
TO FORT MYERS



GENERAL LEGEND
DIVIDED HIGHWAY
PAVED ROAD—HIGH TYPE
BITUMINOUS ROAD—MEDIUM AND LOW TYPE
GRAVEL OR STONE ROAD
SOIL SURFACED ROAD
LAND SECTION LINE
WILDLIFE MANAGEMENT AREA BOUNDARY
COUNTY SEAT
OTHER CITY OR VILLAGE

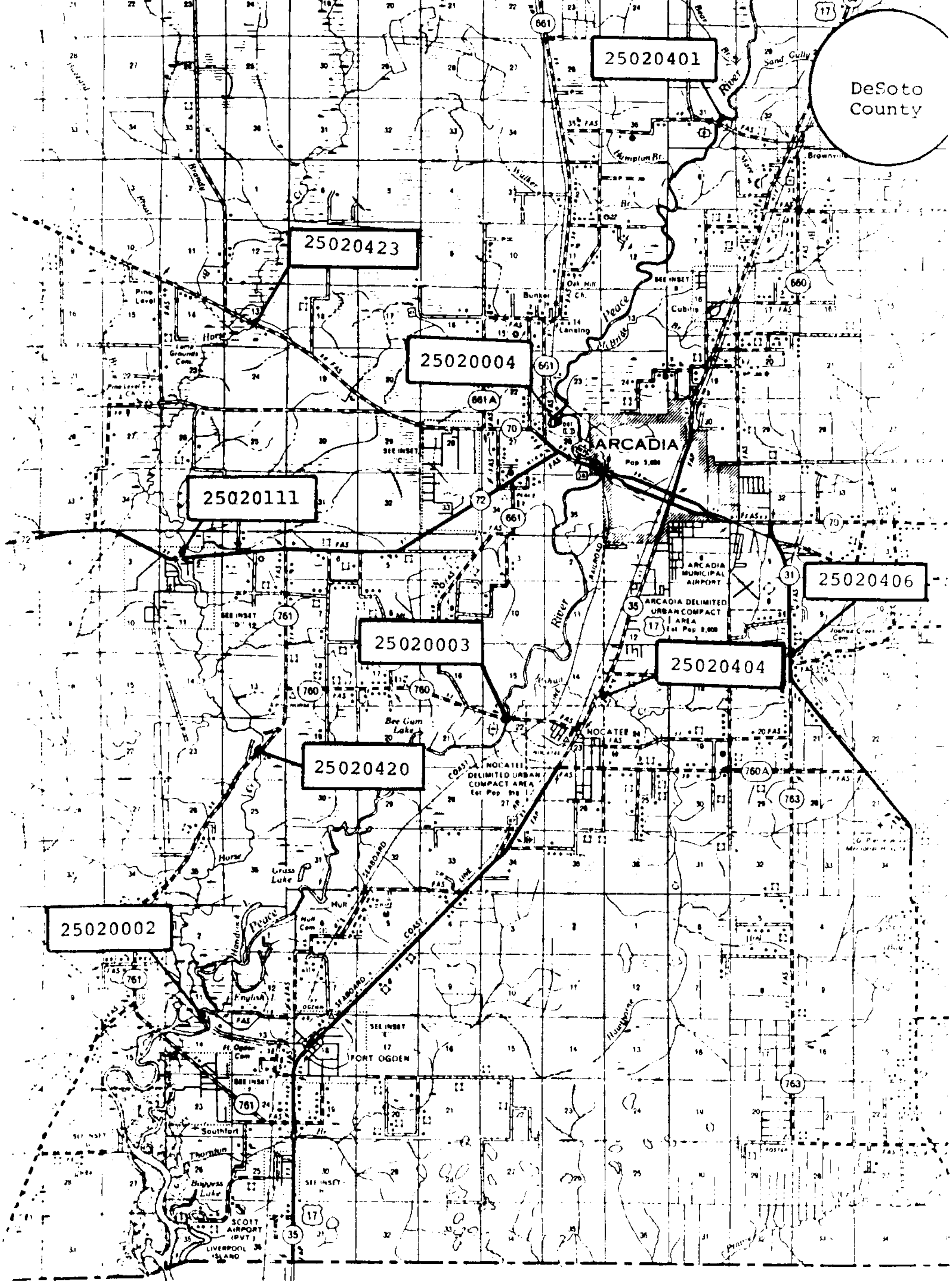
MAP 2


MAP 3
INSET "B"
T 40 S - R 21 E
25020526
25020473
25030401
25020001
25020061
25020000
PORT CHARLOTTE DELIMITED URBAN COMPACT AREA
Port Charlotte Sta
MURDOCK
HARBOUR HEIGHTS
Myakka
SEE INSET "B"
EL JOBEAN
Frizzell Lookout Tower
Southland Sta
COUNTY
Charlotte Beach
Cattle Dock Point
Sancassa
LEMON BAY DELIMITED URBAN COMPACT AREA
Two V Ranch
Hog Island
Cutoff
Triple Lakes
Locust Point
Shoal Point
Mangrove Pt
Alligator Bay
Muddy Bay
Grassy Pt
CHARLOTTE HARBOR
Live Oak Pt
Harbor View
BIRD KEY
LONG ISLAND
COON KEY
Solana
River
Peace
PUNTA GORDA
Tee And Green Estates
Punta Gorda
SOUTH PUNTA GORDA DELIMITED URBAN COMPACT AREA
Aqui Esta
Mangrove Pt.
Alligator
Acline
Cockroach Mound
SILCOX KEY
BLACKS ISLAND
Tropical Gulf
Charlotte
Harbor
Buck
Coral
Creek
West Branch
Branch
SEE INSET "C"
Cape Haze
SEABOARD COAST LINE RAILROAD
Forty Acre Pond
Halfway Pt.
PLACIDA
Placida Harbor
LITTLE GASPARILLA ISLAND
BIRD KEY
Catfish Creek
Gasparilla Pass
GASPARILLA ISLAND
Gasparilla
Boggess Hole
MEXICO
DON PEDRO IS.
Charlotte County
II

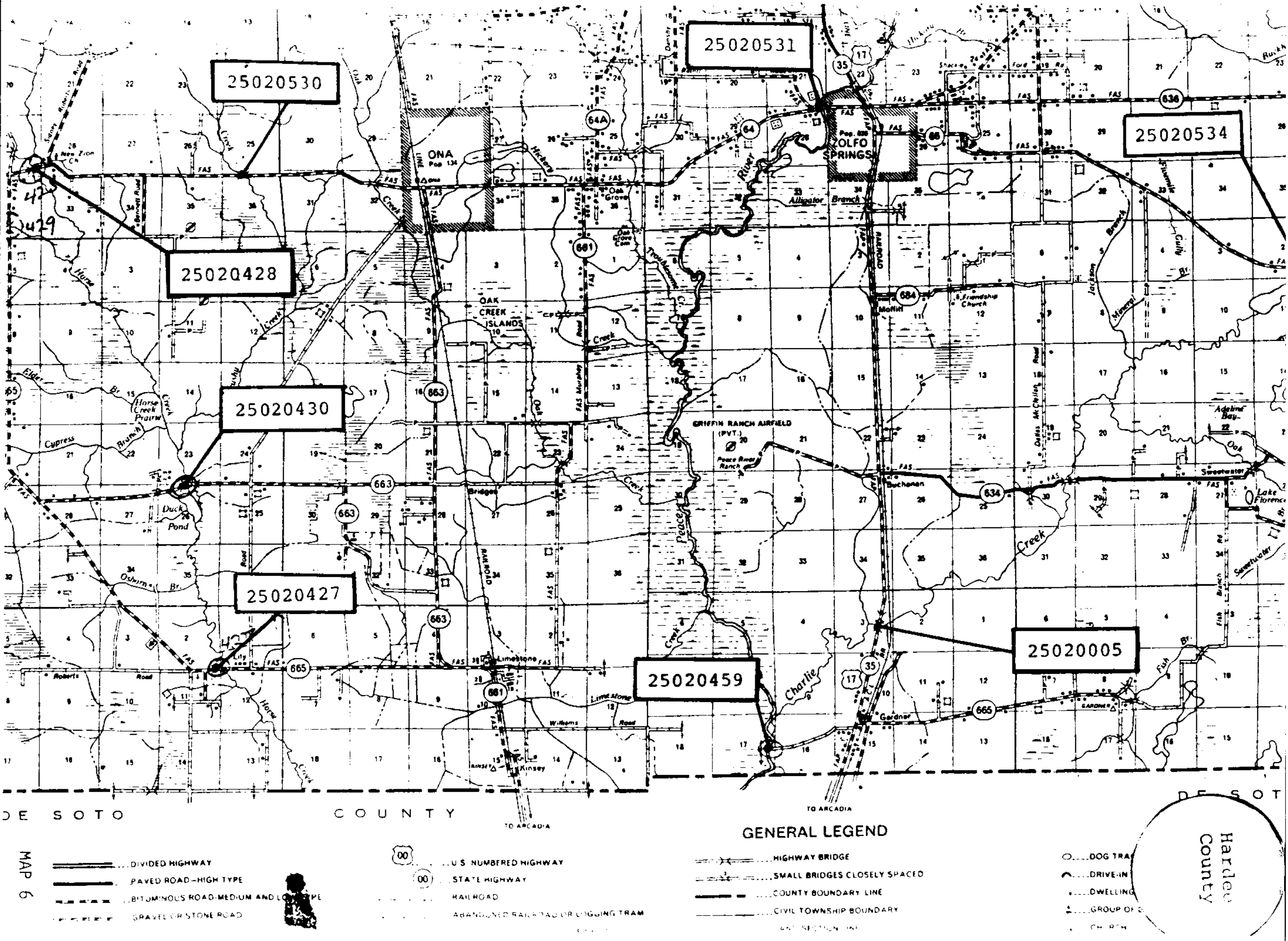


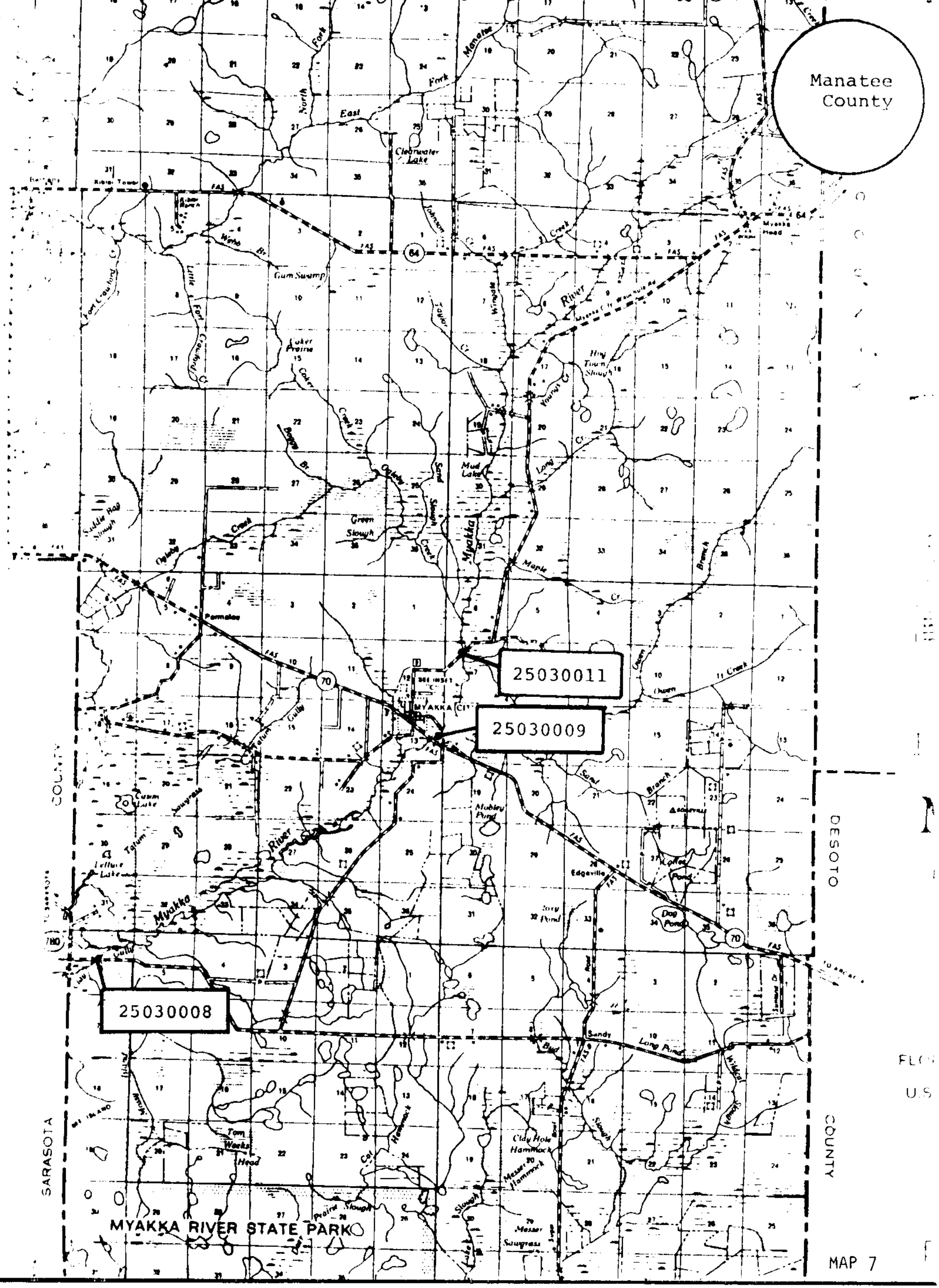
Sarasota County
25030404
25030403
25030402
25030413
MYAKKA
Lower Myakka Lake
STATE
PARK
Deep Hole
Myakka River
Myakka Tower
VENICE DELIMITED URBAN COMPACT AREA
Venice Farms
Manhattan Farms
Creek
Deer Prairie Slough
Prairie Creek
Big Slough
Myakka
NORTH PORT CHAR
Venice East
SEE INSET "B"
SEE INSET "C"
SEE INSET "D"
Tamiami Trail
Venetia Tower
Woodmere
Gulf Pines Memorial Park
Manasota
Forked Creek
BUCHAN AIRPORT
ENGLEWOOD DELIMITED URBAN COMPACT AREA
ENGLEWOOD
Lemon Bay
PENINSULA
Ainger Creek
Myakka River
C H A R L
72
41
45
777
775
45A
775A
GRID NORTH AT SARASOTA
MAGNETIC NORTH IN OCTOBER, 1966
ANNUAL MAGNETIC CHANGE

MAP 4


DeSoto County
25020401
25020423
25020004
25020111
ARCADIA
25020406
25020003
25020404
25020420
25020002
ARCADIA MUNICIPAL AIRPORT
ARCADIA DELIMITED URBAN COMPACT AREA
NOCATEE
NOCATEE DELIMITED URBAN COMPACT AREA
FORT OGDEN
Peace River
Pine Level
Bee Gum Lake
Grass Lake
Hull
Brownville
Cubitis
Lansing
Bunker
Southfort
Horse Cr.
SCOTT AIRPORT (PVT)
LIVERPOOL ISLAND
Joshua Creek
SEABOARD
COAST LINE
Sand Gully

MAP 5


25020530
25020531
25020534
25020428
25020430
25020427
25020005
25020459
ONA
ZOLFO SPRINGS
OAK CREEK ISLANDS
GRIFFIN RANCH AIRFIELD (PVT.)
Peace River
Charlie Creek
Horse Creek
Alligator Branch
Limestone
Buchanan
Moffitt
Gardner
Kinsey
Sweetwater
Lake Florence
Duck Pond
Bridges
Lily
DE SOTO COUNTY
TO ARCADIA
MAP 6
GENERAL LEGEND
DIVIDED HIGHWAY
PAVED ROAD—HIGH TYPE
BITUMINOUS ROAD-MEDIUM AND LOW TYPE
GRAVEL OR STONE ROAD
U.S. NUMBERED HIGHWAY
STATE HIGHWAY
RAILROAD
ABANDONED RAILROAD OR LOGGING TRAM
HIGHWAY BRIDGE
SMALL BRIDGES CLOSELY SPACED
COUNTY BOUNDARY LINE
CIVIL TOWNSHIP BOUNDARY
Hardee County



Manatee County
25030011
25030009
25030008
MYAKKA CITY
MYAKKA RIVER STATE PARK
Myakka River
Gum Swamp
Clearwater Lake
Mud Lake
Green Slough
Mobley Pond
Edgeville
Dog Pond
Coffee Pond
Cunn Lake
Lettuce Lake
Tom Weeks Head
Clay Hole Hammock
Messer Hammock
Parmalee
Wingate
Maple Cr.
Owen Creek
Sand Branch
Long Pond
Wildcat Slough
SARASOTA COUNTY
DESOTO COUNTY

MAP 7

VI. APPENDICES

Appendix B

Chemical Data Summaries

STATION		COND umhos /cm	pH	TEMP °C	D.O. mg/l	TURB NTU	LABpH	COLOR pt-co	SO_4 mg/l	F mg/l	Cl mg/l	T-PO_4 mg/l	NO_2 mg/l	NO_3 mg/l	TKN mg/l	FECAL COLI/ 100ml	CHL-A ug/l
25030011	MAX	185	7.0	30.0	6.8	1.0	6.8	160	50.2	.25	14.4	.85	K.01	K.10	1.04	B 452	3
	MIN	80	6.4	15.0	3.8	0.6	6.4	120	18.4	K.17	8.3	.34	K.01	K.10	0.67	B 44	0
	MEAN	136	6.7	22.8	5.2	0.8	6.6	150	29.9	K.17	10.1	.54	K.01	K.10	0.89	187	1
25030008	MAX	200	7.0	29.0	8.2	2.4	6.8	200	44.8	.26	15.4	.78	K.01	K.10	1.21	190	0
	MIN	95	6.6	13.0	3.5	1.3	6.5	160	23.0	K.17	8.8	.34	K.01	K.10	0.79	B 8	0
	MEAN	149	6.8	22.4	4.8	1.8	6.6	170	33.4	K.17	11.5	.59	K.01	K.10	1.03	80	0
25030404	MAX	230	7.4	31.0	7.8	1.7	7.2	200	7.7	.26	16.3	.58	K.01	K.10	1.14	56	11
	MIN	120	6.8	13.0	6.0	1.4	6.8	60	22.0	.19	12.7	.43	K.01	K.10	0.93	B 12	0
	MEAN	180	7.0	22.3	6.6	1.5	7.0	140	37.9	.23	14.2	.48	K.01	K.10	1.03	32	6
25030403	MAX	340	7.4	29.0	8.6	2.4	7.2	200	56.0	.25	16.6	.41	K.01	K.10	0.98	B1870	9
	MIN	110	6.5	13.0	5.0	1.2	6.7	80	22.6	K.17	10.6	.34	K.01	K.10	0.86	B 28	0
	MEAN	181	6.9	22.4	6.2	1.7	7.0	140	31.2	K.17	13.4	.38	K.01	K.10	0.90	493	3
25030402	MAX	9000	7.6	30.0	8.6	4.5	7.8	160	----	----	----	.32	K.01	K.10	0.98	TNTC	18
	MIN	175	6.9	14.5	4.4	1.3	7.0	80	----	----	----	.13	K.01	K.10	0.84	B 26	0
	MEAN	2401	7.2	23.1	6.4	2.6	7.4	130	----	----	----	.21	K.01	K.10	0.92	65	9
25030413	MAX	900	7.7	28.0	8.8	5.4	7.8	200	84.3	.32	93.1	.40	K.01	K.10	1.11	B1160	11
	MIN	190	7.0	14.5	5.0	2.1	7.3	80	28.0	.24	27.4	.12	K.01	K.10	0.84	B 16	0
	MEAN	510	7.4	22.6	6.7	3.6	7.5	150	51.5	0.28	47.3	.24	K.01	K.10	1.03	344	7
25030401	MAX	31000	8.0	29.5	9.4	3.0	8.1	120	----	----	----	.48	K.01	K.10	1.17	100	16
	MIN	8000	7.6	14.0	5.1	1.8	7.7	50	----	----	----	.28	K.01	K.10	0.75	B 2	11
	MEAN	16875	7.8	23.1	7.3	2.4	7.9	82	----	----	----	.36	K.01	K.10	0.91	57	14

CHEMICAL DATA SUMMARY

Myakka River Stations FY-84

Figure 1.

< & K. - Actual Value Known to be Less Than

B - Approximate Value

STATION	DATE	Cd ug/l	Pb ug/l	Cu ug/l	Fe ug/l	Zn ug/l	Mn ug/l	Ni ug/l	Cr ug/l	Hg ug/l	Ca mg/l	Mg mg/l	K mg/l	Na mg/l
25030404	01/03/84	---	K100	K 50	416	30	---	79	---	K.5	11.3	5.8	3.8	8.7
25030413	04/10/84	K10	K100	K 25	331	K25	---	---	K100	K.5	---	9.8	1.4	---
25030403	10/19/83	---	K100	K 50	459	23	---	K50	---	---	21.7	6.4	1.6	7.3
25030403	FY-83 $\bar{x}$	K10	K 50	K 50	338	K50	K25	K50	K 30	K.2	19.2	6.7	1.4	7.4
25030403	FY-82 $\bar{x}$	K10	K 50	K100	243	K50	K50	K100	K 50	K.2	23.0	9.8	2.5	10.5

CHEMICAL DATA SUMMARY (METALS)
Myakka River

Figure 2.

STATION		COND umhos /cm	pH	TEMP °C	D.O. mg/l	TURB NTU	LABpH	COLOR pt-co	SO_4 mg/l	F mg/l	Cl mg/l	$T\text{-}PO_4$ mg/l	NO_2 mg/l	NO_3 mg/l	TKN mg/l	FECAL COLI/ 100ml	CHL-A ug/l
25020531	MAX	370	8.8	28.0	12.6	13.0	8.9	100	74.8	1.71	28.6	2.49	.07	1.89	2.96	K 25	169
	MIN	280	7.2	15.5	5.7	2.6	7.2	80	49.0	1.14	17.0	1.72	K.01	K.10	1.15	K 4	4
	MEAN	325	7.6	22.8	8.2	5.8	7.6	90	64.2	1.50	21.5	2.19	.030	1.19	1.64	58	87
25020459	MAX	310	8.7	28.0	11.6	12.0	8.7	160	66.0	1.35	24.5	2.06	.06	1.59	2.59	70	132
	MIN	250	6.7	15.5	5.8	2.5	7.1	100	44.0	0.84	17.0	1.69	K.01	K.10	1.17	K 4	3
	MEAN	286	7.5	22.8	8.1	5.3	7.6	120	54.8	1.13	20.3	1.84	.030	1.01	1.61	38	35
25020401	MAX	330	8.5	28.0	10.5	15.0	8.9	160	70.0	1.35	25.5	1.98	.06	1.58	2.81	76	149
	MIN	265	7.2	15.5	5.5	2.5	7.2	100	43.0	0.80	18.0	1.47	K.01	K.10	1.17	B 20	3
	MEAN	301	7.7	22.8	7.7	6.3	7.6	120	55.8	1.18	21.1	1.79	.030	1.00	1.68	50	52
25020004	MAX	340	9.5	28.5	13.1	15.0	9.1	160	64.0	1.34	26.5	1.92	.07	1.60	2.83	B 550	4
	MIN	270	6.9	16.0	5.4	2.7	7.0	80	40.0	0.74	18.0	1.69	K.01	K.10	1.19	B 20	4
	MEAN	310	7.8	23.6	8.3	6.3	7.7	115	51.5	1.12	21.1	1.80	.050	0.98	1.68	185	4
25020003	MAX	340	9.5	28.0	12.9	15.0	9.2	160	69.0	1.29	26.5	1.87	.07	1.44	2.98	164	157
	MIN	270	7.0	16.5	5.1	3.6	7.1	40	41.0	0.74	18.2	1.74	K.01	K.10	1.26	B 4	5
	MEAN	303	7.8	23.6	8.2	6.8	7.7	105	52.9	1.10	20.9	1.81	.030	0.91	1.70	77	81
25020002	MAX	310	9.1	28.0	9.2	14.0	8.9	120	61.0	1.13	28.6	1.67	.04	1.09	2.60	104	96
	MIN	265	7.1	17.0	4.0	2.9	7.0	120	39.0	0.72	19.0	1.47	K.01	K.10	1.14	B 8	14
	MEAN	291	7.7	23.8	6.6	6.2	7.6	120	49.4	0.98	23.5	1.56	.018	0.63	1.55	63	55
25020001	MAX	24800	8.6	30.4	10.6	3.2	8.4	160	---	---	---	0.69	.01	0.15	1.23	B 28	36
	MIN	12700	7.3	19.2	3.2	2.3	8.0	40	---	---	---	0.36	K.01	K.10	0.80	B 4	9
	MEAN	19083	7.9	24.2	8.0	2.6	8.2	103	---	---	---	0.51	K.01	0.08	0.99	11	24

CHEMICAL DATA SUMMARY

Peace River Stations FY-84

Figure 3.

STATION	DATE	Cd ug/l	Pb ug/l	Cu ug/l	Fe ug/l	Zn ug/l	Mn ug/l	Ni ug/l	Cr ug/l	Hg ug/l	Ca mg/l	Mg mg/l	K mg/l	Na mg/l
25020531	09/17/84	K10	K250	K 50	259	K25	K50	K100	---	K.5	---	15.9	3.6	18.8
25020003	02/06/84	---	K 57	K 50	409	K50	---	K50	---	K.5	44.6	11.3	3.7	17.7
25020004	11/08/83	---	K100	K 50	372	K25	---	K50	---	---	30.2	13.7	2.9	15.8
25020004	05/01/84	K10	K100	K 25	269	K25	---	---	---	K.5	---	---	---	---
25020004	FY-83 $\bar{x}$	K10	K 50	K50	485	K50	K50	K50	K50	K.2	25.4	9.6	2.4	12.9
25020004	FY-82 $\bar{x}$	K10	K 50	K100	337	K50	K50	K50	K50	K.2	37.0	14.8	3.5	17.7

CHEMICAL DATA SUMMARY (METALS)
Peace River

Figure 4.

STATION		COND umhos /cm	pH	TEMP °C	D.O. mg/l	TURB NTU	LABpH	COLOR pt-co	SO_4 mg/l	F mg/l	Cl mg/l	$T\text{-}PO_4$ mg/l	NO_2 mg/l	NO_3 mg/l	TKN mg/l	FECAL COLI/ 100ml	CHL-A ug/l
25020530 Brushy Creek State Road 64		235	7.2	22	4.6	3.8	7.0	265	<2.1	.43	23.0	.52	<.006	<.06	1.00	231	1.0
25020428 Horse Creek State Road 64		148	7.3	21	7.7	1.7	7.2	110	16.2	.36	14	.46	<.006	.15	.75	271	0
25020430 Horse Creek County Road 663		113	6.4	22	2.9	1.6	6.5	160	11.6	.25	17	.28	<.006	.06	1.09	1500	2.5
25020427 Horse Creek County Road 665		160	6.6	23	5.7	3.8	6.5	150	24.0	.28	8	.45	<.006	<.06	84	---	2
25020423 Horse Creek State Road 70		278	6.7	23	6.8	3.0	6.7	110	56	.36	14	.53	.08	.31	.86	---	1.0
25020111 Horse Creek State Road 72		265	7.0	24	6.8	4.6	7.0	140	57	.38	16.5	.51	<.006	.21	.89	---	---
25020420 Horse Creek State Road 761		270	6.7	24	6.6	3.2	6.7	140	54	.39	.17	.55	<.006	.15	.84		

DATA SUMMARY

Horse Creek (Mean Values)

Figure 5.

STATION		COND umhos /cm	pH	TEMP °C	D.O. mg/l	TURB NTU	LABpH	COLOR pt-co	SO_4 mg/l	F mg/l	Cl mg/l	$T-PO_4$ mg/l	NO_2 mg/l	NO_3 mg/l	TKN mg/l	FECAL COLI/ 100ml	CHL-A ug/l
25020534	MAX	165	7.1	28	6.0	3.6	7.3	320	12.1	.23	24	.44	<.006	.17	1.88	171	0
Charlie Creek	MIN	100	6.7	20.5	2.3	1.3	6.2	160	<2.11	<.17	11.8	.34	<.006	<.06	1.21	12	0
State Road 66	MEAN	139	6.9	25.5	4.1	2.4	6.8	260	---	<.17	17	.38	<.006	<.06	1.51	278	0
25020005	MAX	210	7.5	28	6.8	3.4	7.5	320	26.3	.33	22	.61	<.006	.32	1.46	58	0
Charlie Creek	MIN	110	6.8	19.5	4.9	1.5	6.8	100	<2.11	.17	10.8	.46	<.006	.07	.87	20	0
U.S. 17	MEAN	155	7.2	25	4.9	2.0	7.2	255	13.6	.22	18.6	.51	<.006	.18	1.29	39	0
25020406	MAX	360	7.5	28	8.1	25	7.5	200	55.3	.50	40.2	.61	<.006	.39	1.26	108	2
Joshua Creek	MIN	60	6.7	19.5	5.3	2.3	6.1	60	<2.1	<.17	24.5	.30	<.006	.24	.79	---	0
State Road 31	MEAN	238	7.0	24	6.7	8.3	7.0	135	33.4	---	34.6	.43	<.006	.32	1.01	---	<1
25020404	MAX	550	7.5	26	6.5	6.4	7.5	160	67	.42	56.3	.69	.02	.95	2.21	84	3
Joshua Creek	MIN	150	6.7	20	6.0	2.8	6.6	60	26	.18	32.3	.30	<.006	.26	.72	---	0
U.S. 17	MEAN	360	7.2	23.6	6.2	4.3	7.3	115	46	.31	45.8	.47	.01	.53	1.29	---	1
25020433	MAX	680	7.8	29.5	6.4	3.8	7.7	160	51.3	.30	82.5	.20	.12	.32	1.80	64	2
Prairie Creek	MIN	325	6.9	21	4.5	2.3	7.2	80	15.8	.23	36.2	.13	<.006	.11	.99	10	0
	MEAN	486	7.5	26	5.4	3.1	7.4	125	33.4	.26	55.1	.17	.006	.19	1.28	31	<1
25020120	MAX	850	7.9	31	7.1	2.8	7.9	200	35.1	.30	150	.38	<.006	.12	1.76	92	17
Shell Creek	MIN	360	7.4	21	4.0	1.8	7.0	60	15.3	.21	64.6	.08	<.006	<.06	.81	40	6
	MEAN	640	7.6	26	5.4	2.2	7.6	120	24.2	.24	94.4	.19	<.006	<.06	1.15	65	12
25020526	MAX	700	8.1	30	9.9	6.0	8.0	60	77	.44	80	.17	<.006	<.14	1.08	172	25
Elkam Wtwy.	MIN	650	7.6	22	5.9	4.9	7.6	30	44	.36	68.6	.06	<.006	<.06	.60	2	8
Hills. Ave	MEAN	688	7.9	27	7.8	5.3	7.8	40	62	.40	72	.12	<.006	<.06	.86	68	20
25020473	MAX	500	8.1	30	8.0	3.9	8.0	60	19	.37	19.6	.15	<.006	<.06	1.16	204	39
Elkam Wtwy.	MIN	470	7.6	21	5.9	2.6	7.7	40	11	.31	14.7	.08	<.006	<.06	.70	32	8
U.S. 41	MEAN	490	7.8	27	7.0	3.0	7.9	45	15	.34	18.7	.12	<.006	<.06	1.00	138	28
25010061	MAX	1900	7.7	26	5.6	2.5	7.8	60	62	.30	411	.14	<.006	<.06	.90	60	53
Alligator Cr.	MIN	850	7.0	19	1.0	1.5	7.5	50	33	.27	127	.10	<.006	<.06	.73	---	9
North Fork	MEAN	1283	7.3	23	2.8	2.0	7.5	53	48	.29	269	.12	<.006	<.06	.84	---	31
25010008	MAX	900	7.5	29.5	6.6	2.8	7.5	80	20	.23	100	.15	<.006	.13	.99	178	18
Alligator Cr.	MIN	350	7.2	19.5	2.6	1.7	7.3	40	14	<.17	51	.10	<.006	<.06	.81	64	6
South Fork	MEAN	633	7.4	25	4.1	2.0	7.4	60	17	---	75.5	.13	<.006	.09	.93	121	11

CHEMICAL DATA SUMMARY
Peace River Tributaries - FY84

Figure 6.

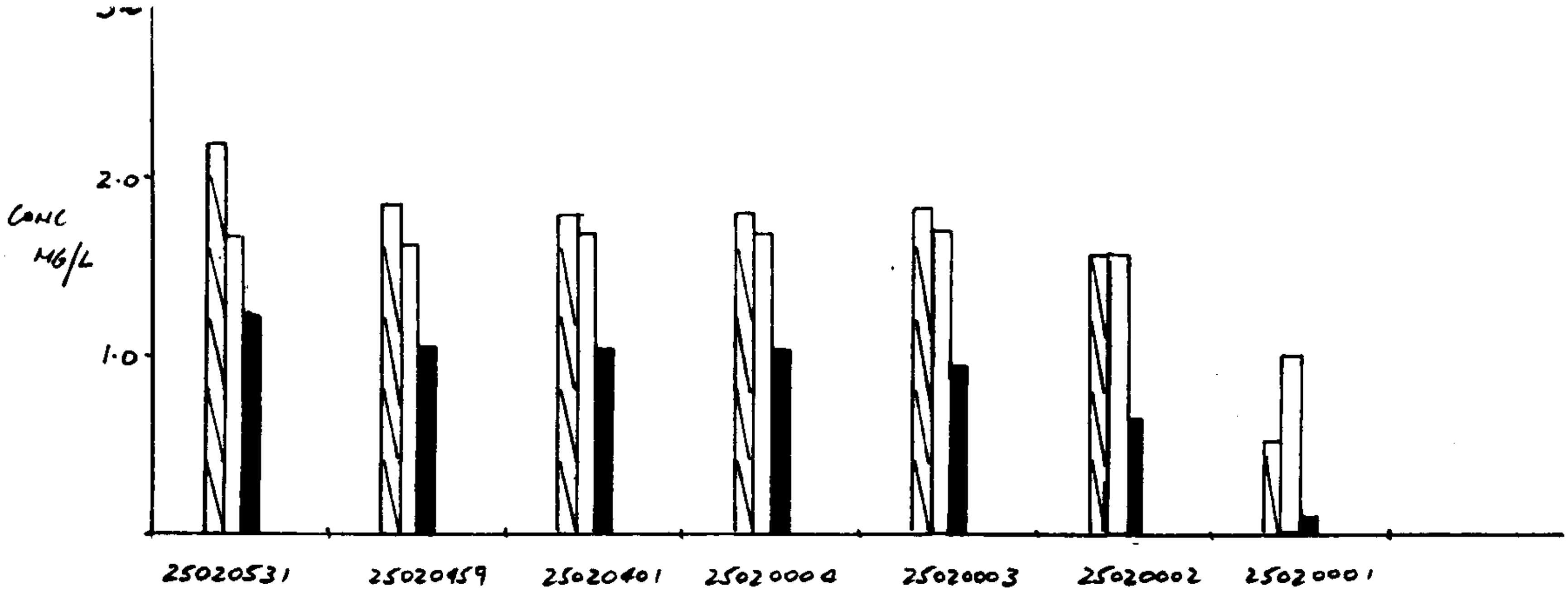
STATION	DATE	Pb ug/l	Cu ug/l	Fe ug/l	Zn ug/l	Ca mg/l	Mg mg/l	Hg ug/l	Ni ug/l	Na mg/l	K mg/l	Cd ug/l	Cr ug/l
25020473 Elkam Wtrwy	12/05/83	<100	<50	242	27	96	6.2	<.5	<50	16.5	2.1	---	---
25020005 Joshua Cr. U.S. 17	03/12/84	<100	<25	413	<25	19	4.4	<.5	---	---	4.2	<10	<100

TRIBUTARY METALS SUMMARY

Figure 7.

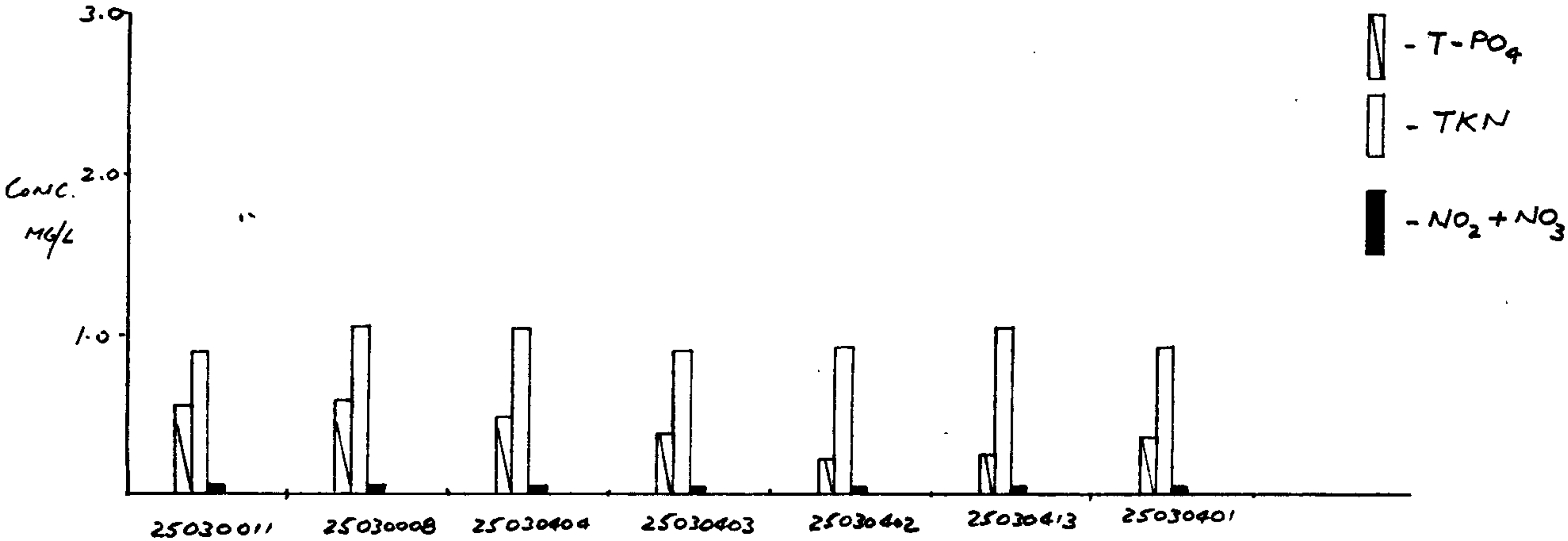
Appendix C

Graphs



PEACE RIVER.

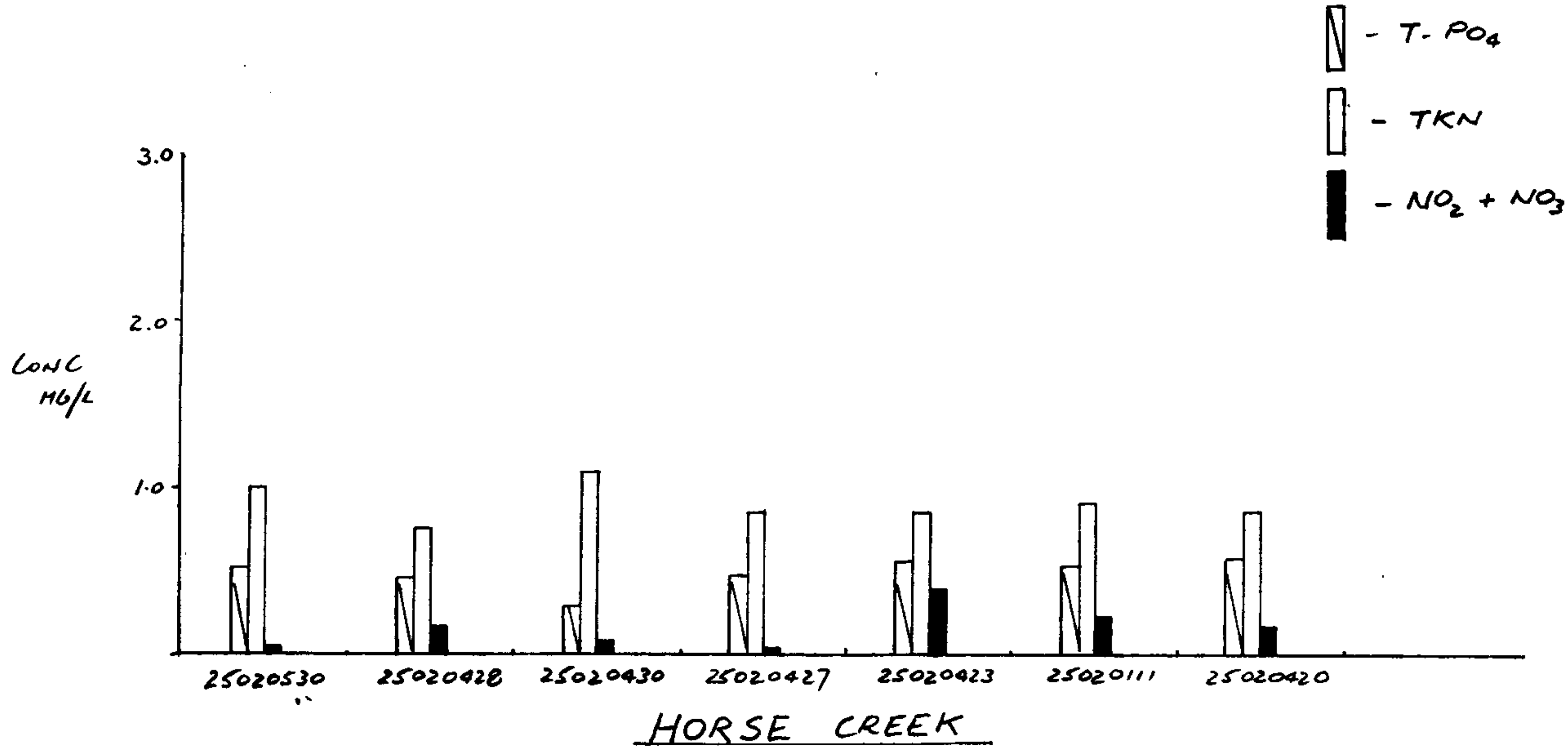
Figure 9.



MYAKKA RIVER

AVERAGE NUTRIENT CONCENTRATIONS.

Figure 8.



AVERAGE NUTRIENT CONCENTRATIONS.

Figure 10.

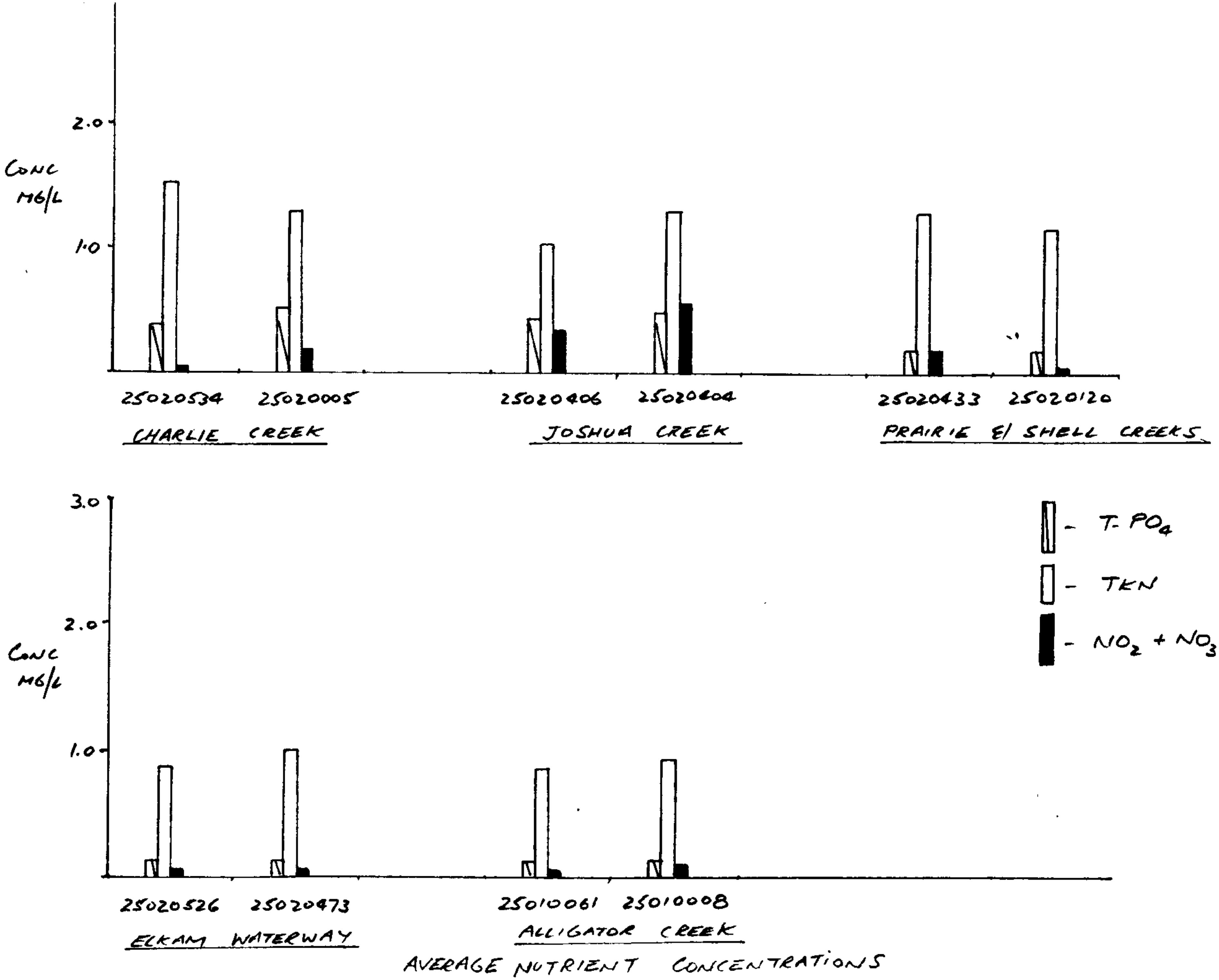

2.0
1.0
CONC MG/L
25020534
25020005
CHARLIE CREEK
25020406
25020404
JOSHUA CREEK
25020433
25020120
PRAIRIE & SHELL CREEKS
3.0
2.0
1.0
CONC MG/L
- T-PO4
- TKN
- NO2 + NO3
25020526
25020473
ELKAM WATERWAY
25010061
25010008
ALLIGATOR CREEK
AVERAGE NUTRIENT CONCENTRATIONS

Figure 11.

Appendix D - Biology

Tables

Figures

FIGURE 1 . STREAM QUALITATIVE CHECKLIST

STATION NUMBER ____________ DATE ____________ TIME ____________

QUALITATIVE CHECKLIST

Photos, at least upstream and downstream ☐

Canopy: Open ☐ Partial ☐ Complete ☐

Flotsam: Wood ☐ Plastic ☐ Other ____________

Dominant vegetation:

Submerged ____________ Littoral ____________ Floating ____________

Water types: Littoral ☐ Pool ☐ Riffle, all current speeds ☐
Shallow run ☐ Deep (sub-photic) run or midchannel ☐
Neuston ☐ Standing backwater open to channel ☐
Standing backwater, isolated but intermittently open to channel ☐
Mouth of tributary(s) ☐

Substrates:

☐ Sand	☐ Stone(s)	☐ Exposed roots
☐ Silt	☐ Log	☐ Woody detritus
☐ Shell	☐ Board	☐ Leafy detritus
☐ Mud	☐ Snags	☐ Fine detritus
☐ Moss	☐ Plastic	☐ Palm frond
☐ Peat	☐ Metal	☐ Hyacinth/Pistia roots
☐ Gravel	☐ Glass	☐ Sponge

(NOTE: In addition to visual search use stir/decant method with 350um sieve, and air-drying. Sponge can be put in ETOH and examined in lab)

Sampling Gear:
- ☐ Drift net (duration ________)
- ☐ Bait,traps (duration ________), Type ____________
- ☐ Hester-Dendy (duration ________)
- ☐ Sieve 350um
- ☐ D-frame dip net (include kick samples)
- ☐ Ekman
- ☐ Ponar
- ☐ Dredge
- ☐ Other: ____________

Mussel search ☐

Clean collecting gear ere relocating ☐

Complete P-chem sheet ☐

Remarks:

DO ________
pH ________
Temp (C) ________
Secchi (M) ________
Color ________
Turb ________
Cond ________

Number of collectors: ______ Total man-hours: ______

FIGURE 2. RELATIONSHIP BETWEEN (A) TOTAL TAXA AND HABITAT DIVERSITY, AND (B) TOTAL TAXA AND THE FLORIDA BIOTIC INDEX. POINTS REPRESENT MEAN (N=4) VALUES FOR EACH OF THE 14 STATIONS. SEE TEXT FOR DERIVATION OF HABITAT DIVERSITY VALUES.

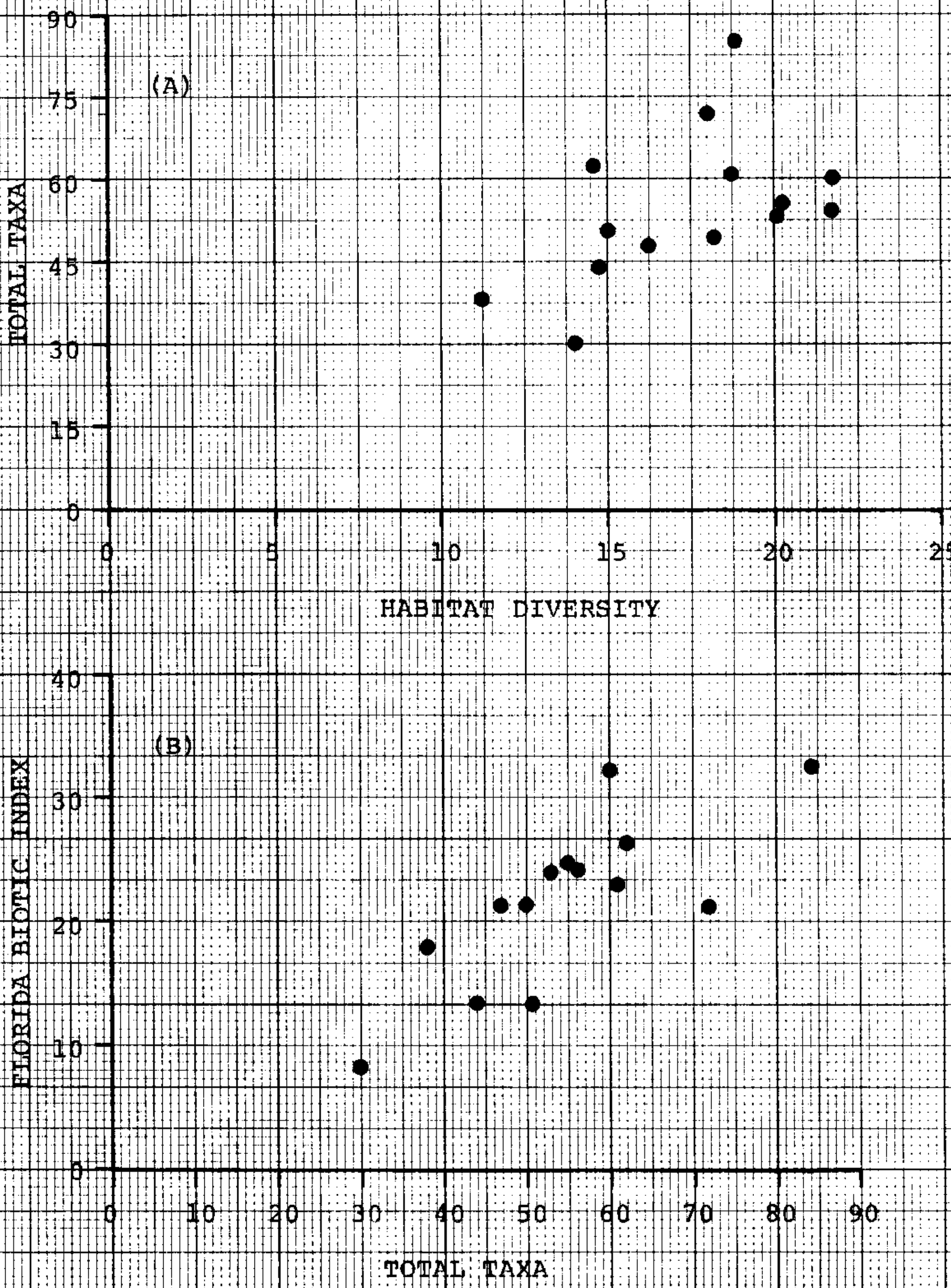


TABLE 1 - MEAN (N = 4) NUMBER OF MAN HOURS, COLLECTORS, WATER AND SUBSTRATE TYPES, AND HABITAT DIVERSITY RELATING TO QUALITATIVE SAMPLES COLLECTED IN THE PEACE RIVER BASIN ASSESSMENT

	MAN HOURS	COLLECTORS	*WATER TYPES	*SUBSTRATE TYPES	*HABITAT DIVERSITY
Myakka River:					
25030009	3.0	3.2	4.8	8.8	18.4
25030403	2.0	2.2	2.8	9.2	14.8
Peace River:					
25020459	2.8	3.1	4.5	9.2	18.2
25020401	3.0	3.2	5.0	10.2	20.2
25020004	2.0	2.2	2.0	7.2	11.2
25020002	2.0	2.4	2.8	8.5	14.1
Peace River Tributaries:					
Horse Creek					
25020428	3.0	3.4	4.0	13.8	21.8
25020111	2.0	2.2	4.0	8.2	16.2
Brushy Creek					
25020530	3.0	3.4	5.0	8.0	18.0
Charlie Creek					
25020005	3.0	3.0	2.8	9.0	14.6
Joshua Creek					
25020404	2.0	2.8	5.2	11.2	21.6
Shell Creek					
25020124	2.2	2.9	4.2	10.2	18.6
Prairie Creek					
25020433	2.2	2.5	2.5	10.0	15.0
Alligator Creek					
25010011	2.0	2.5	5.8	8.5	20.1

* See text for explanation of these terms.

TABLE 2

FLORIDA BIOTIC INDEX ORGANISMS
Class I (value 2 points) = Intolerant of organic pollution
Class II (value 1 point) = moderately tolerant *

CLASS I

Plecoptera (all)
Stenonema exiguum
Stenonema smithae
Agrion (all species) = *Calopteryx
Argia (all species)
Boyeria (all species)
Hetaerina americana
Hetaerina titia
Macromia (all species)
Progomphus (all species)
Corydalus cornutus

Brachycentrus (all species)
Chimarra (all species)
Hydropsyche (all species)
Hydroptila (all species)
Macronema carolina
Oxyethira (all species)
Polycentropus (all species, *includes Cernotina)
Simuliidae (all)
Ablabesmyia aspera
Ablabesmyia mallochi
Ablabesmyia ornata
Ablabesmyia tarella = A. auriensis
Brillia par
Corynoneura (all species)
Cricotopus bicinctus

Eukiefferiella (all species)
Labrundinia floridana
Labrundinia johannseni
Labrundinia neopilosella
Labrundinia pilosella
Labrundinia virescens
Pentaneura inconspicua* = P. inculta

Polypedilum fallax
Psectrocladius (all species)
Rheocricotopus robacki
Rheotanytarsus exiguus, (* includes R. distinctissimus grp. and R. exiguus grp.)
Stenochironomus (all species)
Stictochironomus devinctus
Thienemanniella (all species)
Goniobasis (all species)

CLASS II

Asellus (all species)
Gammaridae (all species)
Palaemonetes paludosus
Gomphus (all species, * includes Arigomphus, Gomphurus, Hylogomphus, Stylurus)
Neurocordulia (all species)
Stenonema integrum
Stenacron interpunctatum
Tricorythodes albilineatus
Cheumatopsyche (all species)
Leptocella (all species) = Nectopsyche
Oecetis (all species)

Ablabesmyia parajanta = A. janta
Ablabesmyia peleensis
Clinotanypus (all species)
Cricotopus (all species ex. C. bicinctus)
Endochironomus nigricans
Larsia lurida
Polypedilum halterale
Polypedilum illinoense
Procladius (all species)

* This list was prepared in April 1977. Changes in taxonomic nomenclature since that time are indicated with an (*).

TABLE 3 - LIST OF BENTHIC MACROINVERTEBRATES COLLECTED IN QUALITATIVE SAMPLES FROM THE PEACE RIVER BASIN, INDICATING AT WHAT STATION AND DURING WHAT QUARTER THEY WERE COLLECTED.
W = JANUARY - MARCH, P = APRIL - JUNE, S = JULY - SEPTEMBER, F = OCTOBER - DECEMBER

	Myakka River		Peace River				Peace River Tributaries							
ORGANISM	Myakka River 25030009	Myakka River 25030403	Peace River 25020459	Peace River 25020401	Peace River 25020004	Peace River 25020002	Horse Creek 25020428	Horse Creek 25020111	Brushy Creek 25020530	Charlie Creek 25020005	Joshua Creek 25020404	Shell Creek 25020124	Prairie Creek 25020433	Alligator Creek 25010011
PLATYHELMINTHES														
Dugesia sp.	PF	PSF	WP	WPS	WPS	F	PSF	PS		WP	PS	WPS	PS	WF
NEMATOMORPHA														
Unid.	P			P					F	P				
NEMERTEA														
Prostoma graecense				WS	W		W							WF
ANNELIDA														
Oligochaeta														
Lumbricidae		F												
Lumbriculidae														
with proboscis	PS		W	WP				W		WP	WPSF			
without proboscis	WPSF		WF	WPSF		PF	WS	F	WS	S	F	P	P	P
Megascolecidae		W									F			
Naididae														
Dero nivea						W						P		
D. trifida						S	S	F				S		
Dero sp.		S												
Haemonais waldvogeli									S					
Nais pardalis				F										
Pristina breviseta												S		
P. idrensis											F			
P. longisoma													S	
P. sima								P						
Slavina appendiculata								S						F
Unid.	S				P									
Tubificidae														
Aulodrilus pigueti		P		WP	S				PF	W	P	W	PSF	F
Limnodrilus hoffmeisteri	WPSF	WSF	PSF	WPSF	WPS	WPSF	WPSF	WPS	WPSF	WSF	WPSF	WPS	WP	WPSF

ORGANISM	Myakka River		Peace River				Peace River Tributaries							
	Myakka River 25030009	Myakka River 25030403	Peace River 25020459	Peace River 25020401	Peace River 25020004	Peace River 25020002	Horse Creek 25020428	Horse Creek 25020111	Brushy Creek 25020530	Charlie Creek 25020005	Joshua Creek 25020404	Shell Creek 25020124	Prairie Creek 25020433	Alligator Creek 25010011
Hirudinea														
Batracobdella phalera	WPS	WP		PS	P		PS	S	WPSF	WPSF	WPF	F	P	W
Helobdella triserialis	P	F		S	W			S		F		P		WF
Mooreobdella microstoma	W	W					S		W					
Myzobdella lugubris			W		WS			W			S			
Placobdella papillifera								S				W		
P. translucens			W											
ARTHROPODA														
Crustacea														
Branchiura														
Argulus meehani	S		P											
Mysidacea														
Taphromysis bowmani		PS				WPSF								
Isopoda														
Asellus sp.	WPS		WSF	WF	WP			WP		WF	W	W		
Exosphaeroma sp.		S				P								
Sphaeroma terebrans		S											SF	
Amphipoda														
Corophium louisianum						F								
Crangonyx floridanus			F											
Gammarus sp.		WS				WPF								
Hyalella azteca	PSF	WPSF	WPSF	WPSF	WPSF	WS		W	WPSF	WPSF	WSF	PSF	WPSF	WPSF
Decapoda														
Palaemonetes paludosus	WPSF	WPF	WPSF	WPSF	WPSF	WS	WPSF	WPSF	WPSF	WPSF	WPSF	PSF	WPSF	WF
Procambarus sp.	WS		PF	WPSF			PF		WPS	S	PS	PS	F	
Arachnoidea														
Hydracarina														
Type I - Rutter		S		P						WP	PF	F		W
Type II - Rutter									P					

	Myakka River			Peace River					Peace River Tributaries							
ORGANISM	Myakka River 25030009	Myakka River 25030403		Peace River 25020459	Peace River 25020401	Peace River 25020004	Peace River 25020002		Horse Creek 25020428	Horse Creek 25020111	Brushy Creek 25020530	Charlie Creek 25020005	Joshua Creek 25020404	Shell Creek 25020124	Prairie Creek 25020433	Alligator Creek 25010011
Type VIII - Rutter																WP
Type IX - Rutter										S						W
Type XI - Rutter	F															
Type LIII - Rutter															PF	
Type XIV - Rutter	WP	F												SF	F	P
Type XV - Rutter		S								W				WF		
Type XVIII - Rutter										WPSF				W	F	F
Type XX - Rutter	WF				W					W				W	W	F
Type XXII - Rutter				W										W		
Type XXIII - Rutter															WPSF	WPF
Type XXIV - Rutter														F		
Type XXV - Rutter													F			
Type XXVI - Rutter															W	
Type XXVII - Rutter	P										PF			S		F
Type XXX - Rutter						F										
Type XXXVI - Rutter	P								PF							
Type XXXVII - Rutter											W	P				
Type XXXVIII- Rutter														F		
Type XLI - Rutter											WPF					
Type XLIII - Rutter											S W					
Type L - Rutter	F										SF					
Type LI - Rutter															F	
Insecta																
Collembola																
<u>Podura aquatica</u>		S														

ORGANISM	Myakka River		Peace River				Peace River Tributaries							
	Myakka River 25030009	Myakka River 25030403	Peace River 25020459	Peace River 25020401	Peace River 25020004	Peace River 25020002	Horse Creek 25020428	Horse Creek 25020111	Brushy Creek 25020530	Charlie Creek 25020005	Joshua Creek 25020404	Shell Creek 25020124	Prairie Creek 25020433	Alligator Creek 25010011
Ephemeroptera														
Baetis ephippiatus		F	PSF	P			WF	PSF	F	F	S	S	S	PSF
B. frondalis	W								W					
B. intercalaris				WPF			W	P		W	S	S		WPF
B. propinquis	WPSF		WP	F	W		WP	WPSF	WP	WF	WPSF	WPSF	SF	W
B. pygmaeus	WPF	F	F	F			WF	F	WPF	F				
Brachycercus maculatus	S	WPSF	WPSF	WPS	WPSF	WF	P	WPS	F	WPSF	PSF	WSF	S	
Caenis diminuta	WPSF	WF	PSF	PSF	W	WF	WPSF	WSF	WPSF	WPF	WPS	WPSF	WPSF	WPSF
Callibaetis floridanus	WPS	SF	P				PS	P	PSF	SF	F	WP	WPS	WPF
C. pretiosus					F				WPF	S			P	
Centroptilum hobbsi										WSF		WP		
C. viridocularis	WPS	WPSF	WPSF	WS	WPF	F	PSF	WPS	WPF	WPSF	WPSF	WPSF	W	WPF
Choroterpes hubbelli	PF	F					S							S
Eurylophella trilineata							WS							
Hexagenia munda elegans	W								PF		F	WS	WSF	
Pseudocloeon alachua							WPS			F				
Stenacron interpunctatum	WPS	WF	WF	WS			WPF		WPF	WSF		WPSF	WSF	WPSF
Stenonema exiguum	PF	WP	WSF	W	S		WPF	WPS		WP	PSF		S	
Tricorythodes albilineatus				WPSF	WP	SF		PS		WPSF	WPS	WPSF	PSF	
Odonata														
Anisoptera														
Aphylla williamsoni	WP			W	WS				F			F	W	W
Arigomphus pallidus									W					
Boyeria vinosa			P	P										
Coryphaeschna ingens													F	
Dromogomphus spinosus	P							WS			P			
Epicordulia princeps regina				P	W		S	S		PS	S	WPSF	S	
Erythemis simplicicollis	S						S		PS				WP	WF
Gomphurus dilatatus			P	W				PS	F	WPS	SF			

ORGANISM	Myakka River			Peace River					Peace River Tributaries							
	Myakka River 25030009	Myakka River 25030403		Peace River 25020459	Peace River 25020401	Peace River 25020004	Peace River 25020002		Horse Creek 25020428	Horse Creek 25020111	Brushy Creek 25020530	Charlie Creek 25020005	Joshua Creek 25020404	Shell Creek 25020124	Prairie Creek 25020433	Alligator Creek 25010011
Gomphus minutus	WPS			S					WPSF	P	WPSF	WPSF	WS	WPSF	SF	WPSF
Libellula nr. incesta	F									S	F				W	W
Macromia georgina	PSF			WS	P	W			WF	WPS	WP	WPS	WSF	SF	PS	WF
M. taeniolata	WP	F			WF	F			F	F	PSF	F	P		F	
Miathyria marcella		P									S					
Nasiaeschna pentacantha	WPF	F			W							PSF	WS	WSF	SF	
Neurocordulia alabamensis									WF				P		PS	
Orthemis ferruginea	P				F											
Pachydiplax longipennis	WS	W									WSF					
Perithemis tenera seminole	WF	F			P	P					S		S			
Progomphus alachuensis	P								WPF							
Stylurus plagiatus	WPS	W		WPSF	WPSF	WPSF	W		S	WPS		WS	PF			
Tetragoneuria sepia	F									S	WS	S		F	F	
Zygoptera																
Argia fumipennis										P			S			
A. moesta	P				WS				P	W		W		F		
A. sedula	WPSF	WPF		WPS	WPSF	WPSF	W		WPF	P	WPF	WPSF	WPSF	WPSF	PS	WPSF
Calopteryx maculata					F				W							
Enallagma cardenium	PF	PF		SF	WPF	WF	W		PF	PS	WPF	WSF	WPSF	WPF	WS	WPSF
E. pollutum	WSF	WPS			P	WP	SF				WPSF	P		WP	WPSF	PF
E. weewa	WP								WPSF				W			
Hetaerina titia	P	P		SF	F		W		WF			WF	WS		P	WP
Ischnura posita													WP	F		W
I. ramburii	WPS	F								W	WPS				P	
Hemiptera																
Belostoma lutarium	PF	SF			WPF	S	S				WS			F	PF	
B. testaceum					S											

TABLE 3 - CONT'D: PAGE 6 of 15

ORGANISM	Myakka River 25030009	Myakka River 25030403	Peace River 25020459	Peace River 25020401	Peace River 25020004	Peace River 25020002	Horse Creek 25020428	Horse Creek 25020111	Brushy Creek 25020530	Charlie Creek 25020005	Joshua Creek 25020404	Shell Creek 25020124	Prairie Creek 25020433	Alligator Creek 25010011
	Myakka River		Peace River				Peace River Tributaries							
Buenoa spp.							P					F		
Corixidae	WPF	PS	F	WF	WSF	WPSF	W	WPS	WPF	F	WP	WP	WF	
Hydrometra australis	SF								F	PF		F	S	W
Limnoporus canaliculatus		F		F							P	P	F	
Merragata brunnea										P				
Mesovelia amoena	S													
M. mulsanti	F	F			P	PSF			PSF	PSF	P	F	PF	
Metrobates hesperius				PSF		S	F	P		WPS	S	F		
Micracanthia sp.				S										
Microvelia spp.	P								W				F	W
Neogerris hesione	F		F	F	F	PF								
Neoplea striola	WF		WF	SF	F				WPF	WF	F	WF	F	
Paravelia brachialis	S		W					PS	PSF	WP				PF
Pelocoris femoratus	P		P	F						F			PSF	F
Ranatra australis			P				P			P				
R. nigra	WPSF	SF	WSF	WS	P	W			PF	WPSF	W		PSF	
Rhagovelia sp.							WP				F			
Rheumatobates tenuipes	S	PSF	WP	WS	WPS	F		P		WS	WF	P	PF	P
Trepobates sp.											P		F	
Megaloptera														
Chauliodes rastricornis				W										
Corydalus cornutus	PSF		PS	WS	WPS		WPF	S		S		SF		WPSF
Neuroptera														
Climacia areolaris													P	
Trichoptera														
Cernotina sp.		S			S			P			PF	WSF	SF	
Cheumatopsyche sp.	WPS	PF	F	WPF	W		WPF	WPSF	WF	WS	PSF	WPSF		WPSF

ORGANISM	Myakka River 25030009	Myakka River 25030403		Peace River 25020459	Peace River 25020401	Peace River 25020004	Peace River 25020002		Horse Creek 25020428	Horse Creek 25020111	Brushy Creek 25020530	Charlie Creek 25020005	Joshua Creek 25020404	Shell Creek 25020124	Prairie Creek 25020433	Alligator Creek 25010011
	Myakka River			Peace River					Peace River Tributaries							
Chimarra sp.	F				F				WF							S
Cyrnellus fraternus		S		F	W		S		PS			WS	WS	W	S	W
Hydropsyche sp.I - Cantrell	PSF	F		PSF	WPSF	WF			WF	WPS	F	W	S	S		
Hydroptila sp.									W		P					
Nectopsyche exquisita	WPSF	WPSF		WPS	WPS	WSF	PF		WPSF	WPSF	WPF	WPF	WPF	WPSF	S	WPS
N. pavida	S			F		F	S		S	PS		WPS	S	WPS	W	
Neotrichia sp.														F		
Neureclipsis sp.	W	WF								S						
Nyctiophylax sp.									WF							
Oecetis inconspicua	WPF	SF		P	P	S	W		PS	P						
O. sp. I - Cantrell	PSF				P	P			W	S		WP	P			PSF
O. sp. III - Cantrell	PSF	S			P				S	P	W	W		PSF	F	P
O. sp. V - Cantrell		WF									WF	F				
O. sp. VI - Cantrell					P											
O. sp. VII - Cantrell	PF										S					
Orthotrichia sp.															P	
Oxyethira sp.	PS										WP				P	SF
Triaenodes sp.	PS				S				S			F	S	PSF	WSF	WF
Lepidoptera																
Unid.		F		F		F							PF			WSF
Coleoptera																
Agabus johannis	W															
Anodocheilus exiguus	W										PF	F				
Berosus exiguus	S			P		P										
B. infuscatus				F		P										F
B. pugnax											F					
B. sp. (Larvae)										S	W					
Bidessonotus longovalis					P	P			W		F	S				F
Celina slossoni											W					

ORGANISM	Myakka River		Peace River				Peace River Tributaries							
	Myakka River 25030009	Myakka River 25030403	Peace River 25020459	Peace River 25020401	Peace River 25020004	Peace River 25020002	Horse Creek 25020428	Horse Creek 25020111	Brushy Creek 25020530	Charlie Creek 25020005	Joshua Creek 25020404	Shell Creek 25020124	Prairie Creek 25020433	Alligator Creek 25010011
Copelatus caelatipennis					P									
C. chevrolati									F					
Coptotomus interrogatus										F				
obscurus	WPF		WPS	PS				WPS	F	P	S			
Cybister fimbriolatus														
crotchi											S			
Derallus altus	F													
Desmopachria grana	F						W	S	F					
Dineutus assimilis	F													
D. carolinus				S		P		S						
D. serrulatus	PF	PSF	WSF	WPS	WS	WS	WPS	WPSF	S	PS	WPS	S	P	PS
Dryopidae (Larvae)	P							F						
Dubiraphia quadrinotata	WP	WPSF	WPF	WPSF	PS	W	WPSF	PSF	WPSF	WPS	WPS	WPSF	WPSF	WPSF
Enochrus ochraceous	WP		S				W							W
E. pygmaeus	W													
E. sublongus			P											
Enochrus sp. (Larvae)				W										
Gyrinus elevatus		S				WF			S	P				
G. pachysomus				F								WP		
Gyrinus sp.	P				W		P			F		S		
Helobata striata					S				F			F		
Helodidae (Larvae)		S	F	WF	S		W	S		WF		WPSF	WPS	W
Hydraena marginicollis					P							PF		
Hydrocanthus oblongus	WPF	F	WP	WPS			W	WP		W	S			
H. regius			W	S						W			S	
Hydrochus nr. equicarinatus			P		P	S			S					
H. nr. rugosus									F					
Hydroporus pilatei			W											
H. vittatipennis	WPF		W					S						

ORGANISM	Myakka River			Peace River					Peace River Tributaries							
	Myakka River 25030009	Myakka River 25030403		Peace River 25020459	Peace River 25020401	Peace River 25020004	Peace River 25020002		Horse Creek 25020428	Horse Creek 25020111	Brushy Creek 25020530	Charlie Creek 25020005	Joshua Creek 25020404	Shell Creek 25020124	Prairie Creek 25020433	Alligator Creek 25010011
Hydrovatus pustulatus																
compressus	P															
Laccophilus gentilis		F														
L. proximus				P					F		PF					
Liodessus affinis											F					
L. pullus floridanus										S						F
Microcylloepus pusillus	PF								WPSF	P				PSF		F
Paracymus nanus	PF						P				F		S	F		W
Peltodytes dietrichi	PF			WF	WF	F	WF			P	F	F				
P. floridensis	WF			F	F	F				S	WP	PF				
P. oppositus						P					S					
P. sexmaculatus	WPSF			WP			P				WPF	P				
P. sp.				P	P				W	W					S	W
Stenelmis fuscata	S									P						
S. hungerfordi	S			PS	P				S	PS		WS	PS	W		S
S. sp.	P			W	WSF	PS	F		WPF			PF		PF	PS	WPF
Suphis inflatus	S											W		F		
Suphisellus floridanus	SF														F	
S. gibbulus	PSF	F		WP	WSF	PF	S		F	S	W	WSF		WPF	SF	
S. parsonsi							S									
S. puncticollis						P										
Tropisternus blatchleyi											S					
T. lateralis nimbatus	S									WS						
Uvarus lacustris	PF											S				
Diptera																
Chironomidae																
Chironominae																

	Myakka River			Peace River					Peace River Tributaries							
ORGANISM	Myakka River 25030009	Myakka River 25030403		Peace River 25020459	Peace River 25020401	Peace River 25020004	Peace River 25020002		Horse Creek 25020428	Horse Creek 25020111	Brushy Creek 25020530	Charlie Creek 25020005	Joshua Creek 25020404	Shell Creek 25020124	Prairie Creek 25020433	Alligator Creek 25010011
Chironomini																
Chironomini sp. I - Rutter											P				S	
Chironomini sp. II- Rutter		S					P									
Chironomini sp. G (Roback)		WF														
Chironomus attenuatus									S		S					
C. stigmaterus									S							
Chironomus sp.	WP			W	S		W		P				WS	P	WP	
Cladopelma (pp.	P					W										
Cryptochironomus blarina	WPS			PSF			F		WPF	P			P			W
C. fulvus	WPSF	WPF		WPSF	WF	WS	WS		WPS	WPS	WPF	SF	WPSF	WS	S	PSF
C. sp. (Beck)					S											
Cryptotendipes sp.	WS	WS		F					S		WF	P			WS	W
Demicryptochironomus sp.		WF		S			WF		WPS	W	WPF	W			P	
Dicrotendipes modestus	WPS	S							PS		WPSF	F	P	W	P	W
D. neomodestus	P	S			P				S	P	S		P	WP	W	WP
D. nervosus		S														
Glyptotendipes sp.		S		W											S	
Goeldichironomus sp.		F										F	F		W	
Harnischia curtilamellata		P			PS										S	
Nilothauma bicornis		W														W
Pagastiella sp.				F							F					
Parachironomus sp.						P					S					
Paracladopelma sp.	WF								P				P			
Paralauterborniella nigrohalteralis	WPSF	WS		WPF	SF	W	S		WPSF	WP	W	WPF	WF	S	W	W
Pedionomus beckae				W					P							
Phaenopsectra fuscicornis	W	WS								S	W	P	PSF	WF	PSF	
P. jucundus									P							
Polypedilum convictum	WPF	F		F	F	WF			WPSF	PSF		WF	WP	S		WPSF

ORGANISM	Myakka River: Myakka River 25030009	Myakka River: Myakka River 25030403	Peace River: Peace River 25020459	Peace River: Peace River 25020401	Peace River: Peace River 25020004	Peace River: Peace River 25020002	Peace River Tributaries: Horse Creek 25020428	Peace River Tributaries: Horse Creek 25020111	Peace River Tributaries: Brushy Creek 25020530	Peace River Tributaries: Charlie Creek 25020005	Peace River Tributaries: Joshua Creek 25020404	Peace River Tributaries: Shell Creek 25020124	Peace River Tributaries: Prairie Creek 25020433	Peace River Tributaries: Alligator Creek 25010011
Nanocladius crassicornis														W
N. sp.						W								
Orthocladiinae sp.I-Rutter	F						W							
Orthocladius sp.								PF			F		W	W
Parakiefferiella sp.		S												
Thienemanniella nr. *fusca*	P													F
T. nr. *xena*	WP		S				WF							S
Tanypodinae														
Ablabesmyia aspera	WP				W			W	WP	P		P		
A. mallochi	P		F		W	W	P			PF	W	WP		W
A. ornata											W			
A. parajanta	F	S	S	SF	WPS		PF	S	WPF	WPSF	S	WS	S	W
A. peleensis									PS					
A. tarella	PS		P	W			PS	PS	WPF	WPSF	PS	WSF		
Clinotanypus sp.	WPS	F	W	WPS	PS		S	WS	PSF	W	PF	WPSF	WPSF	WF
Coelotanypus scapularis				PS	PS					S	S		S	
C. tricolor								W			F			
C. sp.					S				S					
Fittkauimyia sp.							S							
Labrundinia johanseni													P	
L. neopilosella									W				P	
L. pilosella		P			W	F						W		
L. sp.		S								S			F	
Larsia lurida									S					
Pentaneura inconspicua	P	W	F	P			WPF		PF	SF	WPSF	WPF		WPF
Procladius sp.	S		W	W	WF		PS	W	S	F	S	WS		W
Tanypus carinatus	S	F							S					
T. stellatus									S					

	Myakka River			Peace River					Peace River Tributaries							
ORGANISM	Myakka River 25030009	Myakka River 25030403		Peace River 25020459	Peace River 25020401	Peace River 25020004	Peace River 25020002		Horse Creek 25020428	Horse Creek 25020111	Brushy Creek 25020530	Charlie Creek 25020005	Joshua Creek 25020404	Shell Creek 25020124	Prairie Creek 25020433	Alligator Creek 25010011
Other Families																
Anopheles sp.						F					PSF		F	WP	P	P
Atrichopogon spp.														W		
Ceratopogonidae																
Type I - Rutter		S			W				S			PF	PS	W	S	S
Type II - Rutter	WPSF	WPSF		WP	S	PS			PSF		WPF	WS	PSF	WPS	WPSF	W
Type III - Rutter											S		F			
Type IV - Rutter				SF			WF					F				
Type V - Rutter	WP			WS			W		WP	WPS	WP		PS			W
Type VII - Rutter									S					W		
Type VIII - Rutter					W							W				
Type IX - Rutter					P		W			S		P		P		
Type X - Rutter	S													P		
Type XI - Rutter									S		S					
Type XII - Rutter							WP									
Type XIV - Rutter																W
Type XV - Rutter	WPS	PS		WPS	W	W	WS		PS	P	S	WS	PS	WPS		W
Type XVI - Rutter									WP	P						
Chaoborus sp.															W	
Chrysops sp.															F	
Culex spp.															W	
Dolichopodidae							P									
Empididae												W				
Erioptera sp.				F	F		P			F			F	P		
Forcipomyia sp		S								S						
Limonia sp.		S			F					F			F			
Odontomyia spp.											S					

ORGANISM	Myakka River			Peace River					Peace River Tirbutaries							
	Myakka River 25030009	Myakka River 25030403		Peace River 25020459	Peace River 25020401	Peace River 25020004	Peace River 25020002		Horse Creek 25020428	Horse Creek 25020111	Brushy Creek 25020530	Charlie Creek 25020005	Joshua Creek 25020404	Shell Creek 25020124	Prairie Creek 25020433	Alligator Creek 25010011
Pilaria sp.									P					P		
Simulium sp.	WP	W		PSF	WPF	W	W		WSF	WS	WF	W	W	S		WPSF
~~*Stratiomys* sp.~~ *Chlorotabanus* sp.	F															
Tipula sp.									P					P		
Uranotaenia sp.															W	
MOLLUSCA																
Bivalvia																
Byssanodonta cubensis		WPF		F	F						WS	W				
Carunculina parva									P			PS				
Corbicula fluminea	WPSF	WPS		WPS	WPSF	WPS	WPSF		PSF	WPS	WPSF	WPSF	PSF	WPSF	PS	WPSF
Elliptio buckleyi	PSF	F		S					P	S	WPS	PS			P	PF
E. icterina	P													W	P	P
Musculium spp.		P		W							WPSF					
Pisidium punctiferum	WPSF			PSF	P	WPS			WPS	WP	SF	WPSF	WPSF	S	W	WPF
Uniomerus carolinianus	W										WS				W	
Villosa amygdala											F			SF	F	
Gastropoda																
Amnicola dalli johnsoni	WP			PF	W				PS	WPS		WPSF			SF	
Ferrissia sp.											PS	W	F	F		
Gyraulus parvus														W		WPSF
Hebetancylus excentricus	PF	PF		W	S		F		WF	PS	WPF	SF	W	WPF	WPF	W
Laevapex diaphanus	P	W														
L. fuscus	W			W					W		WS					W
L. peninsulae									PS	S	P		P		P	
Melanoides tuberculata																WPSF

ORGANISM	Myakka River			Peace River					Peace River Tributaries							
	Myakka River 25030009	Myakka River 25030403		Peace River 25020459	Peace River 25020401	Peace River 25020004	Peace River 25020002		Horse Creek 25020428	Horse Creek 25020111	Brushy Creek 25020530	Charlie Creek 25020005	Joshua Creek 25020404	Shell Creek 25020124	Prairie Creek 25020433	Alligator Creek 25010011
Micromenetus dilatatus																
avus				W							WPS	WF	W		WPF	
M. floridensis														F		
Neritina reclivata							WF									
Physella cubensis cubensis		W							SF		S					
P. heterostropha pomila					P						S					W
P. sp.	WPSF	SF		P	WSF	PS	S		WP	W	WPF	WPSF		SF	PSF	SF
Planorbella duryi	P	PF			PS					WS	PS	PS		WPS	PS	WPS
P. trivolvis intertexus	WPSF			W							WPSF			F	F	F
Pomacea paludosa	F						F				WPS				PS	
Pseudosuccinea columella	WPSF				WF	PF	P			SF	WS	WP	F	WPF	WPF	W
Pyrogophorus platyrachis				S	PS	WPSF	PSF						WSF	WPSF	W	
Viviparus georgianus											F					

RPR/wlb

TABLE 4
Quarterly Distribution of Records for the Major Macroinvertebrate Groups

	Percentage of Records Occurring In				
	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Number of Records
Ephemeroptera	26%	24%	23%	26%	321
Anisoptera	26%	23%	27%	24%	194
Zygoptera	30%	29%	18%	23%	149
Hemiptera	19%	27%	20%	35%	184
Trichoptera	23%	25%	27%	25%	219
Coleoptera	23%	27%	24%	26%	340
Chironominae	29%	24%	25%	23%	457
Orthocladiinae	33%	25%	12%	29%	48
Tanypodinae	27%	26%	29%	19%	156
Other Diptera	30%	27%	26%	17%	164
Mollusca	26%	27%	24%	23%	321
Other	26%	25%	24%	24%	456
Number of Records	784 (26%)	769 (26%)	726 (24%)	730 (24%)	3009