F. Caloosahatchee Study Area

## 1. Overview

The Caloosahatchee River Basin drains an area of about 1,327 square miles. The Caloosahatchee River is a blackwater river that drains low, flat mucklands, runs from Lake Okeechobee to the lower Charlotte Harbor Basin at San Carlos Bay. Basically a waterway channeled for flood control, the river flows about 45 miles from the Moore Haven Locks on western Lake Okeechobee to the Franklin Locks near the town of Olga. The watershed includes northern Lee and Hendry Counties, southern Glades County and southeastern Charlotte County.

The Caloosahatchee River was originally a shallow meandering stream about 80 km (50 miles) long with headwaters near Lake Hicpochee (Drew and Schomer 1984; Hammett 1990). To accommodate navigation, flood control and land reclamation needs, the Caloosahatchee River has been radically altered from its natural state.

The area is dominated by seasonally flooded cypress savannas and freshwater marshes with interspersed pine-dominated uplands accompanied by an extensive coastal fringe of mangroves with extensive beaches and numerous estuaries are significant. The Caloosahatchee basin has the last remaining large area of unlogged pine forest in south Florida, the largest stand of virgin bald cypress in the U.S. (Corkscrew), as well as a large number of endangered species (e.g. panther, red-cockaded woodpecker, Big Cypress fox squirrel and manatee).

One of the most dramatic changes was the dredging that connected the Caloosahatchee to Lake Okeechobee in 1881 in order to lower the water table of Lake Okeechobee and it was first channelized to improve navigation and flood control in the 1930s. In addition to the alteration of the main channel, many canals have been constructed along the banks of the river. These canals were constructed for both water supply and land reclamation in order to support the many agricultural communities along the river.

Flow and stage height in the Caloosahatchee River is controlled by a series of locks. Three locks, which prevent saltwater intrusion, were constructed on the river: Moore Haven Lock and Ortona Lock in 1937,and Franklin Lock, which acts as a salinity barrier, near Olga, in the 1960s.. Most of the freshwater entering the Caloosahatchee estuary is through Franklin Lock.. The freshwater portion of the river is 60 km (37 miles) long and the Tidal Caloosahatchee extends downstream of Franklin Lock for about 45 km (28miles).

Land use within the Caloosahatchee watershed is dominated by rangeland and agriculture, particularly in the upper part of the basin with an urbanized West Coast. The most common land uses in the freshwater portion of the basin are agriculture and rangeland; the tidal basin is primarily urbanized. The major urban areas that occur along the tidal Caloosahatchee watershed basin are Ft. Myers and, across the river, the large residential areas of Cape Coral and North Fort Myers. The lower river, south of Ortona

still has portions of the old meanders and natural tributaries, some of which receive water from saline artesian wells. Citrus and fern farms dominate here, and some large residential developments have been built.

The Caloosahatchee River serves as an outlet from Lake Okeechobee to the Gulf of Mexico and is the major source of surface water supply for the Lower West Coast region. It provides agricultural and lawn irrigation, public water supplies and is used to recharge shallow wellfields. The river also provides drainage for private drainage systems and local drainage districts. The East and West portions of the freshwater segment of the Caloosahatchee River have been restructured into a canal known as C-43. Drinking and irrigation water is obtained from the eastern portion of the canal, while the western portion is designated for wildlife and recreational use.

The natural pattern (quantity and timing) of freshwater flow into the Caloosahatchee estuary has been disrupted due to its unnatural connection to Lake Okeechobee, water control structures on the river, the network of channelized tributaries and drainage canals in the basin, and urban and agricultural water demands (Drew and Schomer 1984; Hammett 1990). Periodic regulatory releases from Lake Okeechobee are made to the estuary via the river. These releases usually occur during the latter part of the dry season when freshwater inflow would naturally be lowest. Because of these discharges the freshwater flow into the estuary exceeds the historical volume, especially in the dry season. Conversely, when regulatory discharges are not occurring, unnaturally low freshwater inflow can occur during the dry season due to high water demand for agricultural and urban uses. The network of channelized tributaries and drainage canals exacerbates the excessive discharge problem. Discharges from Franklin Lock cause the entire estuary to become oligohaline and can decrease salinity in the outer embayments, San Carlos Bay and Matlacha Pass (Chamberlain 1992; Bierman 1993). Submerged vegetation in the estuary has decreased significantly since installation of Franklin Lock (McNulty 1972; Harris et al. 1983). Other studies suggest impacts on water quality, benthic fauna and fisheries.

Water quality conditions are degraded in the upper and lower areas of the basin, due to agricultural and urban runoff, respectively. The channelized section of the river also shows degraded water quality conditions, due to agricultural inputs, as compared to tributaries lying in less developed areas of the basin. Problems associated with the degraded areas of the basin are typified by low dissolved oxygen levels, elevated conductivity and decreased biodiversity. Conditions in the urbanized sections of the basin are influenced by nonpoint storm water flows, and are manifested in the river by elevated chlorophyll levels, algal blooms, periodic fish kills and low dissolved oxygen levels.

The freshwater Caloosahatchee is a severely stressed ecosystem, with substantial water quality problems. State water quality standards have been frequently exceeded. Lake Okeechobee discharge and basin runoff contribute pollutants to the river; however, there is conflicting information on which source most affects river water quality.

## 2. Drainage Basin Breakouts

As seen in Figure_, there are nine 303(d) listed waterbody segments in the Caloosahatchee Study Area.

## a. North Coastal Drainage Basin

*Background*

*Land Use*

The land use in the North Coastal Basin consists of urban/built-up (36%), wetlands (24%), upland forests (24%), agriculture (5.3%), rangeland (4.5%), transportation communications and utility (4.5%), barren land (0.8%) and water (0.5%).

*Drainage Features*

### 1. Matlacha Pass

*Background*

The Matlacha Pass is located in Lee County within the greater Charlotte Harbor complex. Matlacha Pass watershed covers approximately 25 square miles. The most common biological communities in the Matlacha Pass are: Mangroves (reds *Rhizophora mangle*, blacks *Avicennia germinans*, whites *Laguncularia racemosa* and buttonwood *Conocarpus erectus*), Seagrasses (turtle *Thalassia testudinum*, manatee *Syringodium filiforme* and Cuban shoal *Halodule wrightii*) , salt marsh grass (*Distichlis spicata*, needlerush *Juncus roemerianus* and cordgrass *Spartina)*

*Drainage Features*

*Water quality summary*

The Matlache Pass was on the 1998 303(d) list for nutrients and mercury. The TMDLs for these parameters are scheduled for the year2004, according to a Consent Decree with USEPA.

No data was available for this waterbody.

### 2. Daughtrey Creek

*Background*

Daughtrey Creek, located in Lee County, drains into the Caloosahatchee River. The drainage basin consists of pine flatwoods, with varying degrees of residential development.

*Land use*

Major land uses in the area include residential, open land and small agricultural areas. The predominant land-use in the area is low density (rural) single family residential, encompassing approximately 80% of the drainage basin. Medium density residential and trailer park use make up the other 20 %.

*Drainage Features*

*Water quality summary*
Daughtrey Creek was on the 1998 303(d) list for dissolved oxygen and nutrients. The development of TMDLs for these parameters is scheduled for the year 2004, according to a Consent Decree with USEPA.
No data was available for this waterbody.

**b. Tidal Caloosahatchee Drainage Basin**

*Background*

The Tidal Caloosahatchee extends 28 miles from Franklin Lock to San Carlos Bay, and is so named because its waters are subject to tidal forces (Drew and Schomer1984). Tributaries of the Tidal Caloosahatchee include Billy Creek, Whiskey Creek, Orange River, Hickey Creek, Roberts Canal and Daughtrey Creek.

Important natural habitats remaining within the Tidal Caloosahatchee drainage basin include mangrove, saltmarsh, tidal ponds and according to one 1988 assessment, a small percentage of rare/unique slash pine/midstory oak (Godschalk and Associates, 1988). The West Indian manatee (Trichechus manatus) is a federally endangered species that frequents the Tidal Caloosahatchee River and winters in the Orange River (FDEP, 1996).

*Land use*

The land use of the Tidal Caloosahatchee Basin consists of urban/built-up (44%), upland forests (15%), wetlands (12%), agriculture (11%), water (8.4%), transportation communication and utilities (3.2%) and barren land (2%).

*Drainage Features*

*Water Quality Summary*

This segment of the Caloosahatchee River was not on the 1998 303(d) list.

According to the State's Surface Water Quality Standards (Chapter 62-302), dissolved oxygen for this surface water should never fall below 4mg/L. For the time period from 1990 to 1995, 13% (10/76) of the samples exceeded this criteria. Figure,, illustrates dissolved oxygen concentrations over time at stations CAL04, CAL06, CAL08, CAL01, CAL02 and S79.

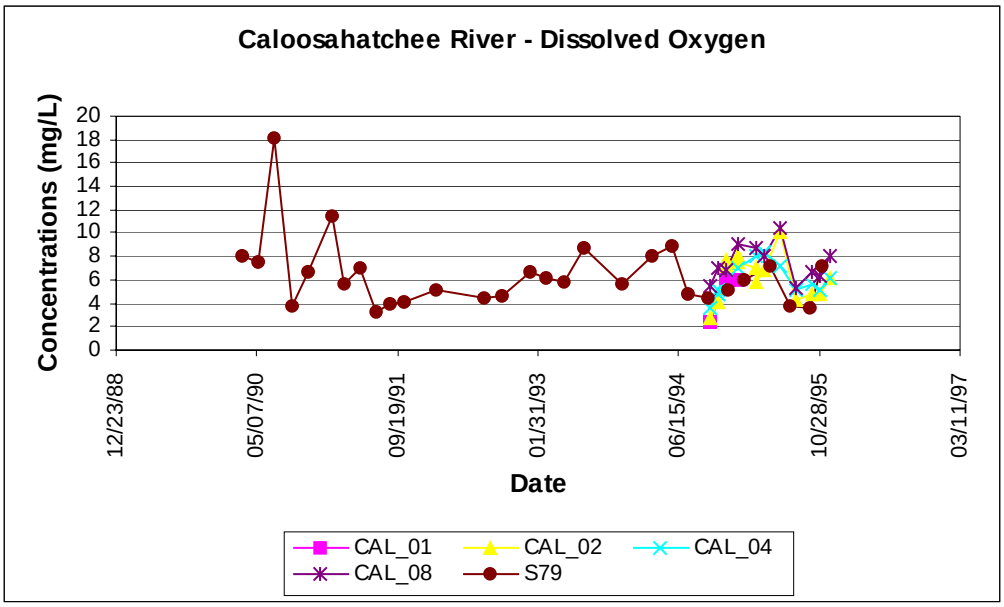



**Figure Dissolved Oxygen Concentrations in Caloosahatchee River**

Temporal analyses for dissolved oxygen, total nitrogen, total phosphorus and turbidity were conducted on stations CAL04, CAL06, CAL08, CAL01, CAL02 and S79. The data was analyzed using the Seasonal Kendall Test to see if there were significant changes in the above water quality parameters during the time period from 1990 to 1995.

According to this test, turbidity is increasing over time, while dissolved oxygen, total nitrogen and total phosphorus are decreasing. The decrease in total phosphorus is statistically significant at the 95% confidence level.

**Table „ Results of Trend Analyses Using the Seasonal Kendall Test**

| Parameter | Seasonal Kendall Test Statistic | Significant @ a=0.05 | Significant @ a=0.10 | Significant @ a=0.20 |
|---|---|---|---|---|
| Dissolved Oxygen | -0.638 mg/L x year | No | No | No |
| Total Nitrogen | -0.925 mg/L x year | No | No | No |
| Total Phosphorus | -3.406 mg/L x year | Yes | Yes | Yes |
| Chlorophyll A | NA | NA | NA | NA |
| Turbidity | 1.240 mg/L x year | No | No | No |

Figures,,, illustrate total nitrogen, total phosphorus and turbidity concentrations, respectively, over time at stations CAL04, CAL06, CAL08, CAL01, CAL02 and S79.

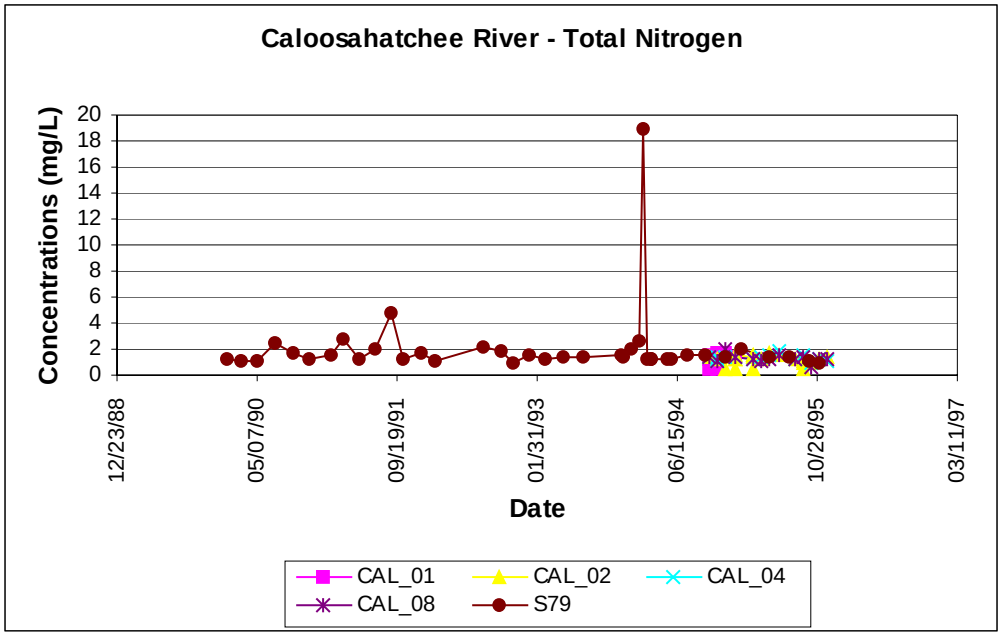



**Figure Total Nitrogen Concentrations in Caloosahatchee River**

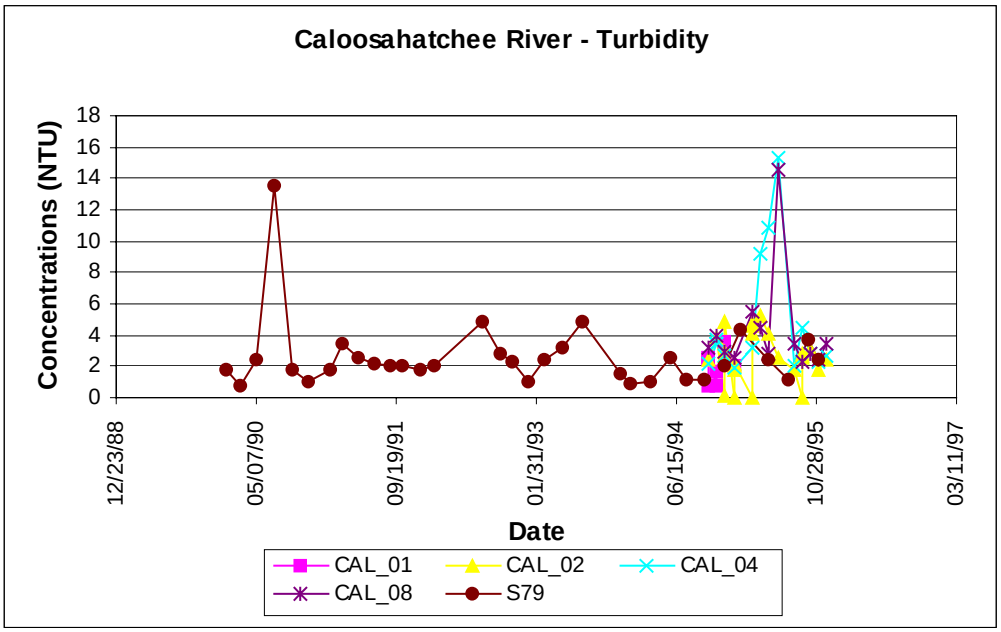



**Figure Turbidity Concentrations in Caloosahatchee River**

## 1. Trout Creek

*Background*

Trout Creek is located in Lee County (Flatwoods Park, a Southwest Florida Water Management District land management area). The creek is bordered by upland forest for most of its length.

*Land Use*

The predominant land-use in the area is low density cattle ranching and rural residential use.

*Drainage Features*

Trout Creek drains into the Caloosahatchee River. The drainage basin consists of pine flatwoods and improved pasture.

*Water quality summary*

Trout Creek was on the 1998 303(d) list for dissolved oxygen, coliforms and biochemical oxygen demand. The development of TMDLs for these parameters is scheduled for the year2009, according to a Consent Decree with USEPA.

Due to lack of sufficient data, trend analyses were not conducted on this waterbody.

## 2. Yellow Fever Creek

*Land Use*

Yellow Fever Creek includes pine flatwoods, undeveloped open land and low and medium density residential areas.

*Drainage Features*

The creek flows into the Caloosahatchee River. There are no obvious large sources of non-point-source pollution in the area.

*Water Quality Summary*

Yellow Fever Creek was on the 1998 303(d) list for dissolved oxygen. The development of TMDls for this parameter is scheduled for the year 2009, according to a Consent Decree with USEPA.

Due to lack of sufficient data, trend analyses were not conducted on this waterbody.

## 3. Manuel Branch

*Background*

Manuel Branch, located in Lee County, drains portions of the City of Ft. Myers into the Caloosahatchee River. The area consists of downtown and suburban Ft. Myers. The stream is a canal for most of its length.

*Land Use*
The predominant land-use in the area is medium density residential, encompassing approximately 75% of the drainage basin. Commercial, transportation and industrial uses make up the other 25%.

*Drainage Features*

*Water quality summary*
Manuel Branch has been placed on the 1998 303(d) list due to dissolved oxygen and nutrients. The development of TMDls for this parameter is scheduled for the year 2009, according to a Consent Decree with USEPA.

Due to lack of sufficient data, trend analyses were not conducted on this waterbody.

**4. Billy Creek**
*Background*
Billy Creek flows into the Caloosahatchee River just above the US 41 bridges. Its drainage basin includes urban and suburban residential areas, orange groves and industrial/ commercial property.

*Land use*
Major land uses in the area include agriculture, high and medium density residential, commercial and light industry.

*Drainage Features*
Billy Creek collects stormwater from much of east Fort Myers and flows into the Caloosahatchee River just above the US 41 bridges.

*Water Quality Summary*
This stream has problems with both water quality and habitat. Water quality problems probably result from the amount and timing of stormwater the creek receives. The bank habitat does not provide the shade, snags and leaf litter that might increase the in-stream habitat diversity. The high conductivity could also affect the insect community and could be caused by groundwater inflow or flow upstream from the Caloosahatchee River.

Billy Creek was on the 1998 303(d) list due to dissolved oxygen and nutrients. The development of TMDls for this parameter is scheduled for the year 2004, according to a Consent Decree with USEPA.

Due to lack of sufficient data, trend analyses were not conducted on this waterbody.

**c. Telegraph Swamp Drainage Basin**

*Background*

*Land Use*

The land use in the Telegraph Swamp Basin consists of upland forests (47%), wetlands (24%), agriculture (22%), rangeland (5.7%), transportation communications and utility (0.1%), urban and built-up (0.3%), water (0.06%), and barren land (0.09%).

*Drainage Features*

*Water Quality Summary*

Telegraph Swamp Basin does not contain any 1998 303(d) listed waterbodies. No monitoring stations in this basin.

**d. West Caloosahatchee Drainage Basin**

*Background*

The Western Caloosahatchee begins at the point where Franklin Lock separates the Tidally influenced waters from the upland waters.

*Land Use*

The Western portion of the Caloosahatchee is designated for wildlife and recreational use. Approximately 41% of the West Caloosahatchee Basin is agricultural lands. Wetland and pine forests make up 21% and 16%, respectively.

*Drainage Features*

*Water Quality Summary*

The West Caloosahatchee Basin does not contain any 1998 303(d) listed waterbodies. Due to lack of sufficient data, trend analyses were not conducted on this basin.

**e. East Caloosahatchee Drainage Basin**

*Background*

*Land Use*

The land use in the East Caloosahatchee Basin consists of agriculture (60%), wetlands (18%), upland forests (12%), rangeland (4.4%), urban and built-up (2.4%), water (0.9%), and barren land (0.8%) and transportation communications and utility (0.8%).

*Drainage Features*

*Water Quality Summary*

The East Caloosahatchee River was on the 1998 303(d) list due to dissolved oxygen, nutrients and biochemical oxygen demand. The development of TMDLs for these parameters is scheduled for the year 2009, according to the Consent Decree with the USEPA.

According to the State's Surface Water Quality Standards (Chapter 62-302), dissolved oxygen for this surface water should never fall below 5mg/L. For the time period 1990 to 1995, 24% (12/51) of the samples exceeded this criteria. Figure,, illustrates dissolved oxygen concentrations over time at station S78 on the Caloosahatchee River.

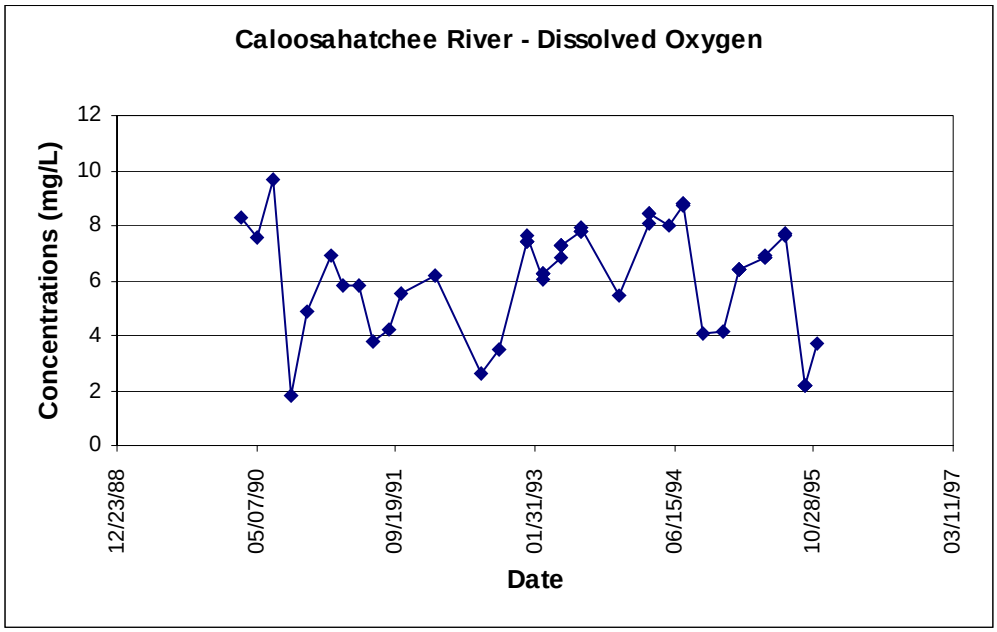



**Figure Dissolved Oxygen Concentrations in Caloosahatchee River**

Temporal analyses for dissolved oxygen, total nitrogen, total phosphorus and turbidity were conducted on station S78. The data was analyzed using the Seasonal Kendall Test to see if there were significant changes in the above water quality parameters during the time period from 1990 to 1995.

According to this test, total nitrogen, total phosphorus and turbidity are decreasing over time. The decreases in total phosphorus and turbidity are statistically significant at the 95% confidence level.

**Table,, Results of Trend Analyses Using the Seasonal Kendall Test**

| Parameter | Seasonal Kendall Test Statistic | Significant @ a=0.05 | Significant @ a=0.10 | Significant @ a=0.20 |
|---|---|---|---|---|
| Dissolved Oxygen | 0.00 mg/L x year | No | No | No |
| Total Nitrogen | -1.056 mg/L x year | No | No | No |
| Total Phosphorus | -2.957 mg/L x year | Yes | Yes | Yes |
| Chlorophyll A | NA | NA | NA | NA |
| Turbidity | -2.443 mg/L x year | Yes | Yes | Yes |

Figures,, illustrate total nitrogen, total phosphorus and turbidity concentrations, respectively, over time at station S78.

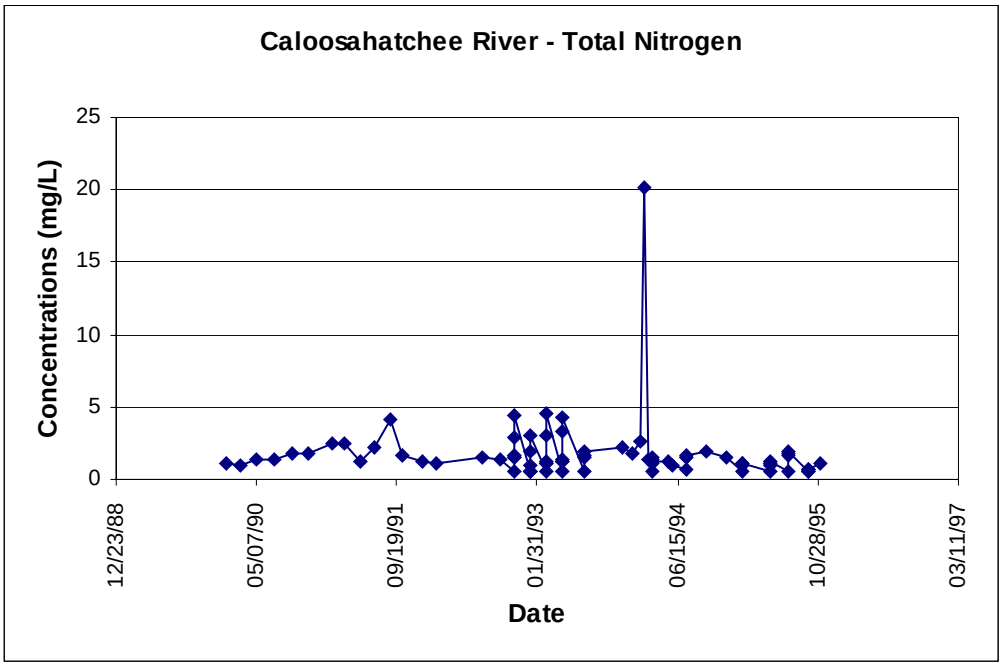



**Figure Total Nitrogen Concentrations in Caloosahatchee River**

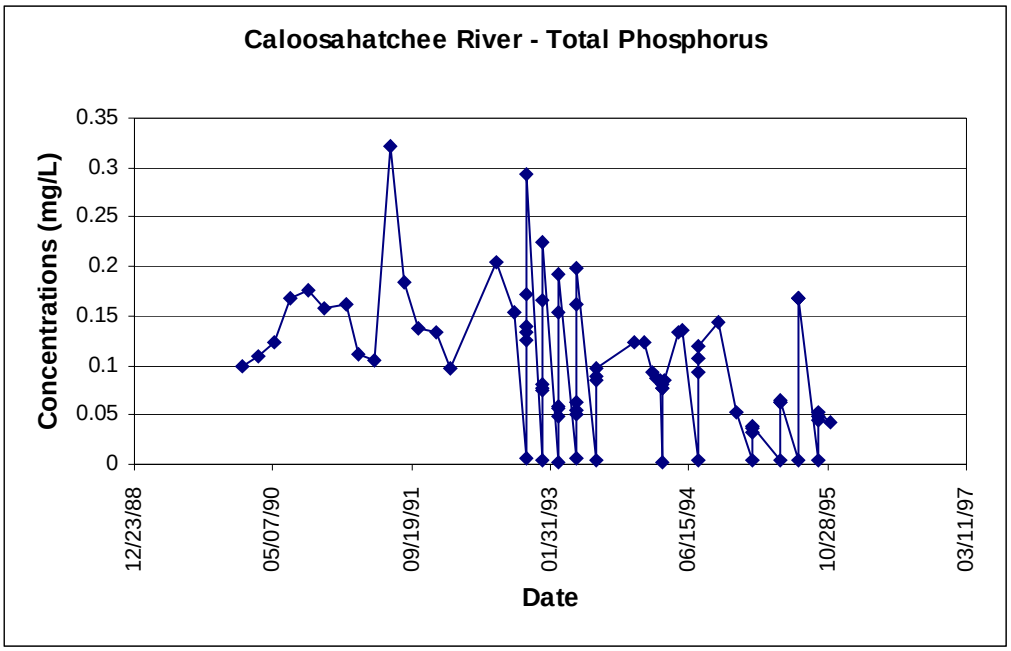



**Figure Total Phosphorus Concentrations in Caloosahatchee River**

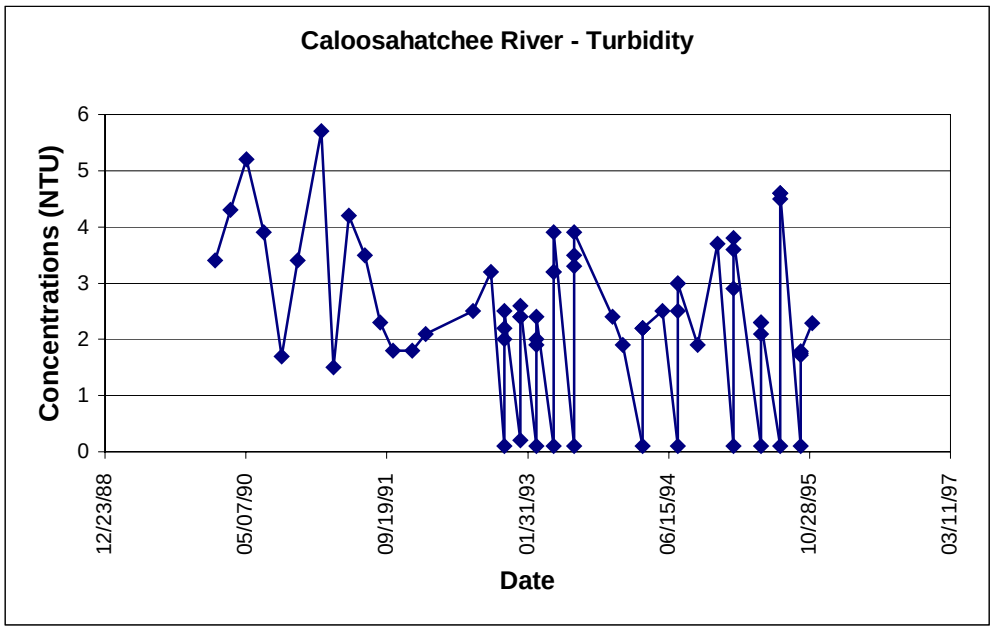



**Figure Turbidity Concentrations in Caloosahatchee River**

The C-19 Canal was not on the 1998 303(d) list.

According to the State's Surface Water Quality Standards (Chapter 62-302), dissolved oxygen for this surface water should never fall below 5mg/L. For the time period 1990 to 1995, 76% (26/34) of the samples exceeded this criteria. Figure,, illustrates dissolved oxygen concentrations over time at station CR-04.8T on the C-19 Canal.

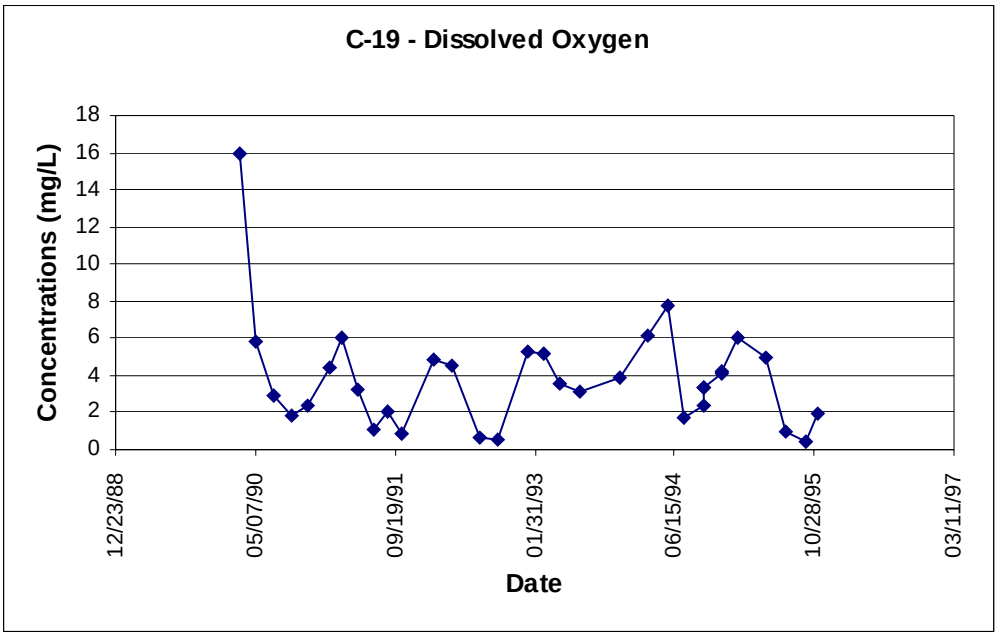



**Figure Dissolved Oxygen Concentrations in C-19**

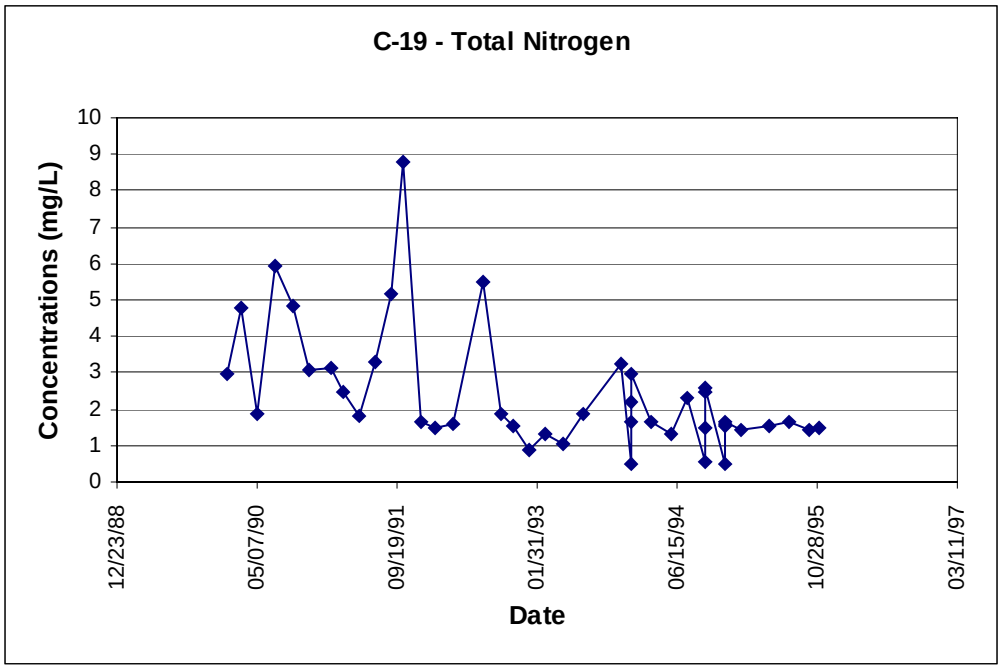
Temporal analyses for dissolved oxygen, total nitrogen, total phosphorus and turbidity were conducted on station CR-04.8T. The data was analyzed using the Seasonal Kendall Test to see if there were significant changes in the above water quality parameters during the time period from 1990 to 1995.

According to this test, all four parameters are decreasing over time at station CR-04.8T. The decreases in total nitrogen, total phosphorus and turbidity are statistically significant at the 95% confidence level.

**Table „Results of Trend Analyses Using the Seasonal Kendall Test**

| Parameter | Seasonal Kendall Test Statistic | Significant @ a=0.05 | Significant @ a=0.10 | Significant @ a=0.20 |
|---|---|---|---|---|
| Dissolved Oxygen | -0.240 mg/L x year | No | No | No |
| Total Nitrogen | -3.292 mg/L x year | Yes | Yes | Yes |
| Total Phosphorus | -2.230 mg/L x year | Yes | Yes | Yes |
| Chlorophyll A | NA | NA | NA | NA |
| Turbidity | -3.631 mg/L x year | Yes | Yes | Yes |

Figures,,, illlustrate total nitrogen,, total phosphorus and turbidity concentrations, respectively, over time at station CR-04.8T.




**Figure,, Total Nitrogen Concentrations in C-19**

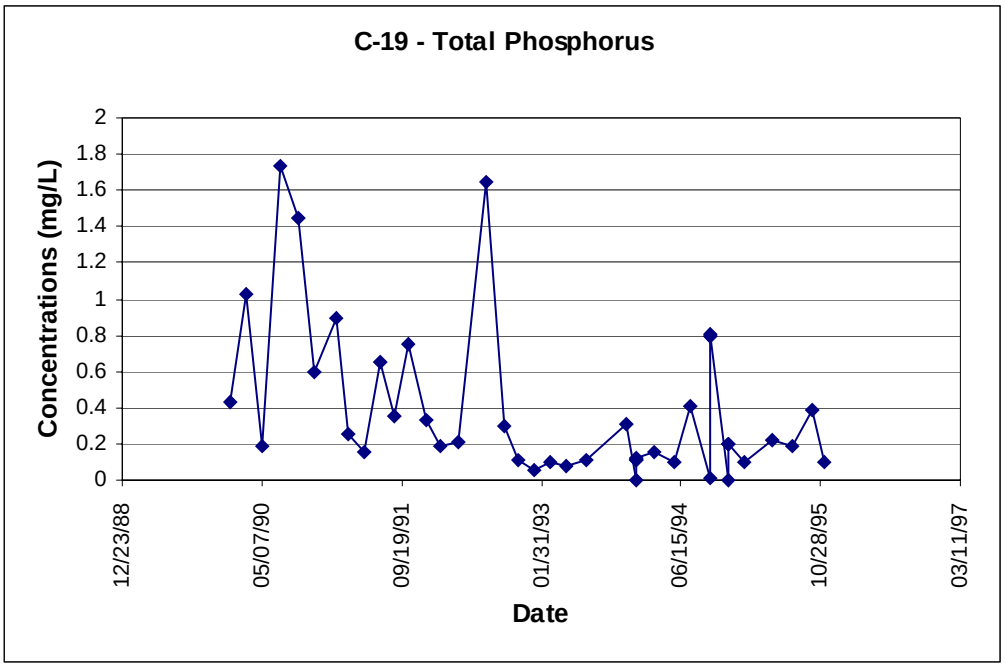



**Figure Total Phosphorus Concentrations in C-19**

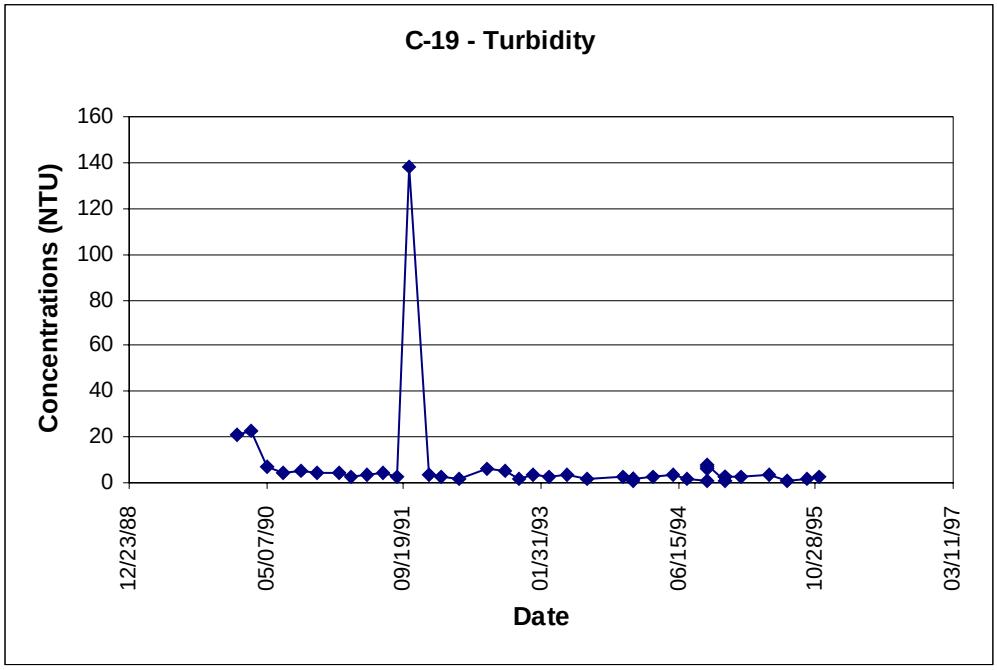



**Figure Turbidity Concentrations in C-19**

## 1. Lake Hicpochee

*Drainage Features*

*Water Quality Summary*

Lake Hicpochee was on the 1998 303(d) list for nutrients. The development of TMDLs for this parameter is scheduled for the year 2004, according to the Consent Decree with the USEPA.

Due to lack of sufficient data, trend analyses were not conducted on this waterbody.

## 2. Nine Mile Canal

*Drainage Features*

*Water Quality Summary*

The Nine Mile Canal was on the 1998 303(d) list for nutrients, dissolved oxygen, biochemical oxygen demand and coliforms. Low dissolved oxygen due to deep canals that intercept groundwater. The development of TMDLs for these parameters is scheduled for the year 2004, according to a Consent Decree with the USEPA.

Due to lack of sufficient data, trend analyses were not conducted on this waterbody.

## 3. Exisiting Strategies

**Caloosahatchee River Water Management Plan**
The South Florida Water Management District (SFWMD) has undertaken development of long-term comprehensive regional water supply plans to provide better management of South Florida's water resources. The purpose of the water supply plans is to develop strategies to meet the future water demands of urban areas and agriculture, while meeting the needs of the environment. The planning process projects future (2020) demand and develops strategies to meet this need. The plan also identifies areas where historically used sources of water will not be adequate to meet future demands, and evaluates several water source options to meet the deficit.

**Caloosahatchee River Water Management Plan**
The Caloosahatchee Water Management Plan (CWMP) planning area is a sub-region of the Lower West Coast Water Supply Plan and is linked through Lake Okeechobee to the Lower East Coast Water Supply Plan. The CWMP is focused on surface water resources associated with the Caloosahatchee River. The findings of the Plan will be incorporated into both the Lower West Coast and Lower East Coast Water Supply Plans.

**Charlotte Harbor NEP Comprehensive Conservation Management Plan**
This plan began in 1995 when Charlotte Harbor was recognized as an “estuary of national significance” and was accepted into the National Estuary Program. The completion of the management plan initianted the action to restore and protect the estuary and its 4,400 square mile watershed. The plan uses a cooperative decision-making process to address diverse resource management concerns.