

E. Loxahatchee Study Area

1. Overview

The major component of the study area is the Loxahatchee River which historically drained over 300 square miles of inland sloughs and wetlands. Some of the major tributary streams, such as the North Fork, the Northwest Fork and Kitching Creek exist today much within their historic banks. Other creeks, such as the Southwest Fork, Limestone Creek and parts of Cypress Creek, have been greatly altered. Part of the watershed, the southern half of the Loxahatchee Slough, has been impounded to for the City of West Palm Beach Water Catchment Area which provides drinking water to the City of West Palm Beach. Today, approximately 277 square miles of the original Loxahatchee River watershed drain to the Jupiter Inlet.

The Jupiter inlet is a prominent feature of the southeast Florida shoreline. A constant presence, yet dynamic in its actions, one season venting large quantities of freshwater into the gulf stream, the next season accepting the tides within its vast embayment. The Jupiter inlet provides a drainage outlet for the entire watershed via three major waterways, the Loxahatchee River, Lake Worth Creek and the Indian River Lagoon.

Significant changes have occurred within the watershed, specifically since the end of the Second World War. Jupiter inlet has been improved and remains open now under all conditions. Lake Worth Creek has been channelized to extend the Intracoastal Waterway (ICW). The marshes that fed Lake Worth Creek have been developed and those lands now contribute urban stormwater runoff. Throughout the watershed, urban, rural and agricultural development have progressed over the past fifty years, and transportation corridors and drainage channels have been built to accommodate this growth. Although large tracts of natural lands have been places in public ownership, the hydrology of the entire watershed has been altered.

Habitat types found within the Loxahatchee River area include pinelands, sand pine scrub, xeric oak scrub, hardwood hammock, freshwater marsh, wet prairie, cypress swamp, mangrove swamps, ponds, sloughs, streams, seagrass beds, tidal flats, oyster beds and coastal dunes. These areas support diverse biological communities, including many designated species, such as the four petal paw paw, which is found only in Martin and Palm Beach counties.

The natural resources of the Loxahatchee River watershed attract people to the area. Development and tourism are growth industries in the watershed. The population growth over the past 50 years, from 1,00 in the 1940's to over 90,000 people now, has had an impact on the environment in the watershed. Land has been developed to support agriculture, residential, commercial, industrial and institutional activities. Most of this development has been concentrated in the eastern portion of the watershed, along the coast and around the Loxahatchee River estuary.

2. Drainage Basin Breakouts

As seen in Figure –, there are six 303(d) listed waterbody segments in the Loxahatchee study area.

a. L-8 Drainage Basin

Background

The L-8 Basin encompasses 171 square miles in northwestern Palm Beach County (168 square miles) and southwestern Martin County (3 square miles). The L-8 Canal is critically important to the City of West Palm Beach water supply system, as water is pumped from the L-8 Canal into the Water Catchment Area (WCA), which is the City's primary water supply on an as-needed basis to augment rainfall capture.

Land Use

The land use of the L-8 Basin consists of wetlands (47%), upland forests (24%), agriculture (19%), urban/built-up (6.2%), transportation communications and utility (2.3%), barren land (0.7%), rangeland (0.1%), and water (0.7%).

Drainage Features

The L-8 Canal starts from southeastern Lake Okeechobee at Sand Cut and ends at its intersection with the West Palm Beach Canal just east of what is locally known as Twenty Mile Bend (on US 441) west of West Palm Beach.

Near Lake Okeechobee, the L-8 Canal passes through a large area of agricultural land consisting of citrus groves, sugarcane and corn. Agricultural runoff to the canal is limited. Further east the canal runs adjacent to the J.W. Corbett Wildlife Management Area and receives high quality runoff from this protected natural area.

The L-8 canal connects to several other canals and waterways throughout its course, including M-Canal (that supplies WPB with drinking water), the M-0 and M-1 canals (that supply citrus groves) and the L-40 Canal (along the eastern perimeter of the Loxahatchee National Wildlife Refuge). Some of L-8's water is withdrawn by the City of West Palm Beach (via the M-Canal) to augment its potable water supply system, but most is discharged into the Palm Beach Canal. Hydrologic modifications are planned by SFWMD and USACE to partition the L-8 into north and south sections, to be completed 2004. The north section would allow drainage from the Dupuis Reserve and Corbett Wildlife Management Area to be diverted toward Lake Okeechobee

Over a nine-year period of record including water years 1980-1988, the average annual runoff from the L-8 Basin was calculated to be 187,039 acre-feet. Runoff from the L-8 Basin can be delivered to a variety of receiving water bodies. Water in the southern portion of the basin may mainly be from residential and agricultural drainage, and thus a concern for potentially deteriorating water conditions.

Water Quality Summary

The L-8 Canal is on the 1998 303(d) list for dissolved oxygen, nutrients, turbidity and mercury. The development of TMDLs for these parameters is scheduled for the year 2005, according to the Consent Decree with the USEPA. Insufficient data for the L-8 Canal.

b. Pal Mar Drainage Basin

Background

The Pal Mar Drainage Basin consists of relatively natural wetland communities. As stated in the 1991 Pal-Mar Carl Assessment, this area's savanna-like flatwoods are the most species-rich slash pine (*Pinus elliotti*) flatwoods community the biologists had observed within the state. They compare it with the highly diverse site of the longleaf pine savannas found elsewhere in the United States. This pine flatwood/wetland mosaic habitat supports many species including the wood stork, deer, sandhill crane, snail kite and is potential habitat for the Florida Panther and red cockaded woodpecker. Wading bird rookeries are also found in Pal-Mar

The basin has retained most of its natural communities. Approximately 24,208 acres of pine flatwood/wetland mosaic habitat, have been identified in the Preservation 2000 Pal-Mar project as having high priority for acquisition and preservation. . If protected, Pal-Mar will be maintained a greenway linking Jonathan Dickinson State Park, Corbett and the Dupuis Preserve. This property is important as a natural corridor from Corbett, where the re-cockaded woodpeckers still reside, to Jonathan Dickinson State Part, where they disappeared in the early 1980's.

Land Use

The land use of the Pal Mar Basin consists of wetlands (53.9%), upland forests (41%), agriculture (2%), water (3%), and transportation communications and utility (0.1%).

Drainage Features

The drainage in this basin is nearly unaltered. There are ditches and canals present, but they have not significantly impacted the historic flow of water.

Water Quality Summary

Pal Mar Basin does not contain any 1998 303(d) listed waterbodies.

c. Jonathan Dickinson Drainage Basin

Background

About 20% of the Park is covered in coastal pine scrub, a biological community so rare as to be designated "globally imperiled". Other natural areas within the basin include sandhill, sand pine scrub, xeric oak scrub, hardwood hammock, pinelands, freshwater marsh, wet prairie, hardwood swamp, cypress swamp, mangrove swamp and open water. Although many of the natural areas in the other basins have been lost to development and urbanization, most of the Jonathan Dickinson Drainage Basin remains undeveloped, and much of the land is in public ownership.

Land Use

The area within Jonathan Dickinson State Park is used for hiking, camping, bird watching and fishing; it is home to deer, bobcats, wild boar, barred owls, wild turkeys, indigo snakes and several birds of prey.

Drainage Features

This basin consists of two major drainage systems largely contained within the Park: (1) The North Fork of the Loxahatchee River and (2) Kitchings Creek. The North Fork begins west of Hobe Sound and the Coastal Ridge, and then flows through the park into the residential area of Tequesta. From that point the flow moves into the estuarine portion of the Loxahatchee River. The headwaters of Kitchings Creek are located north of the park, with the natural channel lying within park boundaries. Most of the water flowing to Kitchings Creek enters the northwest corner of the park through Jenkins Canal. There are no major water control structures to regulate the flow within this basin.

Water Quality Summary

1. Kitchings Creeek

Kitchings Creek was on the 1998 303(d) list for dissolved oxygen, nutrients, biochemical oxygen demands and coliforms.

Temporal analyses for total nitrogen and total phosphorus were conducted on station KITCHEN. The data was analysed using the Seasonal Kendall Test to see if there were significant changes in the above water quality parameters during the time period from 1986 to 1989.

According to this test, total nitrogen is decreasing and total phosphorus is increasing. The decrease in total nitrogen is statistically significant at the 80% 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	NA	NA	NA	NA
Total Nitrogen	-1.309 mg/L x year	No	No	Yes
Total Phosphorus	0.266 mg/L x year	No	No	No
Chlorophyll A	NA	NA	NA	NA
Turbidity	NA	NA	NA	NA

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

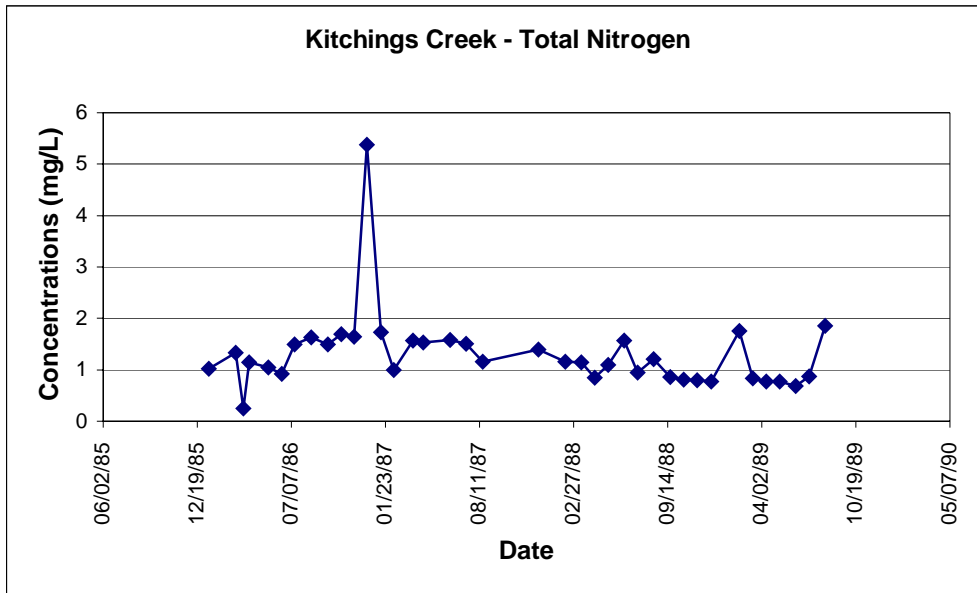


Figure Total Nitrogen Concentrations in Kitchings Creek

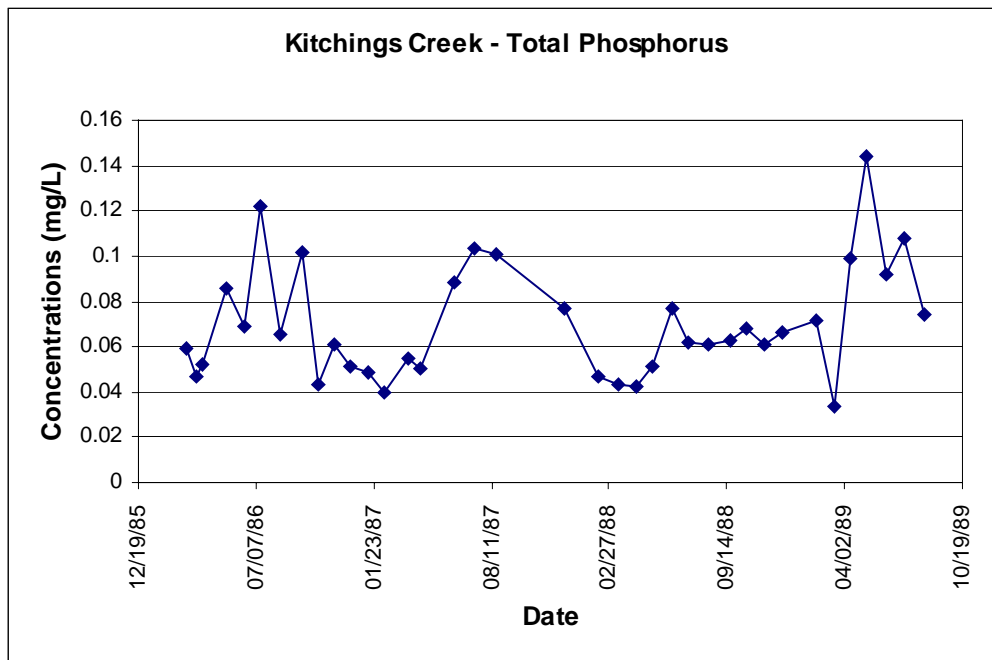


Figure ,, Total Phosphorus Concentrations in Kitchings Creek

Cypress Creek was not on the 1998 303(d) list.

Temporal analyses for total nitrogen and total phosphorus were conducted on station CYP-CK. 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 1986 to 1989.

According to this test, total nitrogen is decreasing and total phosphorus is increasing. The decrease in total nitrogen is statistically significant at the 95% confidence level and the increase in total phosphorus is statistically significant at the 90% 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	NA	NA	NA	NA
Total Nitrogen	-1.994 mg/L x year	Yes	Yes	Yes
Total Phosphorus	1.856 mg/L x year	No	Yes	Yes
Chlorophyll A	NA	NA	NA	NA
Turbidity	NA	NA	NA	NA

Figures,, illustrate total nitrogen and total phosphorus concentrations, respectively, over time at station CYP-CK.

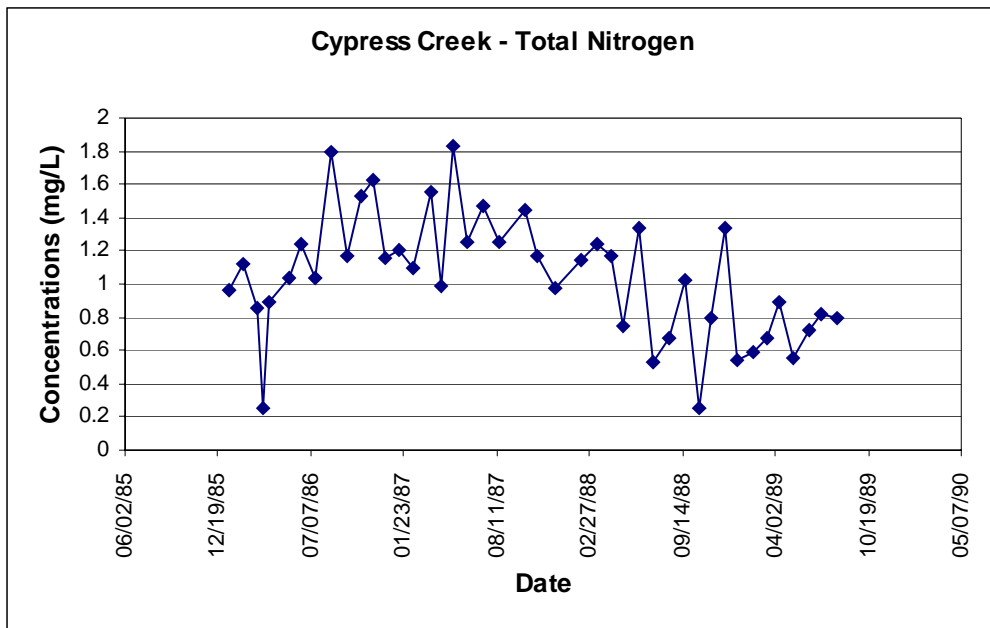


Figure Total Nitrogen Concentrations in Cypress Creek

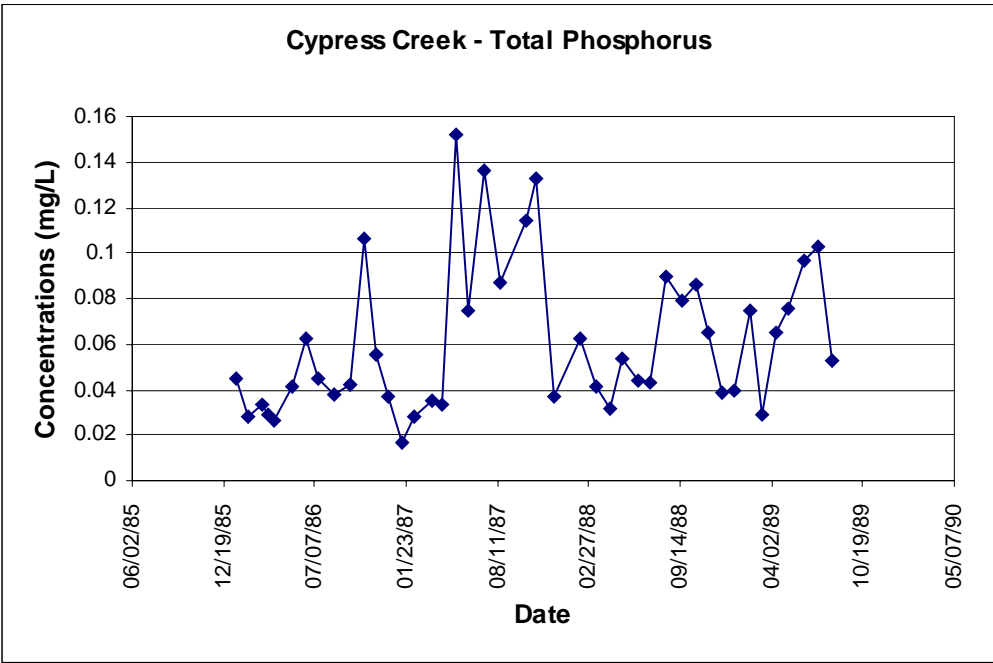


Figure Total Phosphorus Concentrations in Cypress Creek

d. South Indian River Drainage Basin

Background

The South Indian River drainage basin is mostly in northern Palm Beach County, with a small northern section in Martin County. The land within the region is relatively flat with ground elevation ranging from 13 feet to 23 feet above sea level NGVD, the slope running generally from southwest to northeast. The character of the land typically consists of river swamp and pine flatwoods, with areas that have been heavily impacted by drainage, agricultural usage and construction of residential structures.

Natural communities within the undeveloped parts of the South Indian River Drainage Basin include sandhill, xeric oak scrub, hardwood hammock, pinelands, freshwater marsh, wet prairie, hardwood swamp, cypress swamp and open water. Most of the undeveloped lands found in the basin are located within state lands (Jonathan Dickinson State Park and the Loxahatchee Wild and Scenic River corridor) and Palm Beach County property.

Land Use

For the South Indian River Drainage Basin the land use is 56.8% residential, 1.3% recreational, 0.1% commercial, 0.6% institutional, 0.6% transportation, 0.4% agricultural activities, 3.3% industrial and other urban uses and 2.1% in water. The remaining 29.8% of the basin remains undeveloped whether in public or private ownership.

Drainage Features

The major features that presently influence drainage in the basin are the Northwest Fork of the Loxahatchee River, the C-18, the Florida Turnpike and Indiantown Road and the extensive systems of secondary canals developed by SIRWCD. In the western portion of the basin, Jupiter Farms is drained by a combination of roadside sales which discharge into a canal network. The canal network consists of seven lateral canals, running east west and spaced approximately one-half mile apart. Two larger canals maintained by the SIRWCD, the C-12 and C-14, connect the western and eastern ends of the laterals respectively. The C-14 connects to the Northwest Fork of the Loxahatchee River. The laterals are open channel connections to C-14, while the Lainhart Dam acting as the low water control within the western portion of the basin. Road culverts act as controls during periods of heavy runoff.

Water quality summary

The South Indian River Drainage Basin does not contain any 1998 303(d) listed waterbodies.

Temporal analyses for total nitrogen and total phosphorus were conducted on stations TURNPIKE and SR-706 on the segment of the Loxahatchee River that runs through the South Indian River Basin. 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 1986 to 1989.

According to this test, total nitrogen and total phosphorus are decreasing over time. The decrease in total nitrogen 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	NA	NA	NA	NA
Total Nitrogen	-3.205 mg/L x year	Yes	Yes	Yes
Total Phosphorus	-0.128 mg/L x year	No	No	No
Chlorophyll A	NA	NA	NA	NA
Turbidity	NA	NA	NA	NA

Figures,, illustrate total nitrogen and total phosphorus concentrations, respectively, over time at stations TURNPIKE AND SR-706.

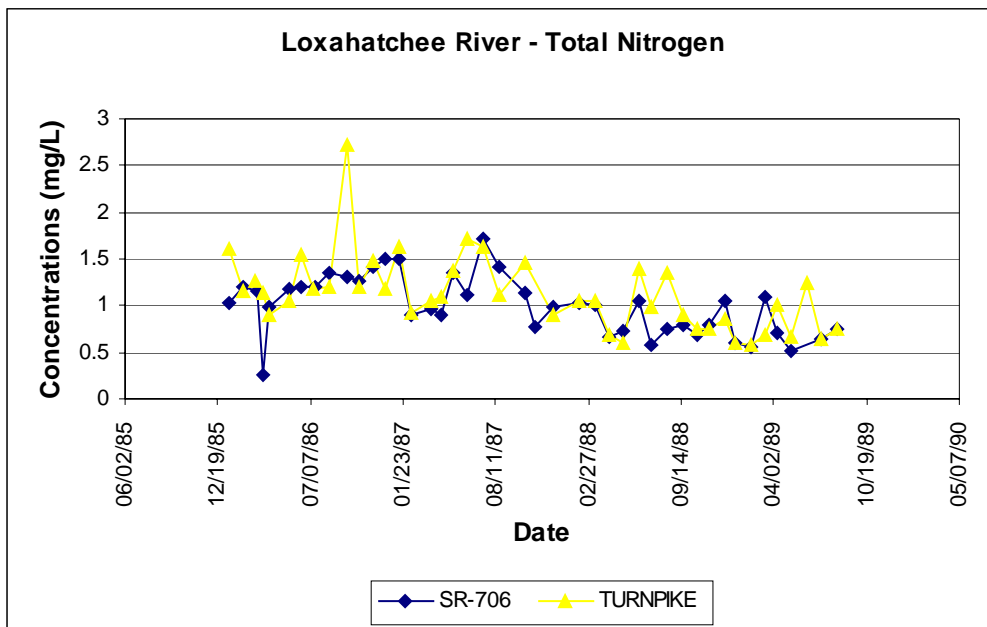


Figure Total Nitrogen Concentrations in Loxahatchee River

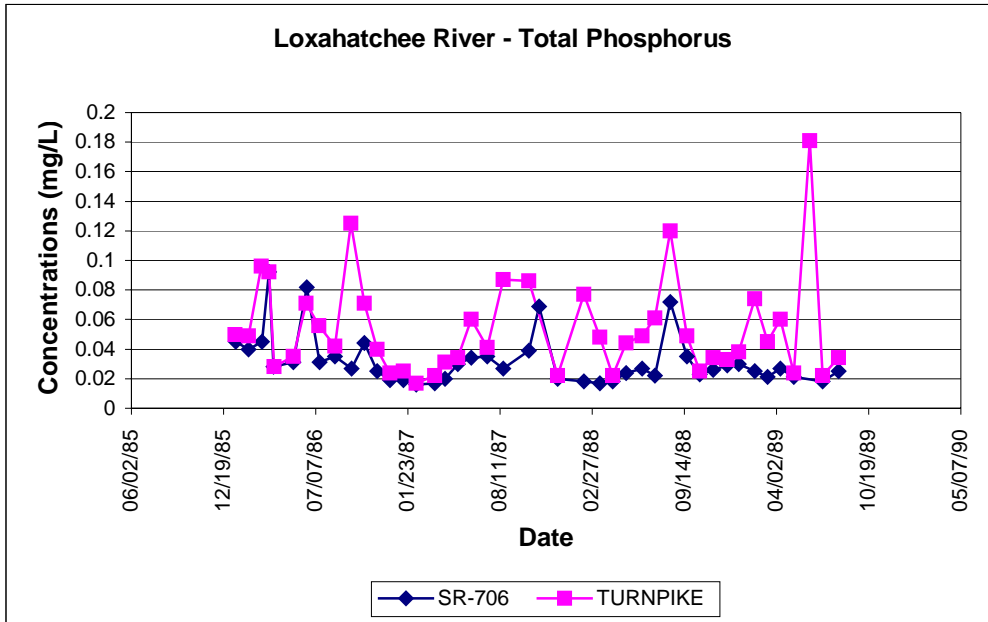


Figure Total Phosphorus Concentrations in Loxahatchee River

e. Loxahatchee River Drainage Basin

Background

The primary feature of this basin is the Loxahatchee River central embayment. The embayment, or estuary, is shallow, with an average depth of four feet. Sand bars and oyster bars in the central embayment are occasionally exposed at high tide. Some of the deeper parts of the estuary are a result of dredging. The salinity in the estuary is largely determined by tidal and freshwater flow. These flows determine bottom sediment characteristics and the spatial distribution of several distinct biological communities. Seagrass beds and oyster bars grow where suitable undisturbed bottom sediment occurs and where tides maintain adequate salinity and flow conditions. The embayment is a popular area for fishing, sailing, cruising, water and jet skiing, snorkeling and swimming.

Land Use

The land use of the Loxahatchee River Basin consists of urban/built-up (75%), upland forests (13.8%), water (6%), wetlands (4.7%), and agriculture (0.5%).

Drainage Features

Cities and other water diversions have affected the drainage of the river by shrinking the drainage basin from 270 square miles to 210 square miles. Because of the rapid residential/urban growth and input of agricultural drainage canals, the health of the Preserve has been affected. The C-18 canal causes massive amounts of freshwater to drain into the river basin and forces saltwater into the North Fork of the river, thereby altering the historical natural communities. The preserve does play host to a vast array of plant and animal species, but many are threatened by the extensive development and the freshwater drainage of the C-18 canal. Major issues in the Preserve include leaching of pollutants from local septic tanks which contributes to a documented decrease of dissolved oxygen in the River. The local state park and the Loxahatchee River Control District also provide on-site management and education about the River.

Water Quality Summary

Listing of Loxahatchee River is based on the NPS Survey.

No data was available for the Loxahatchee River.

f. C-18 Drainage Basin

Background

The C-18 Basin has an area of approximately 106 square miles and is located in northeastern Palm Beach County. This basin includes the remnants of the Hungryland and Loxahatchee Sloughs, which historically fed the Northwest Fork of the Loxahatchee River. At one time the Loxahatchee Slough extended south into what is now known as the West Palm Beach Water Catchment Area, the source of drinking water for West Palm Beach.

The topography of the basin is nearly level. Elevations range from 15 feet in the Loxahatchee Slough to 20 feet in the western uplands. Natural areas found within the basin include pinelands, hardwood hammock, hardwood swamp, cypress swamp and freshwater marsh. As throughout much of south Florida, many of these areas have been lost to development or degraded by urbanization.

Land Use

Much of the land in the basin is publicly owned and protected. Seventy-eight percent of the basin remains undeveloped, whether in public or private ownership. Residential land use constitutes 3.5 % of the C-18 Basin. For the rest of the basin, the current land use is 2.1 % recreational, 0.1 % commercial, 1.8 % transportation, 8 % agricultural, 3.8 % industrial and other urban uses and 2.4 % is water.

Drainage Features

The C-18 canal and the control structures in the C-18 basin have three functions: (1) to provide flood protection and drainage for the basin, (2) to augment flows in the Northwest Fork of the Loxahatchee river and (3) to maintain groundwater table elevation southwest of the S-46 adequate to prevent intrusion of saltwater into local groundwater. Excess water in the basin is discharged to tidewater in the Southwest Fork of the Loxahatchee River by way S-46. Water surface elevations in C-18 are controlled by S-46. Water supply to the Northwest Fork of the Loxahatchee River is made by way of G-92 and canals of the South Indian River Water Control District. In general the only water supply to the C-18 basin is from local rainfall

C-18 was designed to pass the runoff from a 1-30 year storm from mostly agricultural lands. It was assumed that the lands in the western part of the basin, the J.W. Corbett Wildlife Management Area and the test area for the Pratt and Whitney Aircraft Group, would act as a water storage area which would not release water to C-18 until after downstream flood waters had receded. This assumption has proved to be incorrect. Runoff into the western branch of C-18 greatly exceeds that for which the western reach was designed. The South Florida Water Management District restricts runoff rates on permit applications to one inch per day for lands west of State Road 710. This rate protects pastureland in the area from flood damage, however, it still exceeds the design capacity (190 cfs or 0.16 inches of runoff per day) of the western reach and the C-18 weir.

A calculation of the hydraulic profile for the C-18 canal for runoff from the design storm shows the western branch above the C-18 weir to be greatly under designed; the eastern branch upstream of its confluence with the western branch to be adequate to pass the design storm runoff; and the lower reach of the west branch and the C-18 below confluence of the branches to have a capacity 30 % in excess of design capacity. The excess capacity results from the fact that various subdivisions in the basin were expected (in the original design) to discharge to the lower reach of the western branch. In fact, they discharge to the upper reaches of the east and west branches where channel capacity is less. This situation has increased the flooding in the upper reach of the western branch and decreased to flow elsewhere in C-18.

Water Quality Summary

The C-18 Canal was on the 1998 303(d) list for dissolved oxygen, coliforms and mercury. The development of TMDLs for nutrients and dissolved oxygen is scheduled for the year 2010, according to a Consent Decree with 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 from 1986 to 1999, 42% (182/434) of the samples exceeded this criteria. Figure., illustrates dissolved oxygen concentrations over time at stations C18G92, C18S46 and C18SR710.

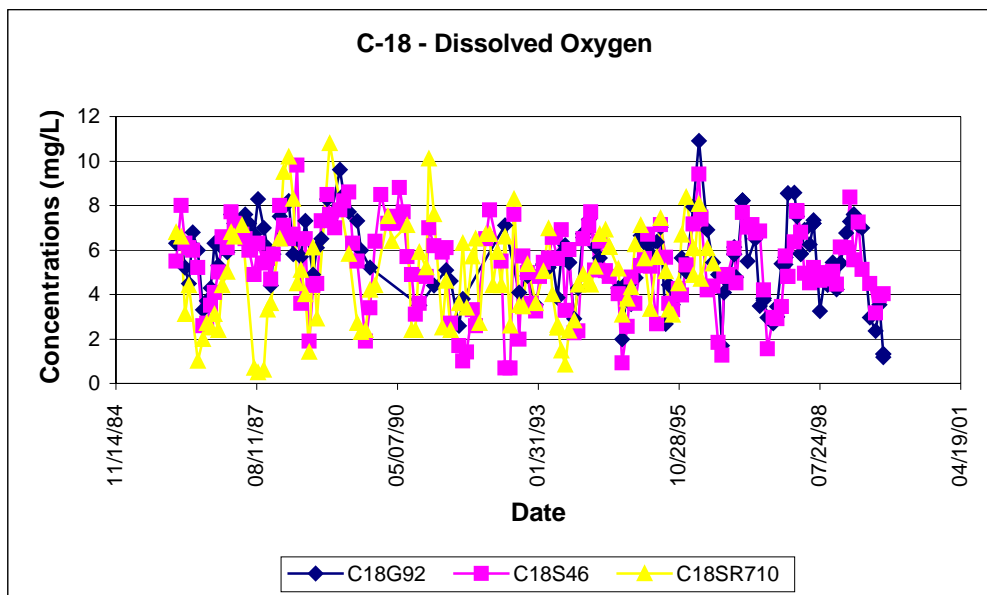


Figure Dissolved Oxygen Concentrations in C-18

Temporal analyses for dissolved oxygen, total nitrogen, total phosphorus and turbidity were conducted on stations C18G92, C18S46 and C18SR710 in the C-18 Canal. 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 1986 to 1999.

According to this test, all parameters are decreasing over time. 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	-0.321 mg/L x year	No	No	No
Total Nitrogen	-4.835 mg/L x year	Yes	Yes	Yes
Total Phosphorus	-4.063 mg/L x year	Yes	Yes	Yes
Chlorophyll A	NA	NA	NA	NA
Turbidity	-6.780 mg/L x year	Yes	Yes	Yes

Figures,, illustrate total nitrogen, total phosphorus and turbidity concentrations, respectively, over time at stations C18G92, C18S46 and C18SR710.

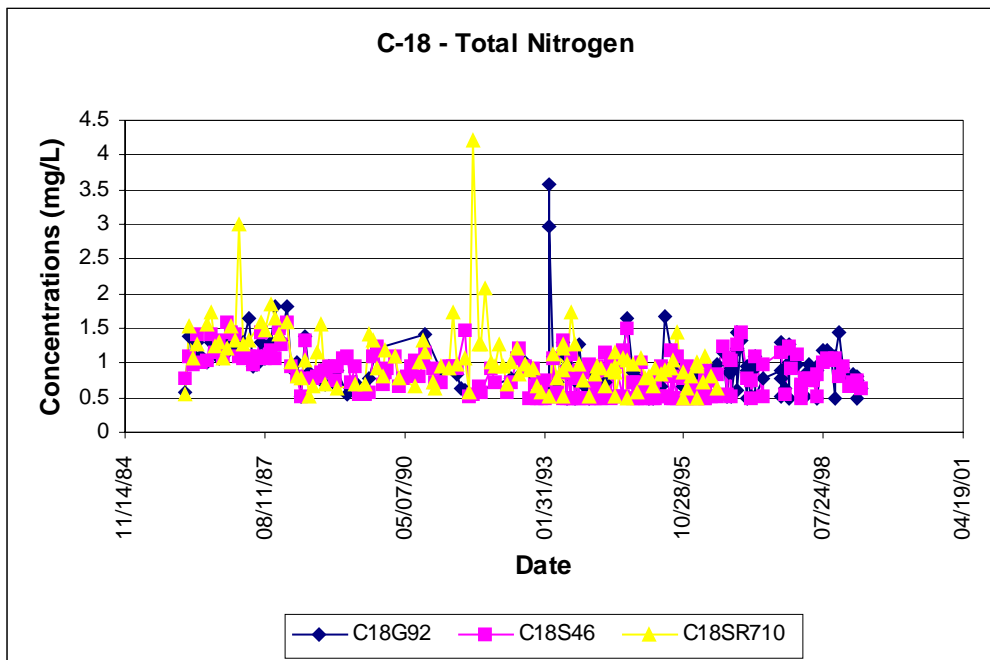


Figure Total Nitrogen Concentrations in C-18

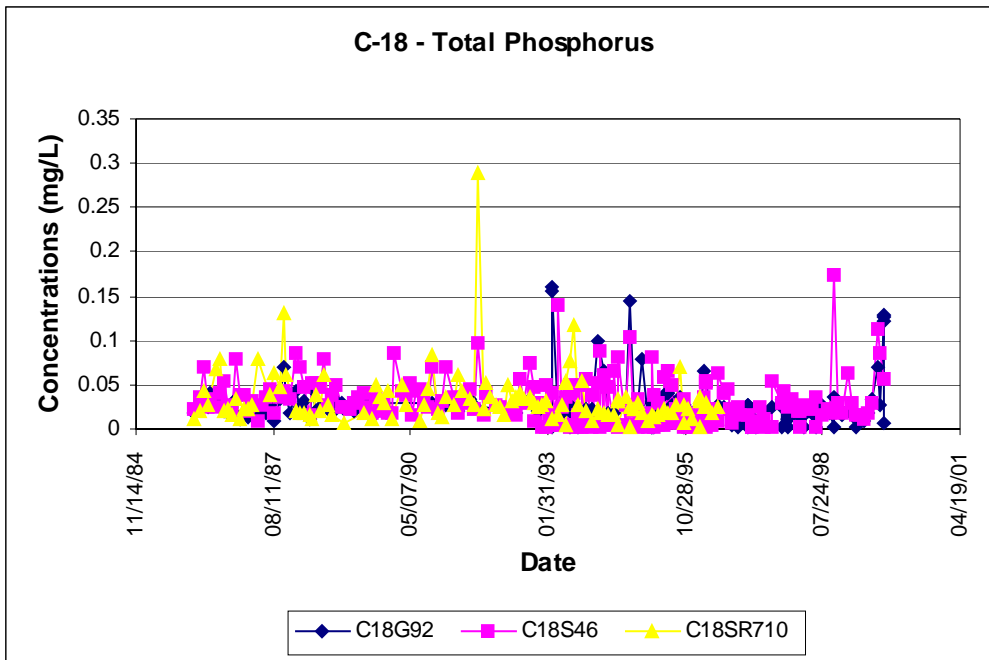


Figure Total Phosphorus Concentrations in C-18

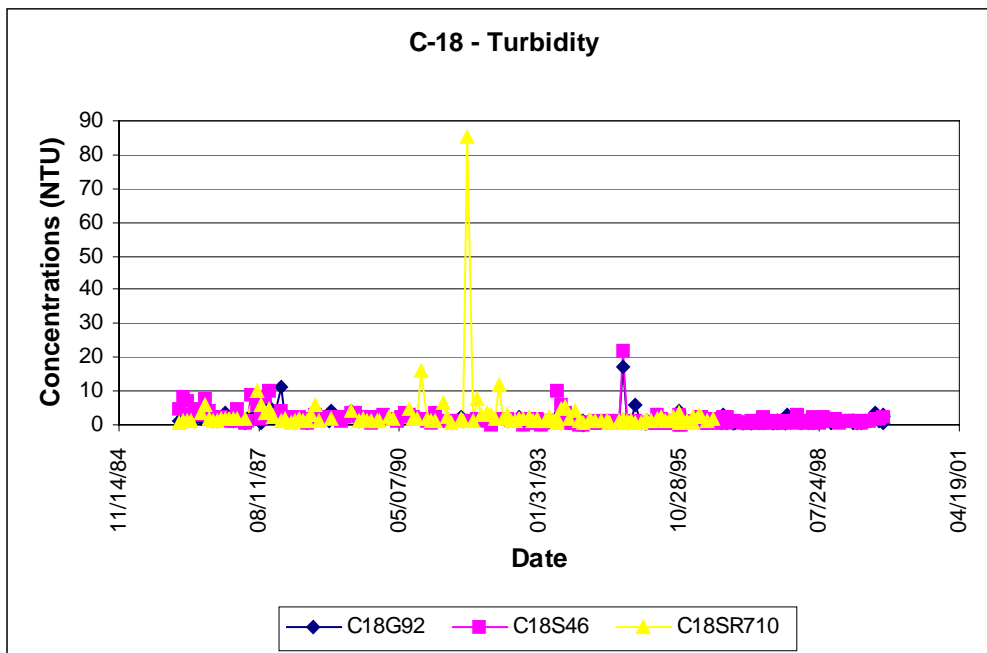


Figure Turbidity Concentrations in C-18

g. West Palm Beach Water Catchment Area Basin

Background

Drinking water for residents of the City of West Palm Beach is provided from the West Palm Beach Water Catchment Area. Water now contained in the West Palm Beach Water Basin historically flowed north through the Loxahatchee Slough into the Northwest Fork of the Loxahatchee River, or south to the Everglades. At some point in the future, based on the findings of a joint project between SFWMD and the City of West Palm Beach, water from West Palm Beach Water Catchment Area may be sent to the Loxahatchee Slough to increase water storage and help reestablish historical flow levels into the Northwest Fork.

Land Use

The land use of the Basin WPB Water consists of wetlands (89%), upland forests (7.7%), water (1.8%), barren land (0.2%), transportation communications and utility (0.9%) and urban/built-up (0.07%).

Drainage Features

Water Quality Summary

The WPB Water Catchment Area does not contain any 1998 303(d) listed waterbodies. No stations present in this basin.

h. C-17 Drainage Basin

Background

The C-17 Basin has an area of approximately 33 square miles and is located in northeast Palm Beach County.

Land Use

The land use of the C-17 Basin consists of urban/built-up (66%), upland forests (11%), transportation communications and utility (7%), wetlands (5%), water (4.7%), barren land (3.6%), agriculture (2%), and rangeland (0.6%).

Drainage Features

The C-17 Canal begins just south of 45th Street and east of I-95 and is a continuation of a City of West Palm Beach Canal. C-17 is aligned north-south approximately parallel to and east of I-95. North of Northlake Boulevard the canal turns east, discharging into the Intracoastal Waterway just north of Singer Island.

The C-17 Canal and the control structure in the C-17 Basin have two functions: (1) to provide flood protection and drainage for the basin and (2) to maintain a groundwater table elevation southwest of S-44 adequate to prevent intrusion of saltwater into local groundwater. Excess water in the basin is discharged to tidewater in the Intracoastal Waterway by way of S-44. S-44 also controls water surface elevation in C-17.

C-17 was designed to pass the runoff from a 1-30 year storm. In 1955 when the Army Corps of Engineers (USACE) completed its General Design Memorandum for C-17, most land in the basin was unimproved (i.e., native range) or in agricultural production (i.e., improved pasture, truck crops and citrus). There was some urban development along the east side of the basin. The study predicted that by the year 2005 the population in the basin would increase to 19,000. This population was exceeded by 1070, at which time the District requested that the USACE restudy the basin. A Survey Review Study completed in 1975 concluded that the design discharge for the basin should be for a 1-30 year storm for an urban area rather than for the 1-30 year storm for an agricultural area used in the original design. This increased the design discharge from 2070 cfs to 3700 cfs from the basin. The study further concluded, however, that the benefit-cost ratio for making the required changes to the C-17 and S-44 was less than 1.0 and that the USACE could not participate in making these changes.

Some sections of the canal have already been enlarged under various free digging contracts. As there is sufficient demand for fill material in the area, the remainder of the canal can be enlarged by free digging at no cost to the USACE or the District.

In general, the only water supply to the basin is from local rainfall. C-17 is the only Project canal in the C-17 Basin. There is one Project structure regulating flow in the C-17 basin. S-44 is a gated spillway located in the alignment of C-17 just east of A1A, six tenths of a mile north of Northlake Boulevard. The structure controls water surface elevations in C-17 and it regulates discharge to the Intracoastal Waterway. Insofar as possible, S-44 is operated to maintain a headwater stage of 6.6 ft NGVD during wet season (May15 to October 15) and a headwater stage of 7.1 ft NGVD during the dry season (October 15 to May15). These stages are usually adequate to prevent saltwater intrusion into local groundwater.

Water Quality Summary

The C-17 Canal 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 year 2010, according to a Consent Decree with 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 from 1986 to 1996, 69% (64/92) of the samples exceeded this criteria. Figure., illustrates dissolved oxygen concentrations over time at station C17SR702.

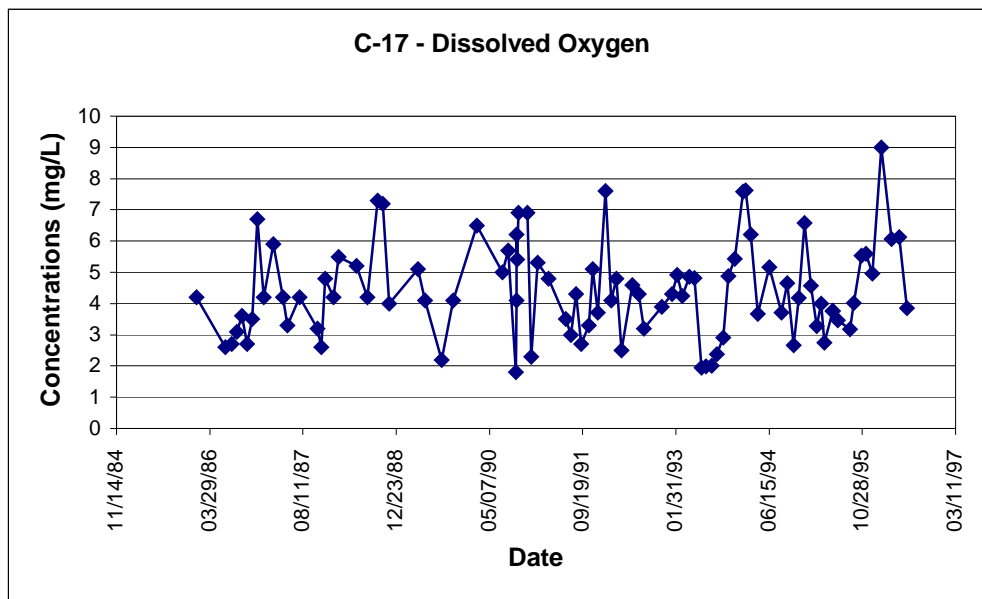


Figure Dissolved Oxygen Concentrations in C-17

Temporal analyses for dissolved oxygen, total nitrogen, total phosphorus and turbidity were conducted on station C17SR702. 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 1986 to 1996.

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

Table... Results of Trend Analyses Using the Seasonal Kendall Test

Parameter	Seasonal Kendall Test Statistic	Significant @ $\alpha=0.05$	Significant @ $\alpha=0.10$	Significant @ $\alpha=0.20$
Dissolved Oxygen	1.114 mg/L x year	No	No	No
Total Nitrogen	-2.756 mg/L x year	Yes	Yes	Yes
Total Phosphorus	-0.486 mg/L x year	No	No	No
Chlorophyll A	NA	NA	NA	NA
Turbidity	0.00 mg/L x year	No	No	No

Figures., illustrate total nitrogen, total phosphorus and turbidity concentrations, respectively, over time at station C17SR702.

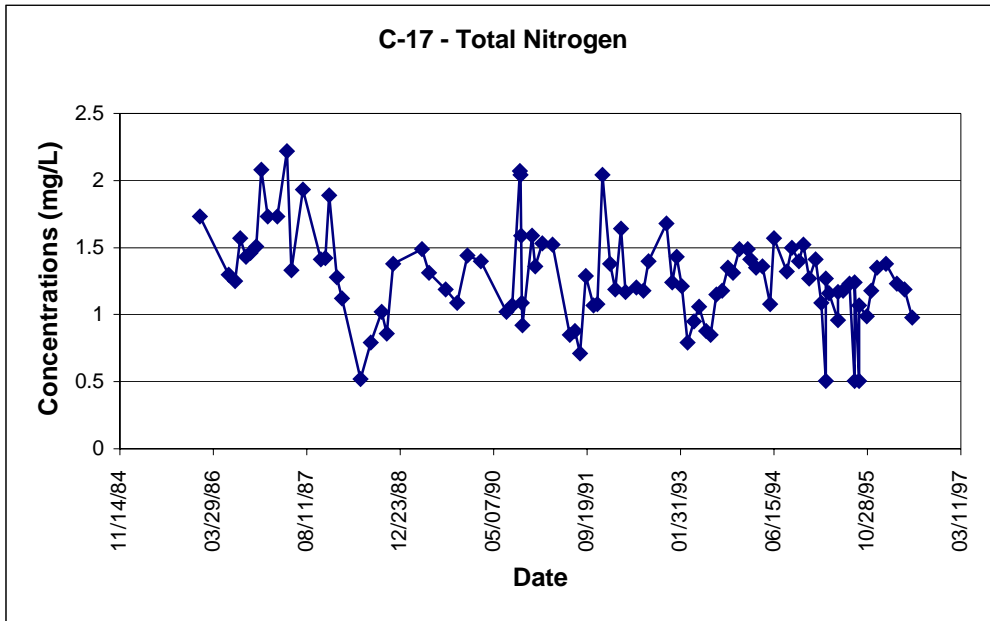


Figure Total Nitrogen Concentrations in C-17

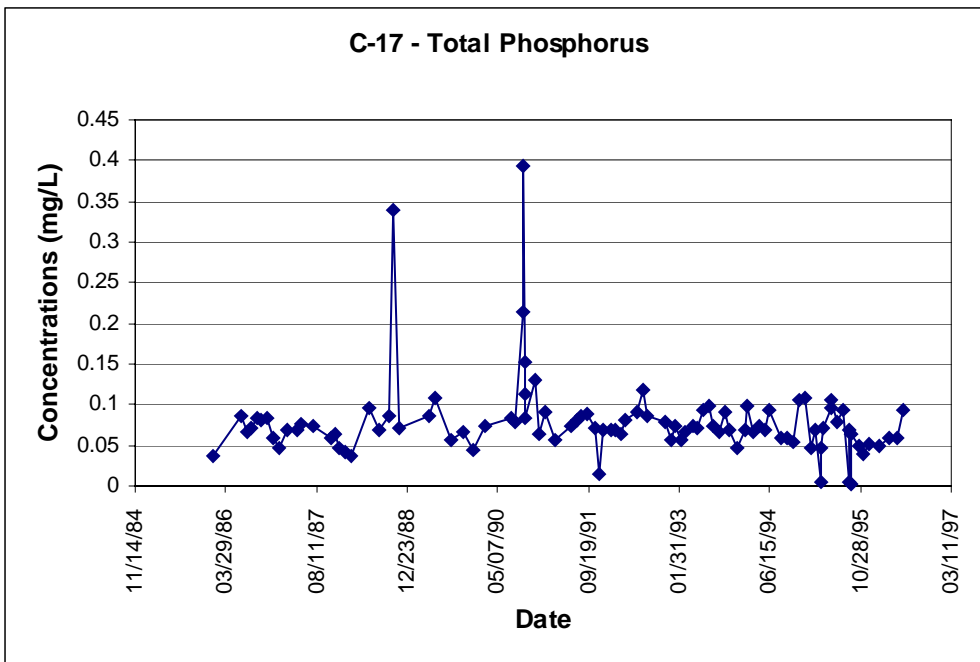


Figure Total Phosphorus Concentrations in C-17

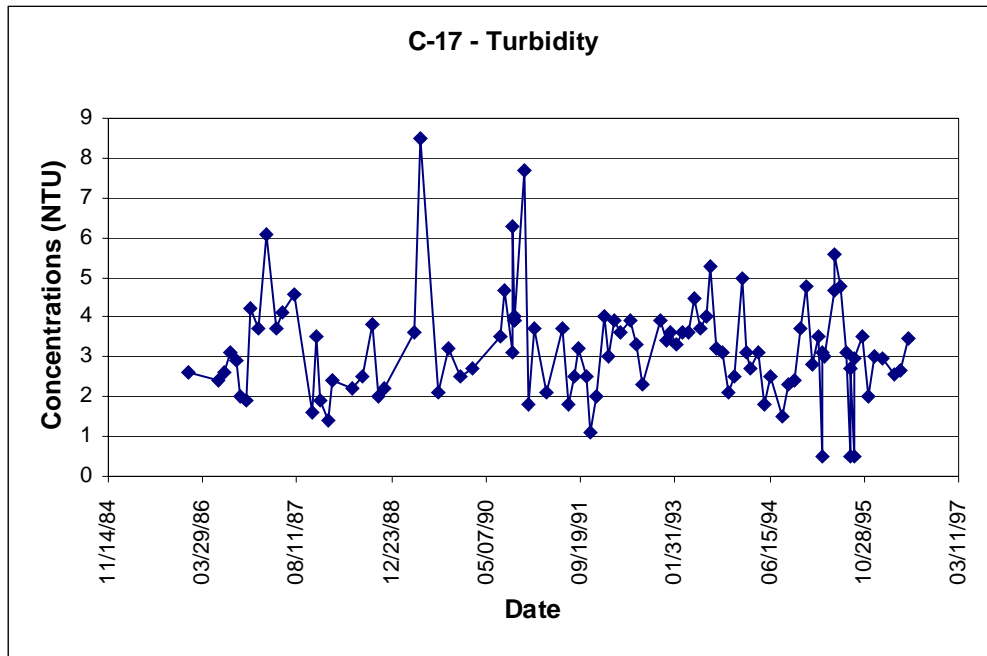


Figure Turbidity Concentrations in C-17

i. C-51 Drainage Basin

Background

The overall C-51 Basin has an area of approximately 164.3 square miles and is located in eastern Palm Beach County. The basin is comprised of two sub-basins, C-51 West (73 square miles) and C-51 East. State Road 7 is generally the boundary between the basins.

Land Use

The land use in the C-51 Basin consists of urban/built-up (59%), agriculture (17%), upland forests (10%), wetlands (5%), transportation communications and utility (4%), water (4%), barren land (0.7%) and rangeland (0.3%).

Drainage Features

The canal and the control structures in the C-51 basin have four functions: (1) to provide flood protection and drainage for the basin, (2) to discharge, under certain conditions, flood flows from the L-8 basin to tidewater, (3) to supply water to the basin during periods of low natural flow, and (4) to maintain groundwater table elevation west of S-155 adequate to prevent saltwater intrusion into local groundwater. Excess water in the east section of the basin is discharged to tidewater in the Intracoastal Waterway by way of C-51 and S-155. Excess water in the west section of the basin is discharged to tidewater by way of G-124 and S-155 or to Water Conservation Area 1 by way of S-5AE,

S-5AW and S-5A. Water surface elevations in the eastern reach of C-51 are controlled by S-155 and in the western reach by G-124 and S-5A.

Water Quality Summary

The C-51 Canal was on the 1998 303(d) list for dissolved oxygen, coliforms, nutrients and iron. The development of TMDLs for these parameters is scheduled for the year 2010, according to a Consent Decree with 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 from 1986 to 1999, 67% (277/416) of the samples exceeded this criteria. Figure., illustrates dissolved oxygen concentrations over time at stations C51SR7, S5AE and S5AS.

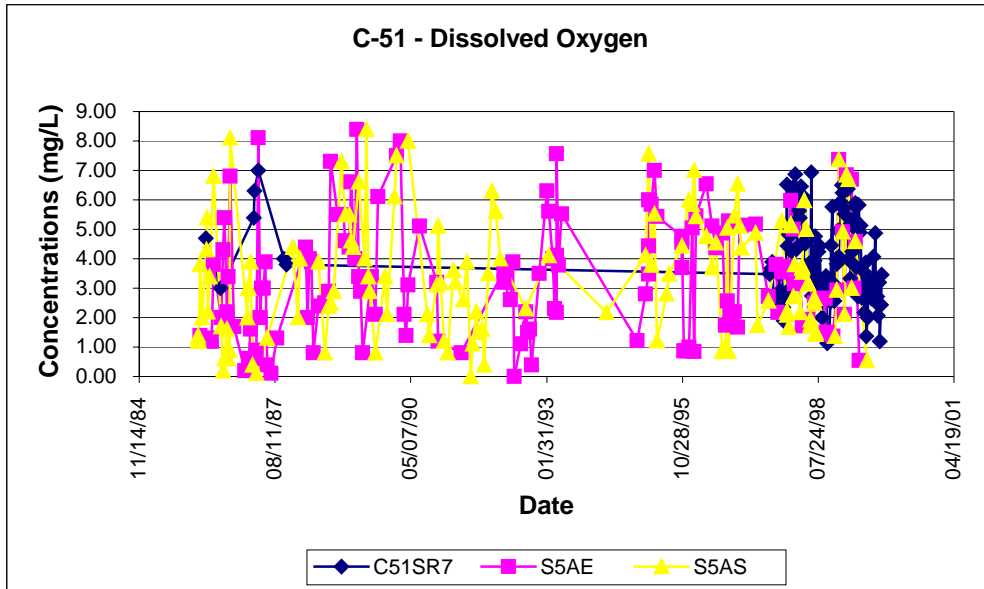


Figure Dissolved Oxygen Concentrations in C-51

Temporal analyses for dissolved oxygen, total nitrogen, total phosphorus and turbidity were conducted on stations C51SR7, S5AE and S5AS. 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 1986 to 1999.

According to this test, dissolved oxygen is increasing over time, while total nitrogen, total phosphorus and turbidity are decreasing. The decreases in total nitrogen and total phosphorus are statistically significant at the 95% confidence level. The decrease in turbidity is statistically significant at the 90% confidence level.

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

Parameter	Seasonal Kendall Test Statistic	Significant @ $\alpha=0.05$	Significant @ $\alpha=0.10$	Significant @ $\alpha=0.20$
Dissolved Oxygen	1.005 mg/L x year	No	No	No
Total Nitrogen	-3.947 mg/L x year	Yes	Yes	Yes
Total Phosphorus	-3.301 mg/L x year	Yes	Yes	Yes
Chlorophyll A	NA	NA	NA	NA
Turbidity	-1.827 mg/L x year	No	Yes	Yes

Figures,, illustrate total nitrogen, total phosphorus and turbidity concentrations, respectively, over time at stations C51SR7, S5AE and S5AS.

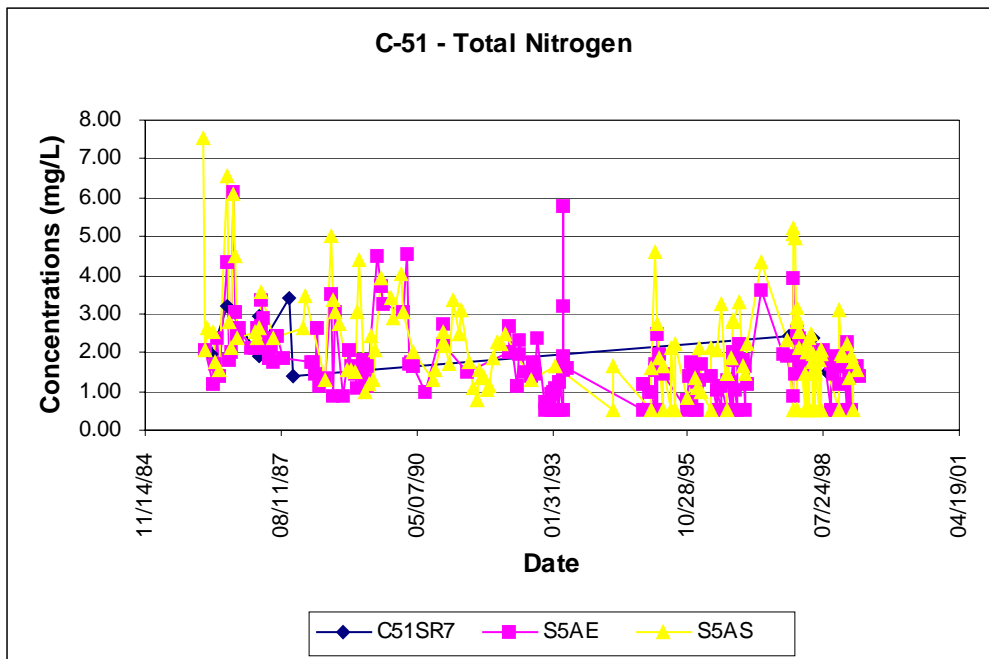


Figure Total Nitrogen Concentrations in C-51

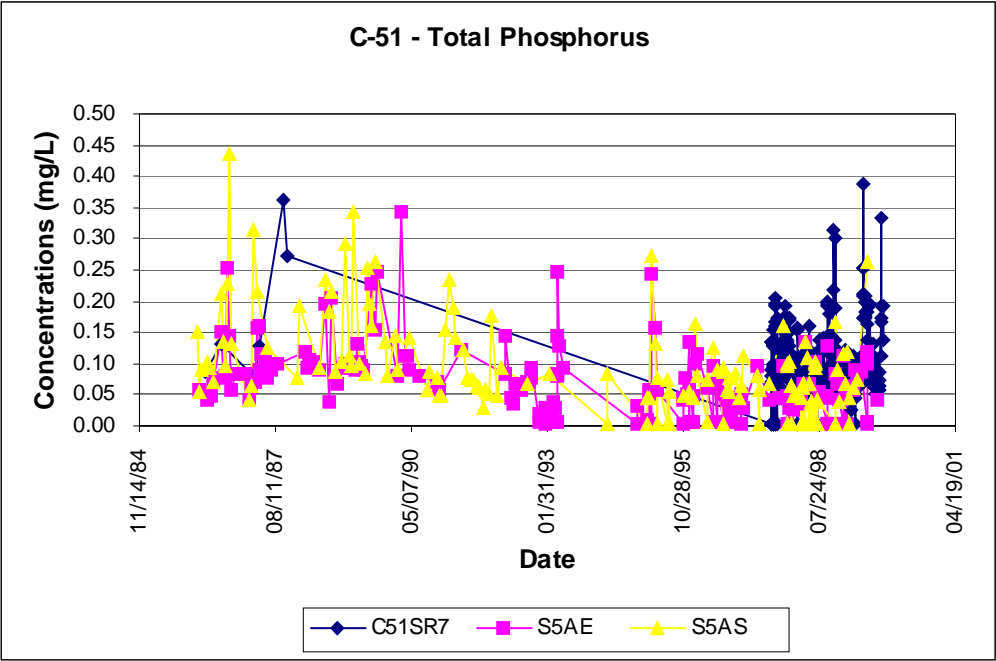


Figure Total Phosphorus Concentrations in C-51

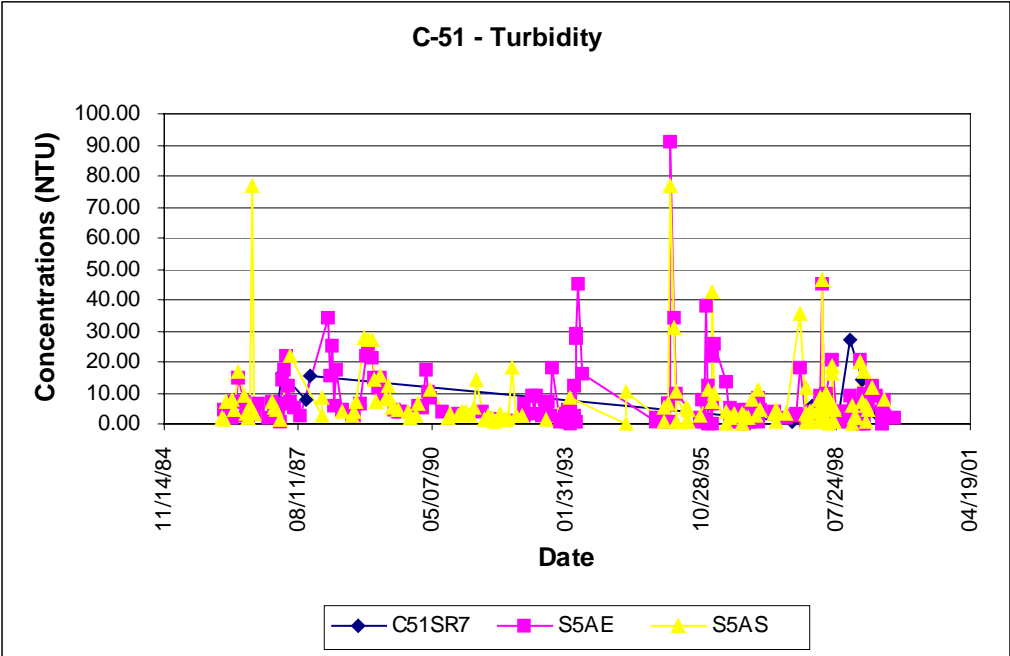


Figure Turbidity Concentrations in C-51

3. Existing Strategies

Loxahatchee River Watershed Ecosystem Management Initiative

The mission of this initiative is to protect and enhance the natural resources of the Loxahatchee River watershed through a coordinated management approach that integrates land and water management activities.

Loxahatchee River Area Stormwater Management Plan

This basin-wide plan was developed to ensure adequate treatment of stormwater before it is discharged to receiving waters. After development of this plan began, several municipal utilities developed local stormwater plans of their own. The Loxahatchee River District is currently conducting a stormwater study in the Jupiter Farms area to identify stormwater inputs into the Wild and Scenic Northwest Fork of the Loxahatchee River.

Loxahatchee River National Wild and Scenic River Management Plan

This plan addresses the management and protection of the Loxahatchee River Wild and Scenic Corridor. The corridor extends along the Northwest Fork of the Loxahatchee River from Indiantown Road to Trapper Nelson's. There are four objectives in the plan; I) protect and enhance natural and cultural values within the designated Wild and Scenic Corridor, II) enhance the hydrologic relationship between the Loxahatchee Slough and the Wild and Scenic Northwest Fork of the Loxahatchee River, III) insure that land use activities within the Loxahatchee basins are conducive to maintaining the values of the Wild and Scenic River and IV) facilitate public involvement in both planning and implementation efforts to protect the Wild and Scenic Loxahatchee River.

Integrated Water Resource Plan, Northern Palm Beach and Southern Martin Counties

This plan addresses the future provision of water to both the urban and environmental needs. This document recognized and prioritized the need to reserve sufficient quantities of fresh water for the environment.

Northern Palm Beach County Comprehensive Water Management Plan

Since 1995, the city of West Palm Beach and the SFWMD have co-funded a cooperative planning effort to develop a comprehensive water management plan for much of northern Palm Beach County. The Plan focuses primarily on land areas located within the Southern L-8 Basin, the city of West Palm Beach Water Catchment Area / water supply lake system, Loxahatchee Slough, and associated tributary areas (known collectively as the C-18 Basin). The theme of the plan is consistent with the LEC Plan and the CERP, but is also addresses concerns specific to the subregion.