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NEW RIVER RESTORATION PLAN UPDATE: ACTIVITIES AND ACCOMPLISHMENTS FROM 1991 TO 2000

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Water Resources Division
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Executive Summary

Introduction and Objectives : In 1994, the Broward County Department of Natural Resource Protection (now the Department of Planning and Environmental Protection [DPEP]) developed the New River Restoration Plan following a study which identified and prioritized environmental issues associated with the New River. This report reviews those environmental concerns, documents additional research of the problems, summarizes the achievements of the 1994 restoration plan, and updates management objectives and action plans for future restoration activities. The management objectives included:

- improving flow characteristics;
- reducing contaminant loads in sediments;
- improving water quality;
- enhancing biological function;
- increasing public awareness of water protection;
- developing a partnership with local leaders to restore the river;
- increasing public participation in identifying waterway problems;
- increasing inter-governmental cooperation to remedy waterways problems;
- focusing media attention on the New River and its restoration; and
- improving the quality of storm water runoff.

As a remnant of the Everglades, the New River and the North Fork specifically, represent an oasis of habitat in an otherwise urbanized environment. The restoration of the river was important to provide habitat for our urban wildlife, to protect public health and safety and to provide aesthetic and recreational opportunities.

Statement of the Environmental Problems: Environmental concerns in the New River vary by subbasin. The 1993 New River Study revealed that the water quality in the North Fork did not meet criteria established by Florida's Department of Environmental Protection. In addition, contaminated sediments, stagnant water, debris and a number of other conditions limited habitat value. In the Las Olas Isles area of Fort Lauderdale, unhealthy levels of fecal coliform, an indicator of sewage pollution, were found. In the South Fork, sediment contaminants, especially heavy metals, were found which were suspected of limiting communities of benthic (bottom dwelling) organisms. In the Intracoastal Waterway, water quality was the main concern. Basin-wide, trash and debris was a problem. Environmental education about New River was lacking.

Additional Research Efforts: The findings of the 1993 New River Study raised public health and safety issues, initiated monitoring studies to determine sources of pollutants, and helped encourage DPEP and other agencies to use new investigative tools. This research has resulted in nine technical reports covering topics as varied as surface water quality, benthic community health, new tools for tracking sources of fecal coliform, contaminant levels in fish and crabs from the river and petroleum contamination in Port Everglades. These research efforts have pointed the way toward new policies and regulations to reduce pollution into the New River Basin.

Summary of Activities and Performance Measures: The majority of activities outlined in the 1994 Restoration Plan have been initiated or have been completed. These activities have resulted in

improvements in a variety of parameters with regard to water quality and habitat quality.

NORTH FORK - Concentrated enforcement and investigative efforts by DPEP and the City of Fort Lauderdale have reduced sources of fecal coliform contamination to the North Fork. A dredging project by the City of Fort Lauderdale in 1997 removed sludge and contaminated sediments from a portion of the North Fork east of I-95 resulting in decreased sediment contaminant concentrations. In1998-99, DPEP performed a fine scale water quality study demonstrating the substantial impact of storm water on the water quality of the North Fork and the feasibility of bringing cleaner water into the North Fork from the C-12 canal to the east. A shoreline revegetation pilot project constructed in the Franklin Park neighborhood in 1998 has helped us formulate a new vision for the North Fork shores encouraging local stewardship of the river while improving the ecological value of the pilot site. We also note that any restoration efforts must include a maintenance and management plan in order to be successful. DPEP hired a contractor to pick up accumulated debris from the river. In addition to removing larger items such as shopping carts and bicycles, the contractor removed 1,900 bags of trash in April and May, 2000.

LAS OLAS - In the Las Olas Isles area of Fort Lauderdale, several years of research by the City and County pointed to the high concentration of live-aboard boats as a major source of fecal coliform. With the encouragement and support of DPEP, the City passed two ordinances aimed at reducing inputs of sewage into this basin characterized by low flow and poor circulation. The 1993 ordinance required property owners to provide access to restroom facilities for their live-aboard tenants and/or to maintain a pump out contract with a mobile pump out operator. When this ordinance failed to reduce the fecal coliform concentrations, another ordinance was enacted. The 1997 ordinance required each land owner who allowed habitable boats to moor at their docks to have marine sanitation pump out facilities installed. All habitable boats were required to be hooked to the pumps while at the dock. Once significant compliance with the ordinance had been achieved, fecal coliform concentrations in the Las Olas Isles began to decline. Fewer excessive fecal coliform concentration readings have also been noted.

SOUTH FORK - Sediment contamination has been addressed in a number of ways. DPEP developed pollution prevention programs such as the Best Management Practices brochure for marinas. The City of Fort Lauderdale dredged 28,000 cubic yards of sediments from the salinity control structure in the west to Port Everglades. Water quality concerns in the Intracoastal Waterway have been partially addressed through education brochures aimed at providing residents with steps to clean-up the river.

Public Outreach: DPEP has expended substantial resources to educate the community about the ecological and social value of the New River to address basin wide issues. DPEP has been a major sponsor of the Marine Industries Association of South Florida annual waterway clean-up. We established new sites on the North Fork to reduce waterway trash and shoreline debris. Through federal environmental justice grants, we have performed outreach in economically depressed neighborhoods. We have focused media attention on the river through a variety of television programs, brochures, press releases and newspaper articles. DPEP staff have given more than a dozen presentations to a variety of audiences about the New River and provided tours of the river

to elected officials and the media to improve awareness.

Community Partnerships: The progress to date would not have been possible without the input of ideas and resources of a variety of agencies, community activists, and grass roots organization. Through partnerships with Broward Beautiful and the Broward Urban River Trails, stewardship of the river is improving. The river is being recognized as a recreational, ecological and historical asset to the community. The support of elected official at local and state levels has been critical to generate funding and momentum for New River restoration. A variety of agencies have been working with Broward County on the local and regional level e.g. South Florida Water Management District, City of Fort Lauderdale, Broward County School Board and the Florida Department of Environmental Protection.

The new implementation plan outlined at the end of this document brings the New River Restoration Plan into the twenty-first century. The focus of the plan remains on the major problems identified in 1993. The activities include dredging, habitat rehabilitation and improved public outreach. The use of state appropriations, the continued commitment of county resources and the pursuit of federal dollars will help move the restoration process forward. Public outreach will receive an increased level of attention as improvement occurs and the community gradually takes possession of the New River as friend and neighbor. With continued community-wide commitment to resource protection and restoration as well as community stewardship, New River Restoration will continue to be a success.

New River Restoration Plan Update

I. INTRODUCTION

A. PROBLEM DEFINITION

A 1991 study of the New River and its tributaries (Broward County Department of Natural Resource Protection [DNRP] 1993) showed that many indicators of water quality did not meet criteria established by Florida's Department of Environmental Protection (FAC 1995). The degradation of water quality had created ecological imbalances in the flora and fauna of the New River and had a negative impact on the environment, health and economy of the Fort Lauderdale metropolitan area. The results of the water and sediment quality assessments were used to identify the principal geographical areas associated with the New River where environmental problems exist. The New River Restoration Plan (DNRP 1994a) outlined a series of steps to improve water quality to meet state criteria, to enhance the biological diversity, to restore ecological function, and to improve the aesthetics for the community. This report is an update of the restoration activities that have taken place on the New River since the initiation of the project in 1991. These activities include initiatives taken by the DNRP (henceforth DPEP- DNRP was renamed Department of Planning and Environmental Protection in 1999), the City of Fort Lauderdale, the South Florida Water Management District (SFWMD), other governmental agencies and private groups.

B. OBJECTIVE

The intent of the Plan was to improve the ecological function of the New River System and to highlight the river as major aesthetic asset to the community. To achieve these goals, the following steps were undertaken:

1. Basinwide Identification and Prioritization of Environmental Issue Areas Associated with the New River
2. Research and Monitoring of Prioritized Issue Areas
3. Development of Management Objectives
4. Implementation of Specific Action Plans

This update extends those goals by implementing a new action plan.

C. RATIONALE

The New River is a focal point of activity for many commercial, recreational, urban, environmental and tourism interests in Broward County. The river and its tributaries are lined with marinas and boatyard facilities, restaurants, parks, condominiums, private homes, as well as mangroves, pond apples, cypress and other scenic natural areas. The national and international importance of the river is signified by Fort Lauderdale's distinction as the 'Venice of America' and the 'Yachting Capital of the World.' The New River is vital to the community, and improvements in environmental quality will enhance both the economic, ecological and aesthetic values of this significant resource.

This rationale has been used to move efforts forward and develop a sense of community stewardship for the river.

II. RIVER BASIN DESCRIPTION AND ISSUES

Based on the New River Report (DNRP 1993), the New River has been divided into four subbasins to better focus and facilitate restoration efforts (Figure 1). These include the North Fork, South Fork, Las Olas, and Intracoastal Waterway. The Restoration Plan also provided action steps to be implemented throughout the New River System. Brief descriptions of the subbasins are provided below.

A. North Fork

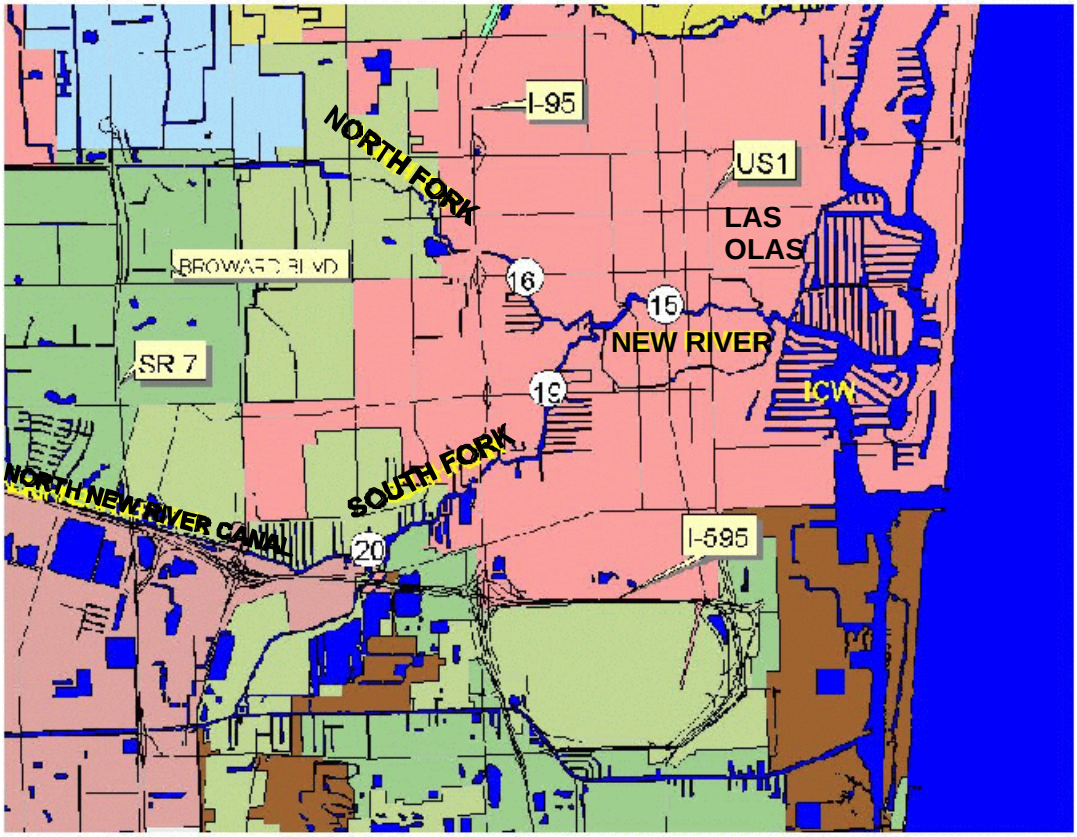
The North Fork (Figure 1) is a shallow, meandering tributary of the New River extending through the northwest section of the City of Fort Lauderdale and unincorporated Broward County. Land use is mixed along this fork of the river and includes industrial, commercial, multifamily residential, single family residential and parks. The majority of the properties south of Broward Boulevard to the confluence with the South Fork are on septic systems. Minimal tidal flow within this section of the river limits circulatory exchanges of tidal waters. Flow has been restricted by large amounts of sediment and debris especially south of Broward Boulevard. Natural freshwater flow characteristics are further restricted in the upstream section of the North Fork by the S-33 salinity control structure that effectively eliminates freshwater inflow from the western C-12 drainage basin. Opening of this control structure is typically limited to significant storm events. Other sources of water include continuous groundwater inflow from the surrounding basin and from both point source and non-point source inflows of storm water runoff.

High bacterial and nutrient concentrations, and low dissolved oxygen levels were characteristic of the North Fork water quality in 1991. Sediment samples collected and analyzed throughout the North Fork have showed consistently elevated metals concentrations. This may explain the very low number of organisms in the sediment (benthic macroinvertebrate community). A blanket of sludge left by a now decommissioned waste water treatment plant contributed to the degradation of the North Fork sediment quality. The North Fork's high particulate load from storm water prohibited light from penetrating to the bottom, effectively eliminating the survivability of submerged vegetation and reducing aquatic productivity, the base of the food web.

B. Las Olas Isles

The Las Olas Isles are a series of artificial islands located along Las Olas Boulevard in east-central

Figure 1. New River Sub-basins. Quarterly sampling sites are marked with circled numbers.



Fort Lauderdale (Figure 1). The Isles are a transition area between the New River and the Middle River on the Intracoastal Waterway. Land use in this area is single and multifamily residential. A majority of the navigable waterways within the Isles are available to larger vessels that require ocean access with no fixed bridges. The two westernmost canals, adjacent to Hendricks Isle and the Isle of Venice, showed consistently high levels of fecal coliform and enterococci bacteria, as well as the highest density of inhabited moored vessels (IMV's). Bacterial levels in this area tend to be highest during the winter dry season, further indicating that the bacteria are not from storm water runoff. In addition, periodic point discharges of sewage into the Las Olas Isles canals have also occurred due to failures of the City of Fort Lauderdale's sanitary sewer force mains and lateral connections (DNRP 1994b).

C. South Fork

The South Fork is composed of two freshwater drainage tributaries; the C-11 and North New River Canals. These join and later converge with the North Fork (Figure 1). Land use along the South

Fork is partially residential with a significant number of commercial marine industry properties. Flow in the South New River canal is maintained chiefly by groundwater inflow, which may occur directly or into the many drainage canals that discharge into the C-11 Canal. Surface runoff from low areas occurs during periods of heavy rainfall. Flow may be either to the east or to the west. The S-13 structure regulates water level at the east end of the C-11 Canal by controlling discharges to tidewaters. Tidewaters east of the S-13 control structure splits into the South Fork of the New River and the Dania Cut-Off Canal. The Dania Cut-Off Canal flows east to join the Intracoastal Waterway just south of Port Everglades. The South Fork receives additional continuous flow from cooling waters discharged by the South Broward Florida Power and Light power plant.

Flow in the North New River Canal is maintained by releases and seepage from Water Conservation Areas 2 and 3, and by groundwater inflow that enters directly or from the secondary canals that discharge into the North New River Canal. Water levels in the eastern part of the canal are controlled by the Sewell Lock (Structure G-54), 1.7 miles west of State Road 7. The canal is tidal east of the dam and joins the South Fork of the New River just east of State Road 7.

Waterborne pollutants are quickly moved downstream and out of the river system due to constant flow from the western regions of the South Fork. Thus the indicators of ambient water quality are typically within the acceptable criteria established in the Broward County pollution code (Broward County 1994). A moderate amount of litter and debris may be found in the waterways, particularly in the urban areas of the North New River Canal.

The impact of runoff from the marine maintenance and boatyard facilities concentrated at the convergence of the southern tributaries, along what is locally termed "Marina Mile", has been of ecological concern in the South Fork. The direct deposition of marine paint chips and residues, containing heavy metals, has been identified to be a source of sediment contamination.

D. Intracoastal Waterway

All the basins and tributaries described above flow into the Intracoastal Waterway (ICW) where the outflow is mixed with tidal waters and discharged through Port Everglades Inlet to the ocean. The ICW also receives flow, and the contaminants contained therein, from the Middle River, the Cypress Creek Canal and other drainage canals adjacent to the coastal basins. The chemical contaminants that are commonly found in storm water runoff, as well as the litter and debris that are dumped into the ICW from the source canals, represent the main environmental concerns.

E. New River Basin

A common problem in the New River basin is the accumulation of litter and debris in the water. Of particular concern are household and lawn debris either dumped intentionally or accidentally into the waterways by urban residents. A wide variety of household debris including, but not limited to, cans, plastics, lumber, appliances, tires, and furniture have been recovered in all of Broward's waterways. These items impede the flow of water, trap otherwise mobile sediments, impact fish and wildlife, and contribute to the general degradation of water quality as they decompose or corrode.

Debris also lowers the aesthetic and economic value of the river. Yard clippings and tree limbs are commonly dumped in the waterways based on the conventional attitude that these items are biodegradable. While individual acts of dumping may not be construed as having an impact on water quality but, cumulatively, they do cause environmental degradation.

Urban runoff or nonpoint sources of pollution also have a major impact on the water quality of the New River. Untreated storm water runoff can contain high concentrations of the nutrients nitrogen and phosphorus, and enrichment of these nutrients can result in severe algal blooms. Sediments deposited into the river from runoff can become suspended and make the water look cloudy or turbid, diminishing the aesthetic and recreational qualities of the river. Deposited sediments can change the physical nature of the river bottom and smother sedentary, bottom-dwelling organisms. As indicated in previous sections, these sediments are also a sink for pollutants such as metals and organics (e.g. petroleum products, herbicides and pesticides). The occurrence of high concentrations of fecal coliform or fecal enterococci bacteria in runoff is used as an indicator of pathogens that pose a potential risk to human health. The management and treatment of urban runoff is critical to improving water quality.

III. RESEARCH AND MONITORING

The initial New River Study (DNRP 1993) identified a number of problems but also raised a number of questions regarding pollutant sources as well as environmental and public heath concerns. This section of the report describes the research and monitoring efforts to date, attempting to better understand the environmental problems of this basin.

A. North Fork

The environmental concerns in the North Fork have been the subject of substantial investigation by DPEP often in conjunction with other agencies. Studies have been aimed at understanding the sources of elevated concentrations of fecal coliform, determining the human health risks from consuming crabs and fish from the North Fork, and improving water flow and quality.

1) Fecal Coliform: The high baseline levels of coliform bacteria, an indicator of sewage pollution, were of particular concern for their potential threat to human health. This bacteria is used by regulatory agencies as a indicator of feces-derived pathogenic bacteria and viruses.

a) ILLEGAL DISCHARGES: In November, 1993, DPEP and the City of Fort Lauderdale began a coordinated effort to investigate and remedy sources of pollution entering the North Fork in response to the high fecal bacteria concentrations measured by DPEP's Environmental Monitoring Division. DPEP's investigation, which focused on direct discharges, uncovered five facilities illegally dumping industrial waste into storm sewers and one facility directly discharging raw sewage. The City of Fort Lauderdale's investigation, which focused on indirect discharges through storm sewers, did not reveal any illegal sanitary sewer cross-connections. DPEP generated a comprehensive map of the sewered areas surrounding the North Fork to locate areas served by septic tanks to try to determine if septic tanks were contributing to the problems.

b) OTHER SOURCES: The City of Fort Lauderdale performed extensive investigation of the nearby storm and sanitary sewers but was unable to identify a source. In 1995, the City of Fort Lauderdale convened a committee of academic professionals establishing a Blue Ribbon Task Force Committee aimed at discovering fecal coliform sources in the North Fork of the New River. If no point source exists, the committee was charged with determining what characteristics of the North Fork at these locales are unique from other areas in the county and can contribute to these higher baseline levels of bacteria. DPEP has maintained an active role in providing the Task Force with data and insight during the monthly meetings. The Task Force approved two research projects aimed at fine scale sampling for fecal coliform bacteria and modeling their movement through the North Fork. The sampling study (Wolfert and Solo-Gabriele 1998) concluded that the following could be eliminated as significant sources of fecal coliform to the river:

- direct connections between the river and sanitary sewers;
- animal populations on the river;
- live-aboard boats residing on the river;
- contamination from the main artery of the New River; and
- groundwater, including areas drained by septic.

Two areas of high concentration of fecal coliform were found at I-95 and the Argyle Canal. The authors concluded that the soil was harboring the bacteria and extending the its life expectancy beyond 24 hours. Storm events re-inoculated the river with fecal coliform. The City funded a second study to better understand the role of the soil in fecal coliform survival in the North Fork area. Results should be available in mid-2001.

c) FECAL COLIFORM AS AN INDICATOR OF SEWAGE CONTAMINATION: In 1995, DPEP contracted with Nova Southeastern University to perform a literature review on the behavior of fecal bacteria in tropical and subtropical regions. The resulting technical bulletin (DNRP 1996) explained how fecal bacteria are sometimes found in pristine areas and may survive and multiply in tropical environments. The sources may be naturally occurring, i.e. not from human sewage releases, which reduces the potential health risk. This suggests that coliform detection may not be a good indicator of pathogens associated with sewage in the natural environment where a point source can not be identified. The report recommends other tests that can be used to investigate sources of fecal coliform.

d) TOOLS FOR DIFFERENTIATING BETWEEN HUMAN AND ANIMAL SOURCES: If the fecal coliform were associated with a nonhuman source, the concern for human health risk would be reduced. DPEP has developed new investigative tools to differentiate sources of the fecal contamination as human or nonhuman in sediments (DNRP 1998a). The assay measures the ratio of two byproducts of human metabolism, coprostanol and cholestanol. A coprostanol/cholestanol concentration ratio greater than one suggests fecal contamination dominated by human waste. The assay can be used as an investigative tool in areas were point sources cannot be identified.

2) Chemical Body Burden in Crabs and Fish: Recognizing that the river was a food source for local

residents, DPEP evaluated the potential health effects associated with eating benthic organisms near the sludge blanket. The objective of this program was to determine if metals in the sludge were bioaccumulating in the food chain, using blue crabs and catfish as representative indicator organisms. DPEP working with the Florida Department of Health and Rehabilitative Services (now the Florida Department of Health [FDOH]) conducted assessments of the risks to the public from consumption of fish and crabs and published a technical document with the results (DNRP 1994c). No relationship existed between the sediment concentrations of certain metals and those found in the flesh of hardheaded catfish and the tissues of blue crabs caught in the area. While FDOH does not support the consumption of fish from urban canals and rivers, final recommendation of the report noted that if residents were going to eat these aquatic organisms, they should limit consumption for small children to 7-50 crabs per month and 4-7 catfish fillets.

3) Freshwater Water Flow: DPEP made preliminary estimates of the amount of water necessary to increase freshwater flow to reduce the impact of saltwater intrusion in the river. The rough calculations revealed that increased flow could not reduce the tidal influence. However, DPEP recognized that increased flow could improve flushing through the North Fork and improve other water quality parameters. DPEP proposed a pilot project to the SFWMD in 1996 in which water from west-central Broward County would be pumped into the C-12 canal and eventually into the North Fork. SFWMD recommended more water quality data to show that water quality to the west was better than that in the river and that increased flow could improve the water quality.

4) Water Quality: In 1996 and 1997, the state legislature provided DPEP with an appropriation for North Fork water quality initiatives ($50,000 and $100,000 respectively). Projects included not only the recommended water quality assessment, but also pollution inputs review, shoreline enhancement and rehabilitation, shoreline assessment, and trash removal. In addition, DPEP created a storm water outfall geographic information system coverage to help identify upstream sources of pollution in the storm sewers. In 1998, DPEP deployed two Hydrolabs® on the North Fork for continuous monitoring of several water quality parameters along with conducting biweekly and storm event sampling. This water quality study demonstrated that water from the C-12 canal can be used to augment flow and improve water quality in the North Fork. The results also demonstrated the extreme impact that storm water has on the river's water quality.

5) Biotic Assessment:

a) FISH SPECIES: DPEP, in cooperation with the Florida Freshwater Fish and Game Commission, performed a pilot electroshock study to create a list of fish species present in the North Fork in 1998. While more marine species were found east of I-95, spotted and blue tilapia, jack crevaille, mullet, catfish, largemouth bass, peacock bass, gar, sunfish, juvenile and adult snook and a few other species were present. While the survey was not quantitative, the diversity of the fish present suggests the efforts to rehabilitate the North Fork should be beneficial to a broad group of fish, including some popular sport species.

b) PLANT SPECIES: A portion of the 1997 legislative appropriation was aimed at performing a vegetation survey of the North Fork and creating a shoreline restoration master plan. Early work has begun on this survey expected to be complete by March 2001.

c) BENTHIC COMMUNITY: The New River Study (DNRP 1993) identified elevated metals concentrations in New River sediments as one major area of concern. DPEP conducted a study of the benthic community to determine which areas of the river bottom were impacted the most by sediment contaminants (DNRP 1997b). Several areas of the North Fork had no organisms in the sediments. A benthic community recovery and sediment chemical contaminant study showed an increase in habitat quality, based on successful recruitment of a diversity of bottom dwelling organisms back into the river, and decrease in the heavy metal concentrations of sediment associated with the removal of the sludge blanket.

B. Las Olas Isles

1) Fecal Coliform: With the discovery of very high concentrations of fecal coliform in the Las Olas Isles area, DPEP and the City of Fort Lauderdale began to investigate the possible sources of the pollution. The two agencies set up a monthly monitoring network throughout the Isles. In addition to the base monitoring data, the second report included an investigation of possible infiltration/exfiltration of groundwater into the sanitary sewer system caused by tidally influenced changes in groundwater level and an analysis of seasonal changes on fecal coliform concentration in the isles (DNRP 1995). Interaction of tidal waters with the sanitary sewers did not appear to contribute significantly to the contamination.

A third DPEP study reported on the increasing evidence that the inhabited moored vessels (IMVs) were the most likely source of the elevated fecal coliform. Canal volume estimates and current movement experiments described how the hydrology of the areas aggravated the water quality problem by preventing adequate flushing. A comparison of the water quality in similarly zoned areas showed that land side density was not correlated with poor water quality. Progressive improvements in the sanitary sewers on the Isles did not result in a substantially improvement in the water quality suggesting another chronic source was present, most likely the IMVs (DNRP 1997a).

DPEP aided the City of Fort Lauderdale in conducting a study to determine if groundwater in the Las Olas Isles was contaminated with fecal coliform and could act as a source of sewage pollution to the adjacent canals. No evidence of groundwater contamination was found. DPEP continues its monthly monitoring using a scaled down network to monitor water quality.

C. South Fork and Intracoastal Waterway

1) Sediment Quality: Cursory analyses of sediment samples collected in this part of the basin in 1990 showed evidence of an accumulation of a variety of metals, including copper, tin and zinc. The toxicity levels for these metals were moderately high according to the FDEP Sediment Quality Assessment Guidelines (FDEP 1993) suggesting that benthic communities may be negatively impacted by the accumulations. The kinds of metals found in the sediments in the vicinity of the 'Marina Mile' are typical of those found in marine anti-fouling paints. The distribution of sediment dwelling organisms and the relative toxicity of the sediments were determined (DNRP 1997b).

Some sampling sites showed South Fork sediments had very few organisms and had numerous sites showing a relatively high toxicity (Figure 2).

2) Water Quality: In 1998, DPEP published a technical bulletin on metal concentrations in surface water (DNRP 1998b). High levels of copper were found in several areas throughout the County. However, areas of concentrated marine industries on the South Fork of the New River, suspected of contributing heavy metals, were found to have concentrations of copper, tin, iron and zinc below the countywide average. Best Management Practices for marinas and efforts such as the United States Environmental Protection Agency (USEPA) National Pollution Discharge Elimination System (NPDES) Municipal Separate Storm Sewer (MS4) Permit program designed to eliminate sources of metals from storm water, may have contributed to the low concentration of metals at these sites.

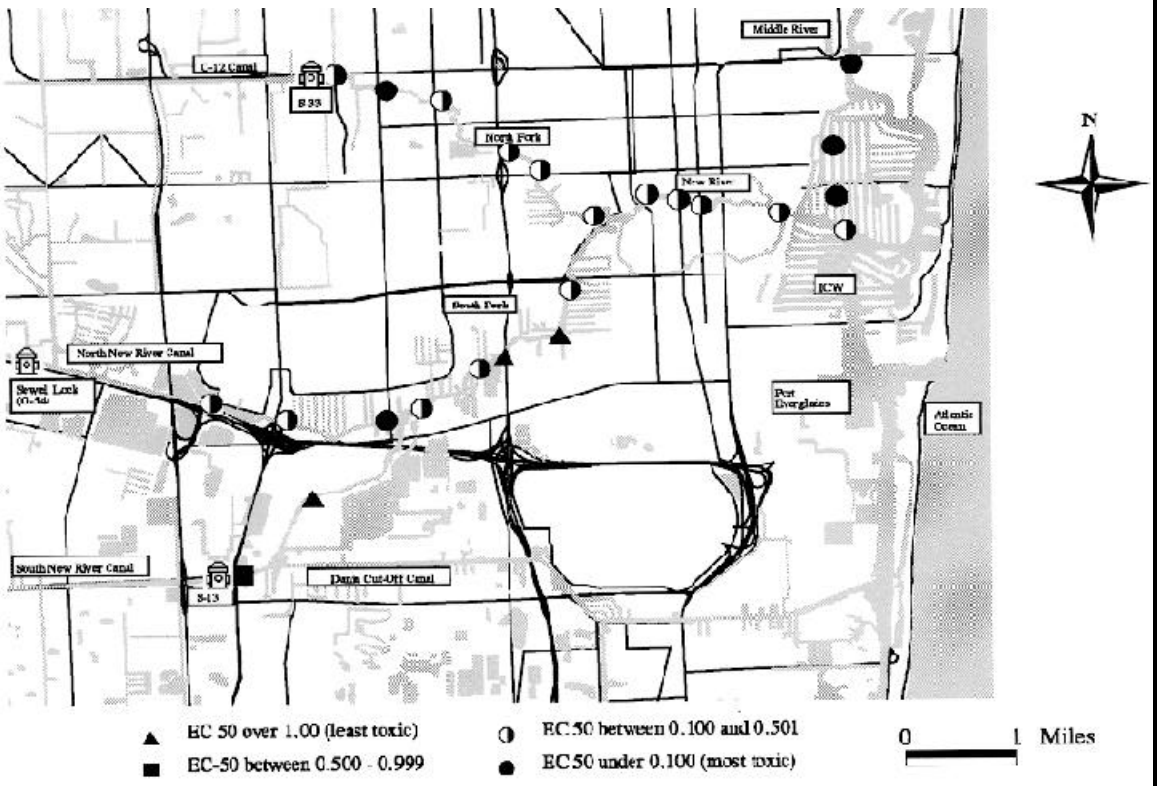
DPEP also worked with the City of Fort Lauderdale to investigate methods of waste disposal by large commercial cruising vessels (party boats) following reports of possible sewage holding tank pump out by these vessels into the waters of the New River and the Intracoastal Waterway.

Concerns had been expressed that petroleum contamination beneath Port Everglades was seeping out into surface water. DPEP performed a survey of petroleum hydrocarbons in the Port. Very little evidence of ambient petroleum hydrocarbon contamination was found (DNRP 1998c). The study did reveal the widespread presence of the octane-enhancing lead substitute, methyltertbutylether (MTBE), possibly from the many fuel-inefficient 2-cycle outboard-engine powered vessels that traverse Port waters. A follow-up study (DNRP 1999a) showed that the majority of MTBE detections, and most of the highest levels, occurred in the eastern portion of the County where boat traffic is more common. This finding supported the contention that outboard motors were a major, but not the only, source of MTBE in County surface waters. Storm water runoff from roadways was suspected to be a source of MTBE in some areas.

D. New River Basin

The Environmental Monitoring Division of the DPEP collects surface water quality samples at 44 sites throughout Broward County on a quarterly basis. The objective of the program is to characterize the ambient chemical, biological and physical composition of the County's water bodies and drainage basins. The parameters currently monitored as part of the program include: fecal coliform, chlorophyll a, total coliform, conductivity, dissolved oxygen, pH, salinity, temperature, total kjeldahl nitrogen, total organic carbon, total phosphorus, ortho-phosphate,

Figure 2. Sediment Toxicity in the New River as Measured by the Microtox® Assay.



turbidity, NH_3, and NO_2 +NO_3. Many of the environmental problem areas described in the Plan were identified through this long-term monitoring effort. DPEP will soon be releasing a review of 25 years of water quality monitoring data showing the changes in water quality parameters during that period of time. The New River Basin is one of the basins reviewed. The "Broward County Historical Water Quality Atlas" is expected to be published in 2001. Remedial measures can then be focused toward the improvement of water quality in appropriate areas.

Identification of all known major outfalls discharging into the New River was accomplished by Broward County and the City of Fort Lauderdale as part of the application requirements for the USEPA NPDES MS4 permit. Information was also provided as to the land use, pipe size, drainage area, runoff coefficients, and location. In addition, an updated listing of industrial activities that may discharge storm water was included.

IV. RESTORATION ACHIEVEMENTS AND FUTURE DIRECTIONS

A great deal of effort has gone into moving the restoration process forward. Appendix A contains the tabular outline of the original New River Restoration Plan (DNRP 1994a) with a column

dedicated to addressing the accomplishments on each item. Appendix B the achievements beyond the original New River Restoration Plan. DPEP and the City of Fort Lauderdale restoration activities have gone well beyond the scope of the original plan. The sum of these activities are described below.

A. MANAGEMENT OBJECTIVES AND ACTIVITIES ON THE NORTH FORK

Objective 1: To Improve Flow Characteristics

a) By Increasing Freshwater Inputs

The most immediate requirement for the North Fork identified in the New River Restoration Plan was to improve circulation and flow-through characteristics of the water body. At the time the Plan was written, computer modeling, regulatory flow changes and the use of alternative technology to improve aeration were proposed. Rough calculations suggested that insufficient water was available to overcome tidal forces in the North Fork. Review of the S-33 salinity control structure operations and rainfall data revealed that the majority of the flow in the North Fork came from storm water runoff during rain events. Eighty-five percent of the time the structure was closed, not allowing any freshwater flow to the North Fork. In 1995, DPEP approached the SFWMD with a proposal for a pilot project to investigate to impact of increased water deliveries, released via the S-33 structure, on water quality on the North Fork. The proposal detailed how water could be brought into the C-12 basin and released to the river.

The SFWMD suggested that a monitoring study was required to show that increased flow could indeed improve water quality. DPEP, using funds from a 1996 state appropriation ($50K), undertook a comprehensive water quality investigation which included fine scale spatial and temporal water quality sampling, sediment sampling at storm water outfalls and a comparison of the water quality between the North Fork and the C-12 canal (DPEP 1999b). Results from the water quality monitoring program, have been used to develop and propose a pilot flow project to the SFWMD. The pilot flow project is expected to begin summer 2001.

a) By Removing Barriers to Flow

Dredging activities are particularly critical in those areas where shoaling of sediments has limited access to the North Fork for both recreation, fish and wildlife. In 1997, DPEP secured a grant from the Florida Inland Navigational District (FIND - $37,000) to design and permit a dredging project to remove shoaled sediments just south of Broward Boulevard and to spot dredge areas north and west of Sistrunk Boulevard. Shoaled areas reduce flow and create areas of stagnant water. Any improvements in circulation will increase the volume of water brought to the surface for exposure to the air and sun. This helps volatilize harmful contaminants, kills bacteria, and adds oxygen to the water. Increased flushing, circulation and aeration will ultimately provide better water quality for fish, manatees and other aquatic wildlife. Permits are currently being sought for this project. A 1998 state appropriation ($450,000) will be used to complete the dredging in the North Fork initiated by the FIND grant (see Appendix C). A 2000 state appropriation will be used to target remaining areas in the North Fork that require dredging.

Objective 2: To Reduce Sludge and Contaminant Load in Sediments

a) By Removing the Sludge Blanket

The Restoration Plan strategy was to have the City of Fort Lauderdale remove a blanket of sludge deposited by a now defunct wastewater treatment plant east of I-95, to improve the quality of sediments such that benthic communities could be re-established. Following characterization of the chemical composition and delineating the extent of the remnant sludge blanket, the City of Fort Lauderdale removed the sludge blanket in the summer of 1997. While some funds came for a Florida Coastal Management Program ($50,000), the City invested over $800,000 in the remedial activity. A substantial portion of the cost was attributable to the City's use of alternative dredging technology, which prevented resuspended contaminated sediment from reentering the river and degrading the water quality during the dredging process. In addition to removing the sludge contaminated sediments, the City also dredged the Argyle Canal that had been contaminated with petroleum hydrocarbons.

DPEP's monitoring of the benthic community following the dredging showed a return of normal sediment organisms to this area (DPEP 1999c). Testing of the sediments has verified a reduction of the heavy metal contaminant concentrations in the area of the treatment plant outfall and 300 meters downstream (Figure 3). The concentration of most heavy metals shown are now below the threshold where they would most likely impact benthic organisms (FDEP 1994).

b) By Removing Contaminated Sediments

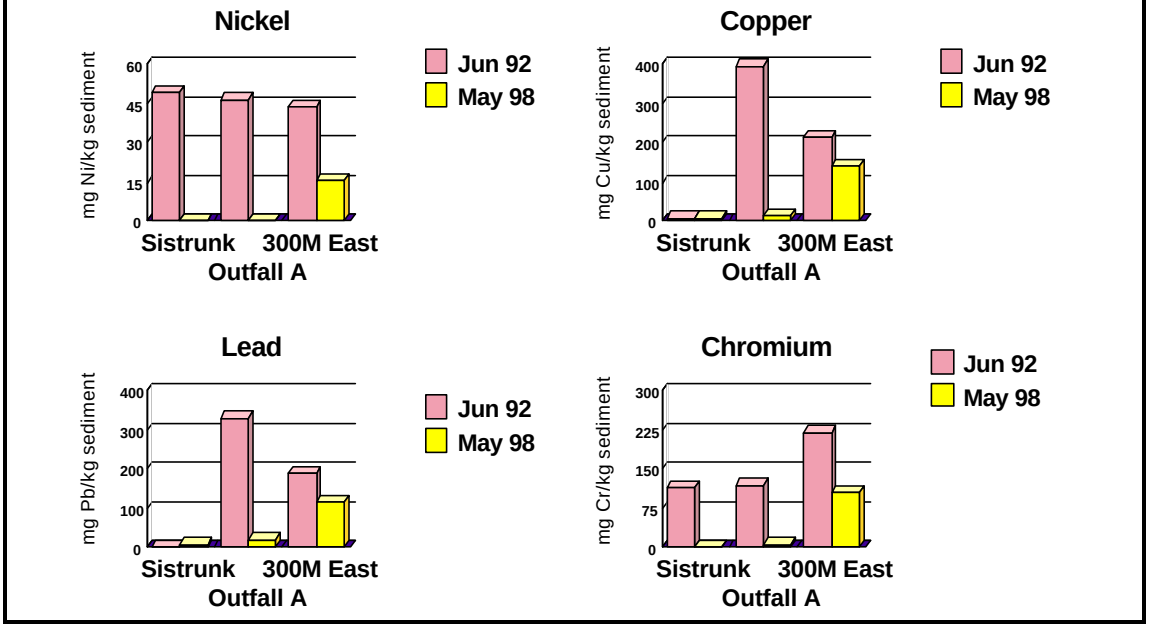
Additional spot dredging in the North Fork should remove sediment bound contaminants and improve the sediment quality for benthic communities. Several sites have already been identified where these types of sediments will be removed (see Figure C-2 in Appendix C).

Objective 3: To Improve Water Quality

Several ambient water quality parameters in the North Fork have improved since the initiation of this project in 1991 (Figure 4). Since 1993, total nitrogen values from ambient water quality monitoring are consistently in compliance with the standard of 1.5 mg/L. Ambient dissolved oxygen levels have been consistently measured above the minimal standard of 4.0 mg/l. Phosphorus levels remain in violation of the Broward County water quality standard. Fecal coliform values remain well above the standard (Figure 4). This parameter remains a major focus for several agencies' activities and their achievements are outlined below.

While ambient water quality parameters are showing some improvement, sampling during storm events has revealed the dramatic impact of stormwater on water quality parameters. Runoff from

Figure 3. Sediment Metal Concentrations Measured Before and After Sludge Blanket Removal at Three Testing Sites.



storm events can drop the oxygen level to below 2.0 mg/l for a period of a week or greater (DPEP 1999b). Fecal coliform levels rise significantly. Phosphorus levels also increase. Activities designed to improve storm water quality are continuing and should eventually contribute to the improvement in overall water quality in this basin.

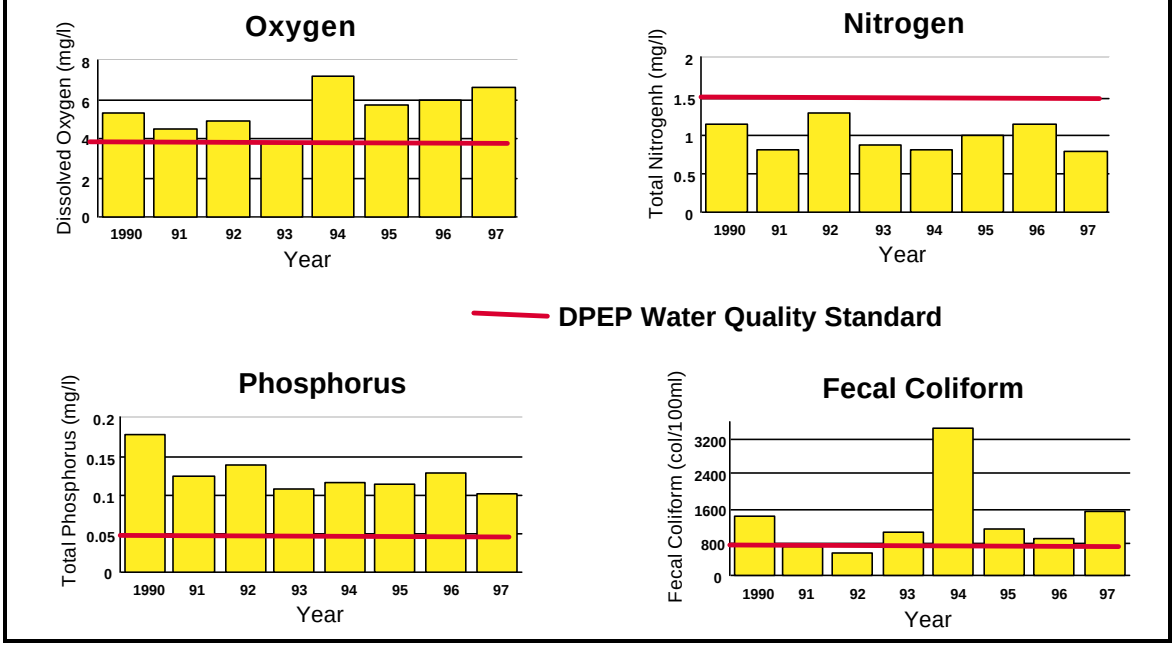
a) By Reducing Turbidity

The river circulation and water clarity are impaired in some areas of the North Fork due to sediments from storm water runoff. Improving circulation, as previously described, will help remove contaminants and particulates from the system. DPEP investigated the possibility of artificially filtering North Fork water utilizing the City of Fort Lauderdale's decommissioned sewage treatment plant. The plant had large clarification tanks that could have been used to filter and remove suspended particulates from the river. This was not feasible as demolition of the plant had already begun. Other methodologies describe below, especially the improvements to storm water quality, may contribute to the reduction of turbidity.

b) By Improving Storm Water Quality Regulation

Improving storm water quality and preventing suspended sediments from reaching the river were used as additional approaches to reducing turbidity. The Plan called for continued investigation of point and nonpoint source discharges into the North Fork in conjunction with the USEPA NPDES storm water management program. DPEP, with 26 municipal and state co-permittees, began implementation of a five year NPDES permit in 1997. The annual reports have been submitted each

Figure 4 - Major Water Quality Parameters Measured in the North Fork of the New River from 1990-1997.



May since 1998.

c) By Improving Storm Water Treatment Infrastructure

Improvements in storm water quality can also be made by improving infrastructure such as installation of swales and grit chambers. The City of Fort Lauderdale improved sidewalks, storm sewer systems and drainage in the Dorsey River Bend neighborhood in 1999. The City will be improving the storm water infrastructure leading to a 72-inch storm water outfall just north of Broward Boulevard to reduce input of sediments into the North Fork. Broward County is undertaking a comprehensive project to improve sidewalks, storm sewer systems and drainage in neighborhoods that may impact the western reaches of this basin including NW 35 Avenue, Franklin Park, Melrose Park, St. George and Washington Park neighborhoods.

d) By Improving the Tools to Track Sources

In addition to monitoring storm water quality, DPEP created a storm water outfall geographic information system coverage in December 1997. Catch basins that drained storm water into the North Fork were identified and were mapped. The coverage can be used to help identify upstream sources of pollution in the storm sewers.

e) By Reducing Sources of Nutrients and Contamination

Many of the properties, both residential and non-residential, on the North Fork are on septic tanks. While fecal coliform contamination may not be a major concern from the drain fields, increased

nutrient loading into the North Fork is likely occurring. DPEP will continue to work with the City of Fort Lauderdale and Broward County Office of Environmental Services to encourage comprehensive planning for the conversion of septic systems to sewer for properties adjacent to the waterway. The City of Fort Lauderdale has already moved in this direction by converting the Tarpon River neighborhood and a portion of Sailboat Bend to sewer. As mentioned above, the Broward County Central County Improvement Project will also contribute to this effort by sewering neighborhoods in the western end of the basin.

f) By Identifying Sources of Fecal Coliform

The high concentration of fecal coliform bacteria in the North Fork continues to be a concern. In 1993, a regulatory investigation by DPEP and Broward County Code and Zoning discovered illegal discharges of raw sewage, industrial waste and a broken sanitary gravity main. Enforcement action was taken to stop the discharges. The City of Fort Lauderdale undertook a comprehensive investigation of the sanitary and storm sewer system in the North Fork area. Smoke tests and video of the lines did not identify any cross connections or sewage leaks.

To identify any possible point source of the fecal coliform, DPEP initiated two investigations. We began development of the coprostanol assay to determine if the fecal coliform was from human sewage or another source (DNRP 1998a). If the elevated levels were due to a nonhuman source, the potential for human health impacts would decrease. Recognizing the coliform assay was originally designed to investigate point sources of sewage contamination, DPEP commissioned a literature search to determine if other assays could be used as investigative tools to help identify the source (DNRP 1996). We have also investigated using genetic markers to identify the source. Preliminary studies suggested mixed human/nonhuman sources.

As noted earlier, the City of Fort Lauderdale City Commission convened the Blue Ribbon Task Force, a group of local scientists charged with reviewing the available data and determining the source of the fecal coliform. Using storm water utility funds, the City has funded three studies recommended by the committee. One of the early findings of the Task Force was that septic systems and live-aboard boats were not major point sources of fecal contamination in the North Fork. Despite this finding, the City of Fort Lauderdale 1997 Marine Sanitation Ordinance requires that the live-aboard boats in the North Fork have permanent hook-ups because overall water quality in this area is degraded. We continue to monitor the City's enforcement and implementation of this ordinance in the North Fork area.

Another possible reason for water quality degradation is aging infrastructure in the older sections of Broward County and Fort Lauderdale. As septic systems and drainfields age, they are less effective and may no longer provide the designed level of treatment. In 1997, DPEP pursued enforcement action against a property owner whose septic system was overloaded and failing resulting in the leaching of improperly treated sewage into the North Fork. DPEP will continue to encourage local municipalities to convert waterway properties from septic to sanitary sewer and in doing so ensure that infrastructure, such as lift stations, is consistently maintained.

g) By Removing Accumulated Debris

Although water quality parameters reveal the extent of pollutant loadings, visual inspection of the river readily shows the accumulated effects of years of dumping. Annual waterway cleanups at several sites successfully gain community participation and remove debris in limited areas. Over the last seven years, the DPEP coordinated clean up site at Sweeting/Delevoe Park has benefitted from the river by removing 20-30 cubic yards of trash each year. New litter is continuously introduced from passing cars, stormdrains, and illegal dumping. The shores receive little attention between the annual community cleanups.

The North Fork needed a thorough removal of the accumulated solid waste. Using funding from a state appropriation, DPEP worked with a contractor in April and May, 2000 to remove visible and accessible buried debris from the shore and tidal areas between Broward Boulevard and the S-33 Structure (Figure 1). The contractor's final report revealed that trash and debris in the river and along its banks varies in age and type and was comprised of "typical" trash such as beverage containers, plastic bags, food containers, cardboard and plastic buckets as well as larger items like shopping carts, bicycles, furniture, tires, and car parts. The contractor provided a map of the river showing the number of bags of debris removed from various segments of the river. During the five week project, 1900 bags of debris were removed. Trash "hot spots" included the Swap Shop, a market on NW 27th Ave, the NW 6th Street Bridge, NW 2nd Street east of I-95, and 18th Street behind Salvation Army. In addition, the contractors identified three areas where homeless populations are contributing to the trash problem: Under I-95, under NW 31St Bridge, the south bank west of the Tri-rail tracks, and behind the Salvation Army at NW 18th Ave. This one-time removal of debris and litter should improve localized water flows and the quality of the habitat for shoreline birds and aquatic animals. The visual impact of the debris removal has been significant.

To address the continuing accumulation of litter along the shore and to develop stewardship in the surrounding community, DPEP plans continue our Adopt-a-Waterway program piloted at the Franklin Park neighborhood shoreline revegetation site. Community organizations will be sought to adopt sections of the North Fork shoreline, agreeing to routinely pick up litter along a stretch of shoreline in exchange for recognition. The cost to run the program over a three-year period will include signs, brochures, promotional items, garbage bags and gloves. DPEP is working with the Broward Sheriff's Office to use prison inmates from Operation Fresh Start to conduct interim cleanups and remove exotic vegetation throughout the year. A successful Adopt-a-Waterway program will result in a more aesthetically pleasing environment to the community and may spark their pride and stewardship for the river. We are also coordinating with code enforcement and the SFWMD to reduce the amount of trash entering the river from local businesses.

Objective 4: To Enhance Biological Function

a) By Performing a Pilot Project for Shoreline Revegetation

The North Fork is characterized by large areas of natural vegetation along its banks. However, exotic and/or nuisance plant species are abundant and much of the shoreline has eroded into steep banks. A pilot project was developed along the shoreline to replace exotic plants with native species, improve and stabilize bank slopes and provide recreational access to the river. The

results of the pilot project are assisting DPEP in developing a shoreline restoration plan for the North Fork.

The Franklin Park Enhancement Plan (SPGM 1995) was proposed by Broward County's Department of Strategic Planning and Growth Management (now DPEP) and described a variety of activities designed to improve conditions in the neighborhood. Franklin Park is located west of I-95 and is bounded by Sunrise Boulevard to the north, NW 27 Avenue to the west, Sistrunk Boulevard to the south, and NW 24 Avenue to the east. One of the goals was to create an aesthetic asset on the New River. The Plan identified the area for the revegetation plot located at the NW 27th Avenue bridge over the North Fork (Figure 5).

Many different agencies and community groups participated in the pilot project. Broward County Streets and Highway Division performed the excavation, removing exotic vegetation and more than 250 cubic yards of debris.

The planting event occurred on September 6, 1997 with the Dillard High School and DPEP volunteers. Cordgrass was the main species planted along the shoreline slopes. After twelve months from planting, it grew from about 25 to 140 cm (4.5 feet), almost reaching its maximum height under optimal conditions (Figure 5). Based on the first year of monitoring data, we have learned that cordgrass planted closer to the water performs better than that growing at higher elevation, suggesting an optimal niche for future use of cordgrass along the North Fork. Also leatherfern performed very well in the first growing season, more than doubling its size in twelve months. Approximately $6,000 from the Broward County Tree Trust fund were used to install palm and pond apple trees in the upland reaches of the pilot area. Broward Beautiful donated two benches which Park and Recreation Division installed.

The pilot project also contained a community participation component to promote stewardship of the waterway within the surrounding neighborhoods. The Dillard High School Environmental Club, under the direction of Mr. John Burke, became the primary volunteer group. The students committed to be responsible for an Adopt-a-Can (through a program with Broward County Office of Integrated Waste Management) and Adopt-a-Waterway Program for a two year period ending in 1999. Their participation has been a benefit for overall community awareness, as well as, high school environmental education efforts by the School Board, DPEP, and the Broward Urban River Trails.

The park is becoming an asset to the local community. Local residents are frequent visitors of the park, as it is evident from the increasing amount of trash collected within the Adopt-a-Can program. Maintenance of the vegetation and grounds increasing became an issue in 1999 and 2000. In October of 2000, the Broward County Park and Recreation Division adopted this area as an official park. As such, maintenance of the facility should improve and enforcement of parking and alcohol prohibition ordinances can be enforced.

b) By Developing a Long Term Community Vision for the Shoreline Rehabilitation

The existing shoreline of the North Fork no longer resembles its historical condition. Although

bulkheads and seawall are conspicuously absent in most areas of the North Fork, the types of plants and wildlife found have changed. The shoreline is actively eroding in some places and exotic plants have replaced native species in some riparian areas. Due to the change in the habitat and poor water quality, the biodiversity of the river has declined. Residents in the surrounding community have expressed interest in shoreline stabilization and revegetation.

DPEP is pursuing a three step process to develop a long term community vision of the North Fork shoreline by creating a Shoreline Master Plan. First, a shoreline vegetative survey will be conducted to assess the existing plant communities and their distribution, identify significant natural resources, and evaluate the historical plant communities that are still present. This baseline information will help us develop a shoreline revegetation plan and to document progress on the river. To guide ongoing restoration efforts by the City of Fort Lauderdale, the SFWMD, and Broward County and incorporate community vision, a series of workshops was begun in August, 2000. The intent of the workshops was to keep the community informed of on-going activities and solicit their input to create a vision of the North Fork shorelines. The final shoreline plan will help identify and rank areas for non-native plant removal and rehabilitation, develop lists of appropriate plant species for revegetation projects, identify publicly owned parcels, identify potential access points and pathways for pedestrians, bicyclists and boaters, and show potential links to other natural resources in the area. The final step will be to implement the rehabilitation of prioritized areas in the Shoreline Master Plan. The shoreline restoration project will include surveying existing publicly owned sites for suitability of revegetation; surveying the selected site and developing site plans; removing exotics; developing vegetation plans and selecting plant species; obtaining permits for regrading; and implementing the project.

The North Fork can receive many immediate and long-term benefits from development and implementation of a revegetation plan, including: 1) aesthetic improvement; 2) restoration of native vegetation; 3) improved habitats; 4) improved water quality, especially dissolved oxygen; 5) reduced erosion from banks; and 6) creation of a wildlife refuge in an urban environment. In 1998-99, DPEP worked with the Army Corp of Engineers (ACOE) to apply for federal funding to implement the Shoreline Master Plan through critical projects funding appropriated in the1996 Water Resources Development Act. ACOE will inform us if funds remain after other priority projects for Everglades restoration are completed.

Figure 5. Franklin Park Neighborhood Shoreline Revegetation Site. On this publicly owned parcel (2/22/96; top photo), the non-native vegetation was removed, the shore resloped, debris disposed of, new trees and shoreline vegetation planted, river access zones created, and benches and trash cans installed (7/21/98; bottom photo).

c) By Planting Native Vegetation

The shoreline vegetation in the North Fork is a mix of non-native and native species. Several properties adjacent to the waterway are in public ownership and represent opportunities to enhance the habitat quality and aesthetic of the shoreline. Over $158,000 from the DPEP's Tree Trust Fund was used to plant trees and landscape the Community Center at Delevoe Park. More than 1,000 trees were planted in the park including numerous pond apples and palms planted on a stretch of North Fork shoreline. The City of Fort Lauderdale removed shoreline exotics from the "oxbow" just north of Broward Boulevard in 1997 and planted mangroves.

d) By Reducing the Impact of Nuisance Vegetation

A number of non-native and native species represent nuisance vegetation in the North Fork. Among these are hygrophila, Brazilian pepper and giant cutgrass. The SFWMD has been working with the Broward County Parks and Recreation Division to reduce the impact of stands of common reed (*Phragmites* sp.) on the SFWMD's right of way near Lafayette Hart Park. SFWMD regraded and stabilized the shoreline near this area. In 1999, DPEP worked with the SFWMD to find access and staging sites for a one-time removal of hygrophila, an aquatic plant which has been introduced into the North Fork and is choking out native species, and constricts flow at some sites. Reduction of the seed stock should help reduce the impact of the vegetation in the future. No additional action occurred.

B. MANAGEMENT OBJECTIVES AND ACTIVITIES IN THE LAS OLAS ISLES

Objective 1: To Improve Water Quality

a) By Identifying Sources of Fecal Coliform

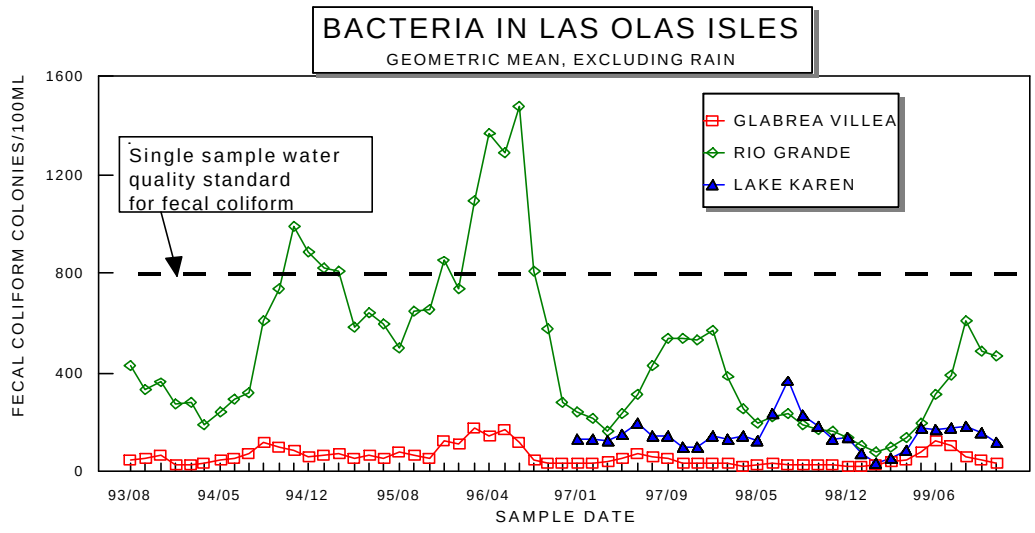
DPEP and the City of Fort Lauderdale have put tremendous resources toward resolving the water quality problems in the Las Olas Isles. The original restoration plan called for monitoring, pump out installations and groundwater assessment in the area. As described earlier in this document, five years of monitoring and study have been performed. The City of Fort Lauderdale has completed upgrades the sanitary sewer system in the Las Olas Isles thus reducing the possibility of direct discharges of sewage into the canals.

b) By Encouraging the City of Fort Lauderdale to Develop a New Water Quality Ordinance

In December 1993, in response to the bacterial findings, the City adopted an ordinance requiring property owners who rent dock space to owners of inhabited moored vessels (IMV's) to provide either permanent land-side toilet facilities, vacuum pumpout devices connected directly to the boats, or pumpouts by septage barges (Section 47-63 Marine Sanitation -City of Fort Lauderdale Code of Ordinances). This ordinance was difficult to enforce and resulted in only minor improvements in water quality. Inspections by the Florida Marine Patrol and a review of the mobile pump out activities demonstrated incomplete compliance with the 1993 City Ordinance designed to reduce fecal coliform input into the canals. In May 1997, the City passed a much broader ordinance (Ordinance C-97-11, Section 8-156 Marine Sanitation Systems -City of Fort Lauderdale Code of Ordinances) requiring property owners, in multi-family zoned areas which allowed live-aboard

boats, to provide pump out facilities for all slips. Liveaboards were required to keep their boats hooked into pump out systems while docked. In areas showing water quality degradation such as the Isles, all habitable boats were required to maintain hook-up. The Florida Department of Environmental Protection, through the Clean Vessel Act, provided $150,000 in grant funds to help homeowners pay for the pumpout facilities. Since passage of the ordinance in 1997, the City has put significant effort towards enforcement. Figure 6 shows that the peaks in the average fecal coliform concentrations have been reduced since the ordinance was enacted. Both the City and the County are continuing their water quality monitoring programs to ensure that bacterial concentrations are kept at an acceptable level. In addition, DPEP is monitoring the compliance of the residents to permanently connect docked boats in the Las Olas area to the new pump out facilities.

Figure 6 - Fecal Coliform Bacteria Levels in the Las Olas Isles from 1993 to 2000. The data shown is the six-month geometric mean of the monitoring data excluding samples taken when it had rained 24 hour prior to sampling. Glabrea Villea is a reference site on an isle that does not allow live-aboard vessels. Compliance with the City of Fort Lauderdale's 1997 Marine Sanitation ordinance has resulted in a reduction of the peak average concentration of fecal coliform bacteria at the sampling sites (Rio Grande) nearest to the isles with the highest number of inhabitable moored vessels.



C. MANAGEMENT OBJECTIVES AND ACTIVITIES ON THE SOUTH FORK

Objective 1: To Remediate South Fork Sediment Contamination

a) By Reducing Sources of Contamination Through Pollution Prevention

Upon documentation of the metals contamination in the vicinity of the 'Marina Mile,' DPEP collaborated with the Marine Industries Association of South Florida, to develop a "Best Management Practices" program. The objective of the program was to decrease the amount of contaminated runoff, paint, and metals discharged into the river. In addition, the International Marina Institute, with a grant from the USEPA, has produced a "Clean Marina Program" designed to inform and educate marina industry professionals, to promote the use of environmentally compatible practices, and understand regulatory compliance requirements.

b) By Removing Contaminated Sediments

DPEP surveyed the sediments in 1994 and found many areas of the South Fork where the sediments did not contain a diverse benthic community (DNRP 1997b). South Fork sediments had limited bottom dwelling organisms and had numerous sites showing a relatively high toxicity. One form of site remediation is the removal of the contaminated sediments. In 1994, the City of Fort Lauderdale undertook the first phase of a three phase dredging program (Figure 7). While the dredging was designed to improve navigation, it also removed the contaminated sediments. From July 1994 through May 1995, 17,600 cubic yards of sediment was removed from the South Fork (SW 24th Avenue east to SW 17th Avenue). Phase II of the City's dredging plan took place from October 1996 to March 1997 and included 1000 cubic yards removed from 24th Avenue west to SW 32 Avenue and south to just past I-595. The City completed maintenance dredging (16,000 cubic yards) of the South Fork from SW 17th Street through the confluence of the North Fork to the Intracoastal Waterway in November, 1999. In the fall of 2000, the City began survey work on the North Fork of the New River to dredge several areas from the confluence to Sistrunk Boulevard.

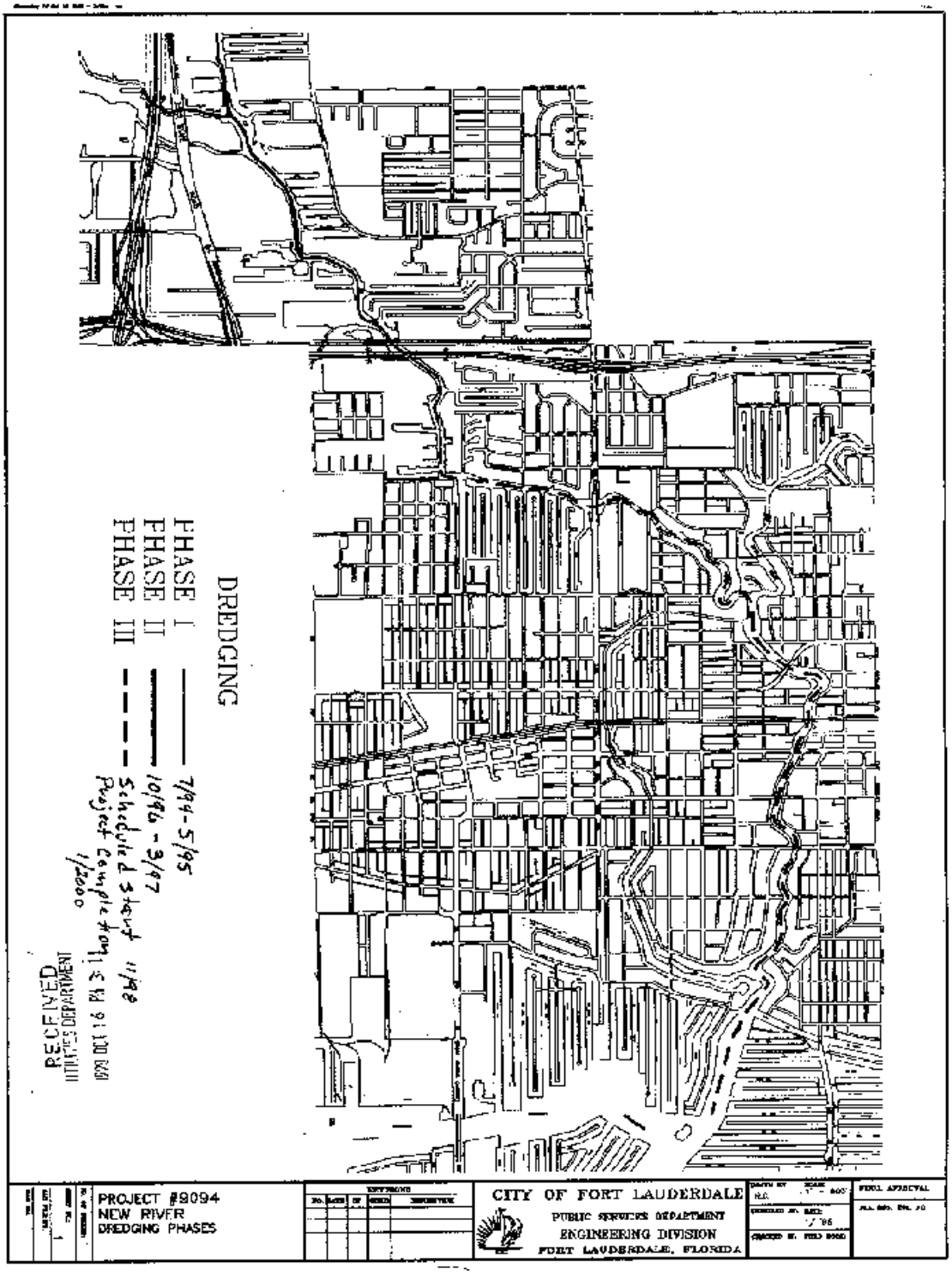
D. MANAGEMENT OBJECTIVES AND ACTIVITIES ON THE INTRACOASTAL WATERWAY

Objective 1: To Improve Water Quality

a) By Educating Homeowners about Landscaping Practices

Most of the Intracoastal Waterway is bulkheaded and lined with private homes, condominiums, and apartment buildings. Impacts to water quality are primarily derived from storm water runoff. Therefore, improvements in the quality of the runoff will enhance water quality. A literature survey of landscape alternatives that improve the quality of storm water runoff was conducted. Recommendations included landscape improvements, such as grass next to bulkheads, to help filter and cleanse the runoff. Additional educational materials on lawn maintenance and pest control have also been developed.

Figure 7. City of Fort Lauderdale Dredging Activities in the South Fork of the New River.



b) By Investigating Water Quality Complaints

As the “Venice of America”, Fort Lauderdale boasts an extensive canal network and a culture based in the waterway. DPEP received several anonymous complaints that dinner cruise vessels were illegally dumping their raw sewage into the Intracoastal Waterway and into the New River. DPEP worked with the City of Fort Lauderdale in 1998 to investigate these illicit discharges and contacted boat owners with our concerns.

E. MANAGEMENT OBJECTIVES AND ACTIVITIES THROUGHOUT THE NEW RIVER

Objective 1: To Increase Awareness of Water Protection Through Public Education

a) By Supporting Clean-up Efforts

The dumping of litter and debris into the New River has been of concern. To educate the public on the ecological impacts of trash on the environment, public awareness campaigns and environmental education programs have been used to help reduce dumping of materials into the waterway. DPEP developed a brochure entitled “20 Ways to Clean up New River” to encourage continuing efforts to help keep the river clean. Perhaps the longest running waterway awareness campaign is that of the Marine Industries Association of South Florida, Inc., (MIASF), which has organized the annual waterway cleanup for the last twenty-one years as part of their "Keep Our Waterways Clean" program. DPEP has been a financial sponsor of the event since the mid 1980s. The waterway cleanup is conducted by hundreds of volunteers who remove tons of trash and debris from Broward County's waterways. This public awareness/participation event serves to directly educate and involve a range of County residents. In the past four years, 25% of the clean-up sites were on the New River.

Beginning in 1994, DPEP initiated and sponsored a clean-up site at the City of Fort Lauderdale’s Sweeting Park on the North Fork. This passive park had a severe litter problem especially beverage containers, shopping carts and bicycles. In 1996, a group from Leadership Broward, under the direction of DPEP, established a second site upstream in the Franklin Park Neighborhood. The SFWMD began sponsoring this site in 1997. In 1998, DPEP moved their site to Delevoe Park just across the river from Sweeting Park to accommodate larger groups of volunteers. DPEP plans to maintain its sponsorship of these events and continue to act as site coordinator in the North Fork. These cleanups provide positive public participation for a cause that directly benefits the community.

b) By Educating the Community About the Intracoastal Waterway

DPEP committed $21,000 of its resources to match a $46,000 grant from the Florida Inland Navigational District to design and implement a program to educate all age groups about the resources of the Intracoastal Waterway (ICW). The program included four public lectures by academic professionals on the resources and history of the ICW, a 100 page booklet summarizing those presentations, a mobile display about the ICW, and ten speaking engagement on various ICW topics. One of the unique features of the program was a Waterway Tour Series that provided 25 guided tours of the ICW at no cost to the public. The program also produced a activity book for elementary school children and two videos, one aimed at an adult audience and one for

children. The videos feature an introduction by Congressman E. Clay Shaw.

c) By Making Presentations to the Public

In the last three years, DPEP has made many presentations to the public and professional organizations to educate them about the concerns in the New River. Two presentations about the New River were made to Parkway Middle School as part of the Young Citizens' Conservation Corps "The Children's Everglades Symphony No. 2: Watershed Trilogy". More general audiences were reached at presentations held at the Anne Kolb Nature Center, the Broward Historical Commission, Fern Forrest Nature Center, Franklin Park Community Center, Secret Woods Park, the City of Fort Lauderdale's Homeowner District III meeting, the City's Central Service Center of the Housing Authority - Elderly Services, a DPEP in-house seminar series and a Broward County Employee life-long learning meeting. Presentations have also been given to students at Stranahan and Dillard High Schools.

Professional informational presentations were made to the Broward Section of the American Planning Association, the South Florida Association of Environmental Professionals, the local chapter meeting of the American Water Resources Association, the Society for Ecological Restoration (Carter 1997), the Water Advisory Board to the Broward County Board of County Commissioners, the state's Surface Water Improvement Management (SWIM) Task Force and the South Florida Ecosystem Restoration Task Force's Social Sciences Symposium. Presentations aimed at generating funding were given to the South Florida Ecosystem Restoration Task Force, the Governor's Commission for a Sustainable South Florida, and the Florida Inland Navigational District. DPEP will continue its pursuit of funding and opportunities for improvements in the New River through the restoration plan activities.

Objective 2: To Develop a Partnership between Community, Business, and Government Leaders to Restore the River

a) By Forging Partnerships with Local Agencies and Community Activists

DPEP has pursued this objective by forming partnerships with the Broward Urban River Trails, Broward Beautiful, the SFWMD, the Marine Industries Association of South Florida and City of Fort Lauderdale. State Representative Josephus Eggelletion (elected to the Broward County Commission in November, 2000) has been particularly active in obtaining funds and creating momentum for the New River Restoration efforts.

b) By Participating in the Projects of the Broward Urban River Trails (BURT)

The Broward County Urban Blueway/Greenway Project was borne out of efforts by 1000 Friends of Florida with local partners such as DPEP and SFWMD to create a greenway in Broward County as part of the Florida Greenways initiative (Florida Greenways Program 1995). In November 1994, a visioning workshop with local agencies and the public established goals for the project. A coordinating council was convened and the project was officially dubbed The Broward Urban River Trails: A link in the Florida Greenways System. Part of BURT's mission is to develop and implement plans that enhance the ecological, recreational, educational, and economic values of the New River. The similarity in mission with the New River Restoration Plan is just one reason why

DPEP has been a consistent supporter of on-going efforts.

BURT has made significant progress since the visioning workshop. A coordinating council was established that meets monthly. An executive director now leads the program. BURT published "The New River Loop" map which highlights cultural, recreational and historic sites on the New River. BURT has become a not-for-profit organization. The news about BURT is being spread at local fairs and events by setting up booths and passing out the Loop map.

BURT is also pursuing state and federal grants for signage on the river and improvements for waterway access. This includes working with the County's Parks and Recreation Division to build a launch for small boats at Delevoe Park, collaborating on the annual inland waterway cleanup to remove litter and debris, and developing sailing and safe boating classes at an adjoining county park. To date, BURT has been successful at generating funding for education at Stranahan High School, initiating a volunteer water quality monitoring program (details below) and generating support from local governments and members of the business community through Leadership Broward.

To continue improving the stewardship of the river, BURT's Environmental Committee developed a volunteer water quality monitoring network. In general, storm water is the number one source of water pollution in metropolitan areas. The group's primary objective is to document the influence of specific storm water outfalls within their neighborhoods. Members are currently searching their local waterways (with the aid of utility maps) for storm water outfall pipes. After a rain event, the volunteers will make observational measurements of water discharging from the pipes into the New River, Dania Cut-off Canal or Intracoastal Waterway. For example, the monitors will note the presence or absence of suds, oil sheen, odors, and/or trash. They will record information on sheets designed by the USEPA and used by DPEP in their NPDES permit activities. Volunteers are also participating in the Great Secchi Disk Dip-In throughout the BURT Loop. The Dip-In is a national once a year event to determine the clarity of the water in water bodies throughout the United States.

c) By Providing Logistical Support to Broward Beautiful

Broward Beautiful has contributed to improvements on the New River in a number of ways. They have been a major sponsor of the MIASF's Annual Waterway Clean-up. They also donated two park benches that Broward County Parks and Recreation installed at the Franklin Park Shoreline Revegetation site. DPEP continues to support their efforts by providing office and meeting space.

d) By Acting as an Advocate for the New River

DPEP continues its commitment to the New River by acting as an advocate, attempting to generate additional funding and increase state and federal awareness of the New River. Over the past several years, DPEP has provided personalized boat tours to elected officials such as state representatives Steve Effman and Josephus Eggelletion and City of Fort Lauderdale Commissioner Carlton Moore. We have provided the experience to groups representing federal interests such as representatives of USEPA headquarters and Col. Terry Rice, the ranking officer of the Army Corps of Engineers in Jacksonville. State and local planning groups that have participated in the waterway tours include community development leaders in the City of Fort Lauderdale, Florida Greenways Coordinating

Council, BURT Coordinating Council, South Florida Regional Planning Council, and a representative of the state Department of Community Affairs. We have provided water access to photojournalists from the Sun Sentinel and the film director of "The Greening of America". DPEP has also participated in four tours of the New River with new members of Leadership Broward, a group of local business people striving to become more active in the community. The Sierra Club, National Audubon Society, and representatives of Art in Public Places have also benefitted from guided tours of the North Fork. Presentations on the restoration of the New River and justifications for improved funding for this project have been given to the South Florida Ecosystem Restoration Task Force Working Group and the Governor's Commission for a Sustainable South Florida. These presentations resulted in a top twenty ranking for the North Fork New River Restoration Project in the critical projects list for immediate funding as part of Everglades Restoration. However, no funding has been received to date (see page 18, Shoreline Rehabilitation).

Objective 3: To Increase Public Participation and Stewardship of the New River

a) By Educating the Public to be Earthkeepers

DPEP currently operates an environmental complaint line (954/519-1499) that provides the citizens of Broward County with 24-hour access to DPEP. In 1994, we began training local residents on how to recognize environmental crimes through the "Earthkeepers Program". Between 1994 and 1997, more than 400 people attended a total of 15 Earthkeeper training sessions. The attendants learned to watch for sheens on the water, illegal dumping of chemical or yard wastes into storm drains or directly into the river, and other activities which would degrade the environment or the waterways.

b) By Providing Environmental Education in Disadvantage Neighborhoods

1) Environmental Justice

In 1996, DPEP received an $80,000 Environmental Justice Through Pollution Prevention grant from the USEPA. The purpose of the grant was to reduce pollution caused by improper handling or disposal of hazardous materials generated by businesses or residents in minority or low income areas of Broward County such as some of the communities surrounding the North Fork of the New River. DPEP hired a minority business to help in the outreach to the community. Unfortunately, educational workshops held were not well attended.

2) Community Gardens

A coalition of government agencies (Broward County Parks and Recreation Division, DPEP, Office of Integrated Waste Management, Agriculture and Extension Education Division and along with the US Department of Agriculture and the University of Florida Agriculture Extension Service) provided technical support and training to the Franklin Park community children. This coalition joined forces in an after-school project called the Franklin Park Community Gardens and Environmental Education Project (Community Gardens).

The goal of Community Gardens was to involve Franklin Park residents in the rejuvenation of their community and to teach and promote grassroots environmental citizenship. Specifically,

Community Gardens coordinated with the Franklin Park after-school program to involve local children in experiential garden and environmental education programs. For a three month period April to June 1998, the coalition conducted "Earthdays" each Friday. These Earthdays were educational opportunities for children in grades kindergarten through fourth grade. Activities included paper making, recycling, planting butterfly gardens, building birdhouses, making bird feeders out of corn cobs or pine cones, recognizing wildlife footprints and how to prevent contamination of groundwater.

3) Cool Communities

A portion of the USEPA Environmental Justice Grant involved Cool Communities, part of a national research and public education effort of American Forests and the U.S. Department of Energy. The program was designed to reduce carbon dioxide emissions, conserve energy, clean the air and slow global warming. Cool Communities activities included strategic planting of trees on private property in a minority community to provide shade to cool the homes. The USEPA grant provided $40,000 to pay for enough ten-foot trees to be planted at 100 homes. Another $3,850 was available for contracting for the use of a backhoe to dig holes for planting. The EPA grant also provided $14,000 for reflective roof coatings and labor to apply them. Several homes were chosen as a demonstration project.

d) By Increasing the Opportunities for the Public to Experience the New River

In 1996, DPEP, in conjunction with the Broward Chapter of the Sierra Club's Inner City Outings and the Boys and Girls Club of Broward, conducted two canoe workshops in which youths were taught how to safely operate a canoe. The youths were chosen from the Unincorporated Broward County Boys and Girls Club which is located within the Environmental Justice Grant area. The workshops culminated in an ecological excursion up the North Fork of the New River. Sixteen teenagers put their newly acquired canoeing skills to the test while meandering through the naturally flowing portion of the New River. The North Fork provided the real challenge while affording an array of natural wonders for the children to observe. These children were also encouraged not to pollute the river and were shown some of the garbage we had retrieved while canoeing. The inner city youths who participated in the canoe trip rarely see their own neighborhood as part of a delicate balance in nature.

e) By Educating the Community About Reducing Upland Contamination and Urban Development

Using funds from the 1998 state appropriation, DPEP will promote stewardship of the river by educating the community about reducing upland contamination, land recycling, and urban development. As part of these activities DPEP will fund the Office of Economic Development's community visioning meetings. In addition we plan to provide regular, audience-specific updates on restoration/brownfields/infill activities occurring within the North Fork communities. Broward County Parks and Recreation Division is developing a kiosk at Delevoe Park to provide educational materials related to the history and ecology of the North Fork.

f) By Targeting Business to Improve Environmental Compliance

To motivate cultural change and encourage stewardship of the environment, every sector of the

community must participate. For the last two years, DPEP has been promoting Green Business Program called the Emerald Awards to recognize and increase patronage of 'green' businesses. DPEP has recognized green businesses through inspector referrals and promotes winners.

g) By Organizing Community Events to Put "*No Dumping*" Labels on Storm Drains

Following a pilot storm drain stenciling activity with local high school students in 1997, DPEP entered into a partnership with the City of Fort Lauderdale and the SFWMD to epoxy permanent labels on storm drains. These labels send the message that materials entering the storm drain end up in a local waterway. The labels were placed in drainage basins leading to the New River.

Objective 4: To Increase Governmental Cooperation to Remedy Waterways Problems

a) By Holding Workshops on Municipal Waterway Clean-up Activities

In 1994, the City of Fort Lauderdale, Broward County, City of Wilton Manors, Independent Drainage Districts, Florida Marine Patrol and other governmental and municipal entities who operate waterways maintenance departments, inspect the waterways and remove trash and debris met. DPEP coordinated an effort to expand and modify this activity through development of a Best Management Practices (BMP) Program for municipalities. The objective of the BMP program was to instruct personnel on the identification of illegal discharges and on proper reporting procedures. An outline of a BMP was presented to municipal workers at a workshop to discuss methods and on-going activities. This effort was intended to improve the maintenance of the New River.

b) By Encouraging the Installation of Pump-outs at Public Facilities

To help facilitate the reduction in sewage in discharges in inland waters, the State of Florida has developed a Clean Vessel Act grant program to fund marine pump out facilities in areas of the State, including Broward County, which have been identified as having severely degraded water quality due to sewage discharges from boats. The State program provides guidelines that encourage public/private partnerships through innovative matching programs, for local governments and private marinas to apply for funding for renovation, construction, operation and maintenance of pump-out and waste reception facilities. A number of the marinas in the New River have been outfitted with pump out stations including Fort Lauderdale Marina and Cooley's Landing.

Objective 5: To Focus Media Attention on the River and Its Restoration

Media involvement has been a critical part of making the New River Restoration Plan a success. Media attention has taken numerous forms. In 1994, the Waterway Clean-up site at Sweeting Park in the North Fork was featured in the Sun Sentinel. The weekly magazine *The New Times* ran a lengthy article on the New River clean up in the spring 1997. The New River has been the topic of a public TV program entitled "Environmental Dimensions" . The history and restoration efforts were featured in a PBS program called "New Florida" in 1997. NBC Channel 6 and local newspapers covered Dillard High School student participation in the Franklin Park Shoreline Revegetation Pilot Project. In the spring of 2000, the trash and debris clean-up was covered by the Florida News Network and the Miami Herald. DPEP's quarterly outreach brochure "Update" featured New River

activities in Jan 1998. Florida Inland Navigation District Funds were used to develop two educational videos on the New River and Intracoastal Waterway. Sun-Sentinel was expected to featured the North Fork in a Sunday news article in December 2000.

In the August 1997, Earthwise Productions, through a grant from DPEP and SFWMD, coordinated a group of minority photographers and videographers to create a photo-documentary of "A Day in the Life of the North Fork". The photo series captured the daily activities along the waterway to educate the community about the river. The collection has been displayed in public venues such as Delevoe Park, Broward County Main Library and Anne Kolb Nature Center.

Objective 6: To Improve the Quality of Storm Water Runoff Through NPDES

The Broward County Code provides regulations that satisfy the compliance with the NPDES Permit required by the USEPA. The permit application requires documentation of structural/source controls for pollutant loadings, identification of illicit discharges and their control, and development of programs to monitor and moderate pollutant loads from municipal landfills, hazardous facilities, and construction sites. Finally, the permit requires development of a management strategy and implementation requirements. Identification of major storm water outfalls and documentation of major characteristics was completed for the initial permit application which involved 26 municipalities and Florida Department of Transportation. Storm drain testing continues as part of the permit which was granted in December of 1996.

V. FUTURE EFFORTS

DPEP continues its commitment to the restoration efforts on the New River. Appendix C contains an update of the New River Restoration Plan for the year 2000 and beyond. The outlined activities for the next five years address the water quality and public perception concerns on the river. Through these efforts we hope to meet our mission to maximize and protect the natural resources of Broward County and to help achieve the Broward Urban River Trail's vision of the New River as a recreational, environmentally healthy and culturally diverse asset to the community.

Since 1996, the State has made four appropriations, totaling $1.05M, to enable Broward County to implement a multi-phase improvement project along the North Fork. The following environmental restoration work is included in an Agreement between Broward County and the South Florida Water Management District for completion by September 2002:

- Dredging;
- Shoreline Revegetation Master Plan;
- Shoreline restoration on public lands;
- Water quality/flow improvements;
- Removal of accumulated debris (including Adopt-A-Waterway);
- Community outreach; and
- Continued support for Broward Urban River Trails (BURT).

Most of the project funding has been allocated for dredging ($550,000), which is to be completed in two phases. Two priority areas, to be dredged in mid-2001, are:

Site 1 - Removal of shoal between Argyle Canal and Broward Blvd., and

Site 2 - Spot dredging of sediment at storm water outfalls between Sistrunk Blvd. and Martin Luther King Jr. Ave.

Subsequently, remaining areas between the S-33 Structure and the City limits will be surveyed and spot dredged by DPEP in 2002. In addition, the City of Fort Lauderdale will be undertaking additional dredging projects within their municipal limits during 2001 (See Figure C-2 in Appendix C).

The second major component is shoreline restoration ($233,000). This includes a Revegetation Master Plan, design and revegetation work, which is limited to publically owned properties along the river. This project started in October 2000, with an ecological survey of the river. Completion of the restoration master plan will result in the identification of specific restoration sites. Following a period for design and permitting, planting and construction of the improvements is scheduled to occur in 2002.

A third part of the project is a Water Quality/Flow Study ($75,000), to determine whether the addition of more fresh water into the river would have a positive impact on water quality. A pilot project, with release of water over a four-week period, is being planned for 2001.

Community Outreach projects ($75,000) focus on developing stewardship of the river, through environmental education, public meetings, constructing a kiosk in Delevoe Park, and conducting a brownfields visioning workshop. A series of bi-monthly meetings with residents from communities surrounding the North Fork has been initiated. Debris removal ($42,000) includes a trash cleanup project (implemented in May 2000) and the Adopt-A-Waterway project, which involves neighborhood participation.

VI. SUMMARY

Through implementation of the New River Restoration Plan Update, we move one step closer to enhancing the value of the New River for the citizens of Broward County. By focusing on specific environmental problem areas in the New River basin and implementing precise management strategies, the water quality will improve and biological diversity will be increased. With community-wide commitment to resource protection and restoration, next steps in New River Restoration will be successful. To date we have laid the groundwork to begin the largest and most ambitious steps in the restoration process. Dredging, shoreline enhancement and storm water treatment improvements should have significant and noticeable impact on the New River environment.

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Appendix A

ACHIEVEMENTS OF THE NEW RIVER RESTORATION PLAN

ACHIEVEMENTS OF THE NEW RIVER RESTORATION PLAN
(December 1, 2000)

OBJECTIVE	PERFORMANCE OBJECTIVE	COMMENTS
	North Fork	
1	***Improve Flow Characteristics***	
1a	*Perform Computer Simulations of North Fork to Determine Optimal Flow*	The amount of freshwater needed to overcome salt water intrusion was preliminarily determined to be unfeasible (1994).
1b	*Propose Regulatory Flow Changes on the North Fork to SFWMD*	In the fall of 1996, DPEP asked SFWMD for additional water quality information prior to considering our flow proposal pilot project.
1c	*Conduct a Cost/Feasibility Study for Internal Pumping/Aeration*	Aeration was not feasible through the City of Fort Lauderdale plant (1995).
1d	*Produce Report Detailing Flow Options and Costs*	Proposal detailing increasing flow from C-12 was shown to SFWMD
2	***Reduce Sludge and Contaminant Load in Sediments***	
2a	*Review Sludge Blanket Data/Options*	DPEP performed chemical analysis of sludge. CH2M Hill performed detail survey of bottom contours for dredging in September 1994.
2b	*Propose Action Plan*	Plan was completed prior to release of The New River Restoration Plan.
2c	*Implement Action Plan*	The City of Fort Lauderdale with DPEP and FDOT applied for funds through Florida Coastal Management Program in December 1994. Sludge blanket removed in summer 1997. At that time, petroleum contaminated sediments were also removed from the Argyle Canal.
3	***Improve Water Quality***	
3a	*Prepare Literature Review on Removal of Suspended Particulates in Riverine Environments*	Other options were pursued in place of doing this literature survey.
3b	*Collaborate with Ft. Lauderdale on Determining Feasibility of Re-commissioning Treatment Plant*	This option was found not to be feasible. Ft. Lauderdale plant was demolished.
3c	*Produce a Report on Findings*	
3d	*Implement Report Recommendations*	
3e	*Identify and Sample 'Clean' Storm Sewer System*	Completed prior to release of The New River Restoration Plan
3f	*Analyze 'Clean" Sample Data and Provide Interpretations*	Completed prior to release of The New River Restoration Plan
3g	*Convene a Workshop to Present Bacteria Data*	Completed prior to release of The New River Restoration Plan
3h	*Prepare a Scope of Work for Future Testing*	A variety of testing programs have since been developed and implemented.

ACHIEVEMENTS OF THE NEW RIVER RESTORATION PLAN
(December 1, 2000)

OBJECTIVE	PERFORMANCE OBJECTIVE	COMMENTS
3i	*Conduct Nighttime and/or Rainy Season Inspections of Waterways*	This activity was not pursued.
4	***Enhance Biological Function***	
4a	*Conduct Literature Survey of Macrophyte Restoration*	In house review completed summer 96.
4b	*Conduct Workshop to Discuss Alternatives*	In house review conducted to determine which plants were appropriate for a pilot shoreline enhancement project.
4c	*Implement Recommendations*	As part of the Broward County Comprehensive and Neighborhood Planning Franklin Park Enhancement Plan, a shoreline restoration pilot plot was established in this neighborhood in Sept 97. A 1000 yard of shoreline in the Franklin park neighborhood was regraded, nonnative plants removed and replaced by native plants.
	Las Olas Isles Area	
1	***Improve Water Quality***	
1a	*Water Quality Testing*	DPEP continues monthly monitoring of fecal coliform bacteria in the Isles.
1b	*Re-assessment of Water Quality 1 yr. From Adoption of Live-Aboard Ordinance*	The 1993 City of Fort Lauderdale ordinance requiring property owners to provide dock space renters access to sanitary sewer facilities proved ineffective.
1c	*Provide Plan Review on Pump out Installation*	DPEP was instrumental in the passage of an ordinance by the City of Fort Lauderdale in May 1997 requiring property owners to install pump out facilities and to permanently connect docked boats to sewers.
1d	*Develop a County-wide Vessel Inspection Program*	DPEP is pre-empted by state and federal law from performing inspections.
1e	*Prepare Groundwater Assessment and Action Plan*	DPEP worked with the City to perform a ground water assessment in the Isles. No fecal coliform was found in the groundwater.
	South Fork	
1	***Remediate South Fork Sediment Contamination***	
1a	*Implement a Best Management Practices Program*	Marine BMP first drafted 1/92. BMPs were updated in 1999.
1b	*Perform a Mailout of BMP Procedures to Reiterate Compliance*	Pollution prevention inspectors provide BMP information and brochures to marina operators in 1999 and 2000. A mail out was performed in 2000 to all marinas and provided on demand.
1c	*Follow-up Inspections to Verify Compliance with the BMP Program*	Marine facilities are inspected once a year.

ACHIEVEMENTS OF THE NEW RIVER RESTORATION PLAN
(December 1, 2000)

OBJECTIVE	PERFORMANCE OBJECTIVE	COMMENTS
1d	*Document BMP Success/Failure*	Completed prior to release of Restoration Plan
1e	*Begin Collection of Sediments Throughout the New River Basin for Toxicity Testing*	Collections made spring 1994.
1f	*Report Results of Sediment Sampling*	Technical document 97-05 published in Dec -97.
	Intracoastal Waterway	
1	***Improve water quality***	
1a	*Conduct Literature Survey of Landscape Alternatives That Improve Storm Water Runoff Water Quality*	Completed in June 96.
1b	*Produce Technical Bulletin on Landscape Alternatives*	Document drafted in October 96.
	Area Wide Objectives and Action Plans	
1	***Increase Awareness of Water Protection Through Public Education***	
1a	*Financially Co-sponsor the Waterways Cleanup*	DPEP has been a major sponsor of the Marine Industry of South Florida annual Waterway Clean-up since 1994.
1b	*Provide Staff Assistance and Help Coordinate Public Participation for Cleanups*	DPEP staff has acted as the site coordinator for a North Fork site since 1994.
1c	*Continue Meetings with Communities Through Outreach Participation Programs*	Presentations related to the Earthkeepers Program (1997), Environmental Justice Grants (1998) and other educational programs have been made and continue.
1d	*Develop a Brochure to Encourage Efforts to Keep the River Clean*	"Do a number on cleaning up the New River" brochure developed prior to release of the New River Restoration Plan.
2	***Develop a Partnership with Local Leaders to Restore the River***	The City of Fort Lauderdale, SFWMD, Broward Urban River Trails (BURT), State Representative Joe Eggelletion, City of Fort Lauderdale Commissioner Carlton Moore and Broward Beautiful have participated in the effort.
2a	*Provide Financial Assistance to Develop the Program Plan*	Financial assistance has been provided to Broward Beautiful and the BURT.
2b	*Provide the Use of DPEP Technical Expertise and GIS Services*	Ongoing effort included interactions with BURT, the City of Fort Lauderdale's Blue Ribbon Task Force, and SFWMD.
2c	*Coordinate Assigned Plan Objectives*	DPEP has coordinated with a variety of agencies and government representatives to receive funding and begin implementing the plan.
2d	*Provide Office Space and Supplies*	BURT offices were provided through 1999. Broward Beautiful offices are housed at the DPEP facility.

ACHIEVEMENTS OF THE NEW RIVER RESTORATION PLAN
(December 1, 2000)

OBJECTIVE	PERFORMANCE OBJECTIVE	COMMENTS
3	***Increase Public Participation in Identifying Waterway Problems***	
3a	*Produce a Public Information Announcement Describing the New River Clean Water Hotline*	An emergency response hotline 519-1499 was established.
3b	*Track Public Response to the Clean Water Hotline*	Records are kept on the type of calls and the response.
3c	*Evaluate the Success of the Hotline and Make Changes as Needed*	The hotline procedures are reviewed and modified as appropriate.
4	***Increase Governmental Cooperation to Remedy Waterways Problems***	
4a	*Identify Funding Sources for Waterway Cleanup Efforts*	DPEP Pollution Recovery Fund used to fund these efforts.
4b	*Identify Components of a BMP Program for Waterways*	This was part of literature review for the original BMP compilation.
4c	*Produce a BMP Document*	An outline was produced and discussed at workshop.
4d	*Convene a Waterways Management Workshop to Outline the BMP Program*	DPEP held a workshop with local utilities to discuss government supported water way maintenance methods.
4e	*Review BMP Programs and Make Changes as Needed*	Program not pursued following first workshop.
4f	*Convene a 2nd Waterways Management Workshop*	Program not pursued following first workshop.
5	***Focus Media Attention on the River and Its Restoration***	
5a	*Provide New Information of Interest on the New River on a Monthly or Quarterly Basis*	The New River has been the topic of a public TV program entitled “Environmental Dimensions, featured in a PBS program called New Florida and highlighted in DPEP’s quarter outreach brochure “Update”. Numerous presentations on New River Restoration have been made to the community.
5b	*Develop a Quarterly Newsletter to be Made Available to the Community*	In 1998, DPEP began publishing a quarterly newsletter. The New River Restoration was the first feature article.
6	***Improve the Quality of Storm Water Runoff Through the US EPA’s National Pollution Discharge Elimination System Program***	
6a	*Identify Major Storm Water Outfalls and Document Major Characteristics*	This work was completed prior to release of the New River Restoration Plan. In 1998, DPEP also produced a storm water outfall GIS coverage.
6b	*Develop Storm Water Management Plan and Submit to USEPA*	This work was completed prior to release of the Restoration Plan.
6c	*Implement the Management Plan After NPDES Permit Approval*	Permit became effective December, 1996.

Appendix B

ACHIEVEMENTS BEYOND THE ORIGINAL NEW RIVER RESTORATION PLAN

ACHIEVEMENTS BEYOND THE ORIGINAL NEW RIVER RESTORATION PLAN

OBJECTIVE	PERFORMANCE OBJECTIVE	COMMENTS
	North Fork	
1	***Improve Flow Characteristics***	
1a	*Complete water quality analysis to determine if increased flow from the west could improve water quality in the North Fork*	A fine scale water quality analysis was performed in 1998-1999. The results showed that water from the west could improve the North Fork water quality.
1b	*Propose a pilot project to increase flow over the S-33 structure on the North Fork to South Florida Water Management District*	Pilot project has been proposed and funded (fall 2000).
1c	*Secure funds to design, survey and permit dredging of the shoal south of Broward Boulevard*	A Florida Inland Navigation District grant ($37,000) was secured in December 1997 (see 2b below and Figure C-2).
1d	*Design and permit a dredging project to remove shoaled sediments just south of Broward Boulevard*	Design and survey work was performed in 2000. Permits were submitted but had not been issued at the time of this publication.
2	***Reduce Sludge and Contaminant Load in Sediments***	
2a	*Initiate a study to look a reestablishment of the benthic community in the vicinity of the sludge blanket to determine if the quality of sediments and habitat has improved*	Macroinvertebrate study was conducted in 1999. Sediments collected at the sludge blanket removal site over the period of one years showed a re-colonization of the sediments by normal fauna.
2b	*Secure funds to design, survey and permit dredging of the project to spot dredge areas between NW 31 Ave and Sistrunk Boulevard*	A Florida Inland Navigation District grant ($37,000) for this purpose was secured in December 1997 (see 1c above).
2c	*Design and permit a dredging project to spot dredge areas between NW 31 Ave and Sistrunk Boulevard*	Design and survey work was performed in 2000. Permits were submitted but had not been issued at the time of this publication.
3	***Improve Water Quality***	
3a	*Implement NPDES Permit*	On-going
3b	*Improve storm water quality entering the river by implementing the Central County Improvement Project*	Broward County Office of Environmental Services has begun a $70 million project to improve storm water treatment systems and make other infrastructural improvements in the North Fork neighborhoods. The City of Fort Lauderdale has implemented similar improvements in the Dorsey River Bend area.
3c	*Identify upstream sources of pollution loading into the sediments using outfall and catch basin geographic information system coverage*	A storm water outfall geographical information system coverage of the stormdrains leading into the North Fork was generated in 1997.
3d	*Support the City of Fort Lauderdale's efforts to implement the recommendations of the Blue Ribbon Task Force*	DPEP continue to participate in this effort.
3e	*Monitor the mandated sewer hook up of live-aboard boats on North Fork.*	On going

ACHIEVEMENTS BEYOND THE ORIGINAL NEW RIVER RESTORATION PLAN

OBJECTIVE	PERFORMANCE OBJECTIVE	COMMENTS
3f	*Encourage comprehensive planning for the conversion of septic systems to sewer and integrated lift station installation in areas draining to the North Fork*	The City of Fort Lauderdale has converted a portion of the Sailboat Bend area and the Tarpon River Area from septic to sewer. The Central County Improvement Program with sewer areas in the western North Fork basin.
3g	*Contract to have accumulated debris removed*	Frank Hill Construction removed 1900 bags of debris from the North Fork river banks in April/May 2000.
3h	*Continue to expand and promote the Adopt a Waterway Program in the North Fork*	This program was funded in June 1999. Efforts are underway to expand it.
3i	*Take enforcement action against illegal discharges of sewage to the North Fork.*	In 1993, several enforcement actions were taken to stop illegal discharges.
3j	*Investigate alternative indicators of sewage pollution*	DPEP developed its own assay to differentiate between human and nonhuman fecal coliform bacteria (Technical Report 98-01). DPEP commissioned a literature review of available indicators of fecal coliform pollution (Technical Report 96-06).
3k	*Participate in the City of Fort Lauderdale's Blue Ribbon Task Force.*	DPEP staff has provided technical information, support and scientific oversight to the Task Force.
4	***Enhance Biological Function***	
4a	*Monitor the shoreline revegetation pilot plot at Franklin Park*	The progress of the plots where monitored by DPEP, Dillard High School and Florida Atlantic University students.
4b	*Pursue funds for the Shoreline Master Plan from the Army Corps of Engineers as part of the Everglades Restoration Critical Projects program*	DPEP advocated for federal dollars to help restore the North Fork. While the project has been approved, priority for funding has been granted to other projects.
4c	*Plant native vegetation*	Through the DPEP Tree Trust Fund, new trees were planted at Delevoe Park and at the Franklin Park neighborhood shoreline enhancement area.
4d	*Remove non-native or invasive vegetation*	The City of Fort Lauderdale removed vegetation from the river just north of Broward Boulevard. The SFWMD has aided in reducing the impact of common reed at Lafayette Hart Park. DPEP worked with SFWMD to find staging areas for removal of *Hygrophila*, an aquatic weed. An appropriate site could not be found.

ACHIEVEMENTS BEYOND THE ORIGINAL NEW RIVER RESTORATION PLAN

OBJECTIVE	PERFORMANCE OBJECTIVE	COMMENTS
	Las Olas Isles Area	
1	***Improve Water Quality***	
1a	*Continue water quality monitoring*	Monitoring continues on a monthly and quarterly basis.
1b	*Conduct compliance reviews of the 1997 Marine Sanitation Ordinance*	Monitoring has been performed on a quarterly basis.
	South Fork	
1	***Remediate South Fork Sediment Contamination***	
1a	*Encourage the City of Fort Lauderdale efforts to dredge the South Fork .*	The City of Fort Lauderdale dredged the South Fork of the New River from SW 32 Ave to Port Everglades over several years. The City removed 34,600 cubic years of sediments.
	Intracoastal Waterway	
1	***Improve water quality***	
1a	*Pursue ways to encourage pumpout use by party and dinner cruise vessels*	DPEP worked with the City of Fort Lauderdale to determine compliance of the large cruise vessels with sewage pumpout requirements.
	Area Wide Objectives and Action Plans	
1	***Increase Awareness of Water Protection Through Public Education***	
1a	*Develop educational programs for the public*	A Florida Inland Navigation District grant was used to develop educational materials and videos to teach the public about the Intracoastal Waterway. The program included 25 free tours of the New River loop on the Water Taxi.
1b	*Make presentations to increase the awareness of the river.*	DPEP has been very active in providing presentations upon request. More than 12 have been given in the past five years.
1c	*Highlight restoration processes to professional organizations.*	A variety of presentations have been given to professional organizations as well as agencies at the local, state and federal levels.
2	***Develop a Partnership with Community, Business and Government Leaders to Restore the River***	
2a	*Provide financial assistance to support the Broward Urban River Trails Project*	DPEP has provided staffing and GIS support as well as financial support through grants to aid in this project.
2b	*Aid Broward Urban River Trails in generating funding for educational activities*	DPEP aiding in developing an Annenberg Challenge Grant to teach Stranahan High School students about the river.

ACHIEVEMENTS BEYOND THE ORIGINAL NEW RIVER RESTORATION PLAN

OBJECTIVE	PERFORMANCE OBJECTIVE	COMMENTS
2c	*Initiate a Volunteer Water Quality Network on the New River Loop with BURT*	Through the Environmental Committee of BURT, a DPEP staff member help launch the Volunteer Water Quality Network. Interested individuals monitor their stormdrains after rain events and report poor water quality.
2d	*Maintain DPEP's role as an advocate for the New River*	DPEP has provided boat tours of the river to politicians and agency staff at the local, state and federal levels to gain support and funding for the North Fork projects.
3	***Increase Public Participation and Stewardship of the New River***	
3a	*Educate local community members on environmental violations*	Between 1994- and 1997, 400 people were trained as "Earthkeepers".
3b	*Provide environmental education in disadvantaged neighborhoods*	DPEP implemented a USEPA Environmental Justice Grant. Programs included a series of workshops on proper handling of household hazardous materials, after school "Earthdays", planting of trees to reduce energy bills, and canoeing trips on the river for high school students.
3c	*Prevent the dumping of chemicals into storm drains leading to the North Fork.*	In 1997, DPEP partnered with SFWMD and the City of Fort Lauderdale to epoxy labels on storm drains to increase awareness of the destiny of fluids put in storm drains.
4	***Increase Governmental Cooperation to Remedy Waterways Problems***	
4a	*Enter into joint projects related to restoration*	DPEP has partnered with SFWMD and the City of Fort Lauderdale on many projects such of reducing debris in the river, grant applications for land acquisition, and nonnative vegetation removal.
5	***Focus Media Attention on the River and Its Restoration***	
5a	*Provide press releases to keep the public informed on the progress of the New River Restoration Plan Update*	DPEP staff provided technical information for numerous articles published in The New Times and the Sun-Sentinel. We also had press releases on major events such as the debris removal project and clean-up and volunteer events.
5b	*Support local journalists efforts to bring attention to the New River*	DPEP co- sponsored "A Day in the Life of the North Fork" - a minority photographers view of daily activities on the waterway.
6	***Improve the Quality of Storm Water Runoff Through NPDES***	
6a	*Renew NPDES permit in 2001*	On going efforts.

Appendix C

NEW RIVER RESTORATION PLAN
FUTURE ACTIVITIES

New River Restoration Plan Future Activities

OBJECTIVE	PERFORMANCE OBJECTIVE	TARGET COMPLETION DATE
	North Fork	
1	***Improve Flow Characteristics***	
1a	*Conduct a pilot project to increase flow on the North Fork and analyze data*	Jan 02
1b	*Propose regulatory flow changes on the North Fork to SFWMD*	Apr 02
1c	*Perform the dredging of the shoal south of Broward Boulevard to the Argyle Canal (Figure C-2 - Site 1)*	Aug 01
2	***Reduce Sludge and Contaminant Load in Sediments***	
2a	*Perform outfall and spot dredging between Sistrunk and NW31st Ave*	Aug 01
2b	*Design and permit a dredging project to spot dredge areas west of NW 31st to the S-33 structure (Figure C-2 - Site 3 and 4)*	Dec 01
2b	*Spot dredge areas west of NW 31st to the S-33 structure*	Sep 02
3	***Improve Water Quality***	
3a	*Implement NPDES Permit*	on going
3b	*Encourage the City of Fort Lauderdale efforts to install a grit chamber on the 72 inch storm drain located north of Broward Boulevard*	Jun 01
3c	*Improve storm water quality entering the river by implementing the Central County Improvement Project*	ongoing
3d	*Continue to expand and promote the Adopt a Waterway program in the North Fork*	Oct 02
3e	*Support the City of Fort Lauderdale's efforts to implement the recommendations of the Blue Ribbon Task Force*	on going
3f	*Monitor the mandated sewer hook up of live-aboard boats on the North Fork*	on going
3g	*Encourage comprehensive planning for the conversion of septic systems to sewer and integrated lift station installation in areas draining to the North Fork*	on going
4	***Enhance Biological Function***	
4b	*Conduct a shoreline vegetation survey*	Dec 00
4c	*Conduct Workshops to discuss a community vision for the North Fork shoreline*	Dec 00 - Feb 001
4d	*Develop a shoreline revegetation master plan*	May 01
4e	*Begin to implement the shoreline revegetation master plan*	Oct 01
4f	*Continue to pursue funds from the Army Corps of Engineers as part of the Everglades Restoration Critical Projects program*	on going
	Las Olas Isles Area	
1	***Improve Water Quality***	
1a	*Continue water quality monitoring*	on going
	South Fork	
1	***Remediate South Fork Sediment Contamination***	
1a	*Follow-up inspections to verify compliance with the BMP program*	Dec 01
1b	*Develop a video of Best Management Practices for Marinas*	Dec 01
	Intracoastal Waterway	
1	***Improve water quality***	
1a	*Concentrate on upstream efforts to improve water quality entering the Intracoastal* Waterway	on-going

OBJECTIVE	PERFORMANCE OBJECTIVE	TARGET COMPLETION DATE
	Area Wide Objectives and Action Plans	
1	***Increase Awareness of Water Protection Through Public Education***	
1a	*Financially co-sponsor the Waterways Clean-up*	on going
1b	*Provide staff assistance and help coordinate public participation for Clean-ups*	March (annually)
1c	*Organize bi monthly meetings with communities to maintain awareness of ongoing activities and develop stewardship for the river*	North Fork workshops planned through Feb 02
2	***Develop a Partnership with Community, Business and Government Leaders to Restore the River***	
2a	*Provide the use of DPEP technical expertise and GIS services for BURT*	on going
2b	*Provide meeting space for BURT*	on going
3	***Increase Public Participation and Stewardship of the New River***	
3a	*Fund the BC Office of Economic Development's community visioning meeting*	Jun 02
3b	*Assist in developing a kiosk at Delevoe Park to provide educational materials and hand on activities related to community revitalization and restoration efforts on the North Fork*	Nov 01
3c	*Improve environmental compliance through promotion of pollution prevention and DPEP's Emerald Award in the business community*	annual
4	***Increase Governmental Cooperation to Remedy Waterways Problems***	
4a	*Coordinate regularly with the Broward County Office of Environmental Services, SFWMD and City of Fort Lauderdale on New River issues*	on going
5	***Focus Media Attention on the River and Its Restoration***	
5a	*Submit articles to local newspapers to keep the public informed on the progress of the New River Restoration Plan*	Feb 02
6	***Improve the Quality of Storm Water Runoff Through NPDES***	
6a	*Renew NPDES permit in 2001*	Dec 01

Figure C-1. CONCEPTUAL NORTH FORK PROJECT SCHEDULE.

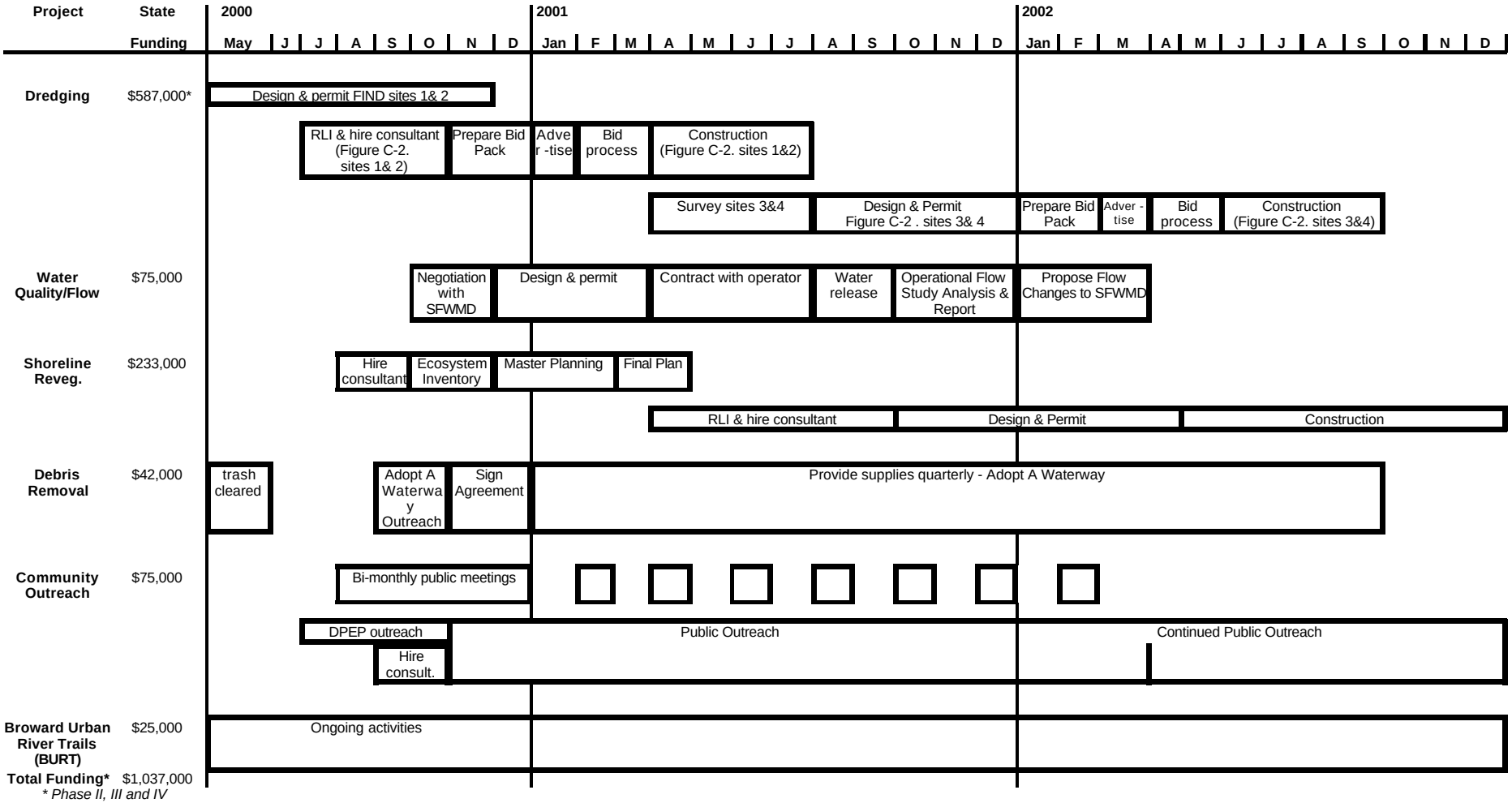
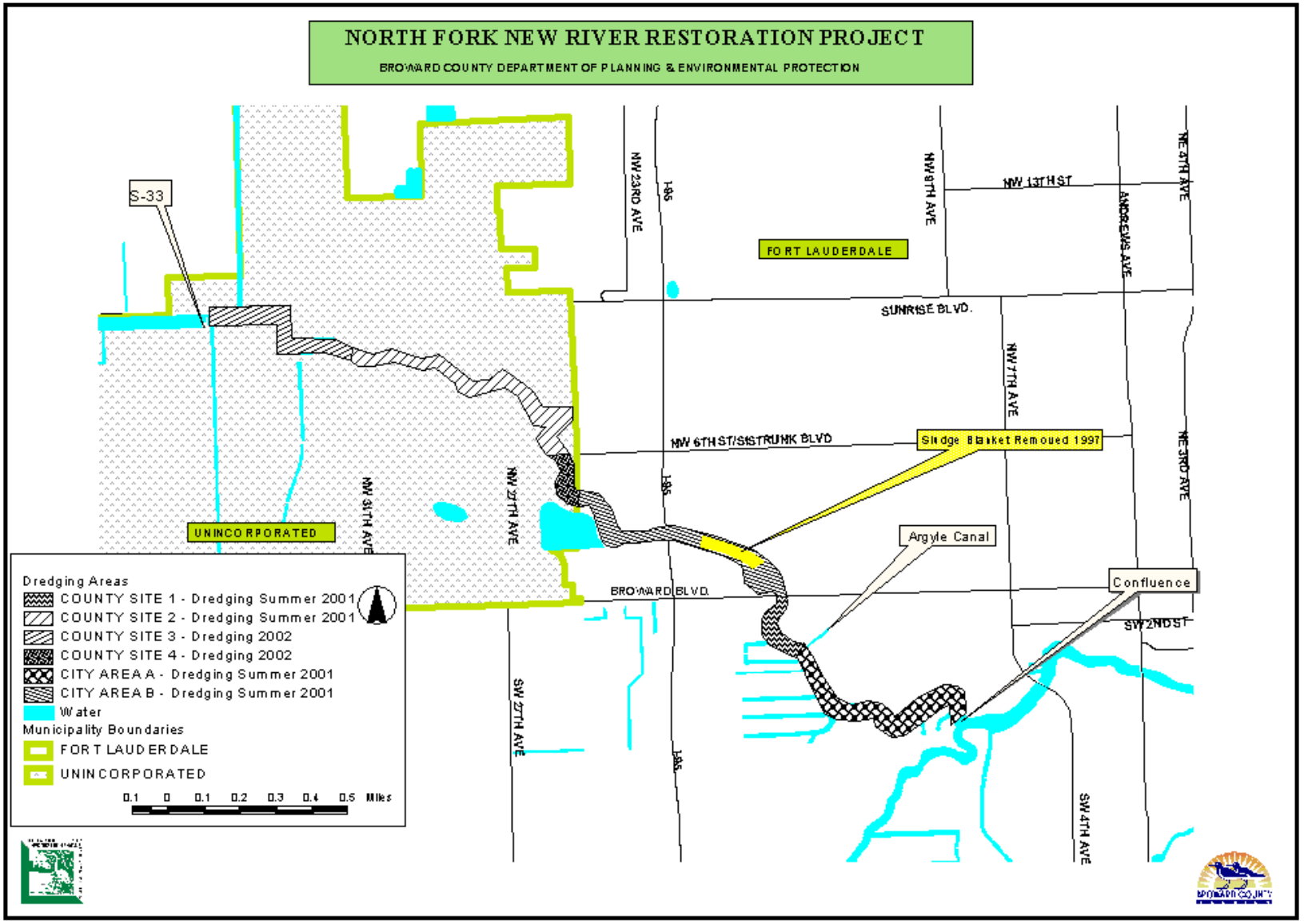


Figure C-2. North Fork Dredging Sites.



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11. ABSTRACT

The Department of Planning and Environmental Protection developed the New River Restoration Plan in 1994 following a study which identified and prioritized environmental issues associated with the New River. The current report reviews those environmental concerns, documents additional research of the problems, summarizes the achievements of the 1994 restoration plan and updates management objectives and action plans for future restoration activities. The management objectives include improving flow characteristics, reducing contaminant loads in sediments, improving water quality, enhancing biological function, increasing public awareness of water protection, developing a partnership with local leaders to restore the river, increasing public participation in identifying waterway problems, increasing governmental cooperation to remedy waterways problems, focusing media attention on the river and its restoration, and improving the quality of storm water runoff. A description of achievements of the plan as well as an action plan for future restoration activities is included.

12. KEY WORDS

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