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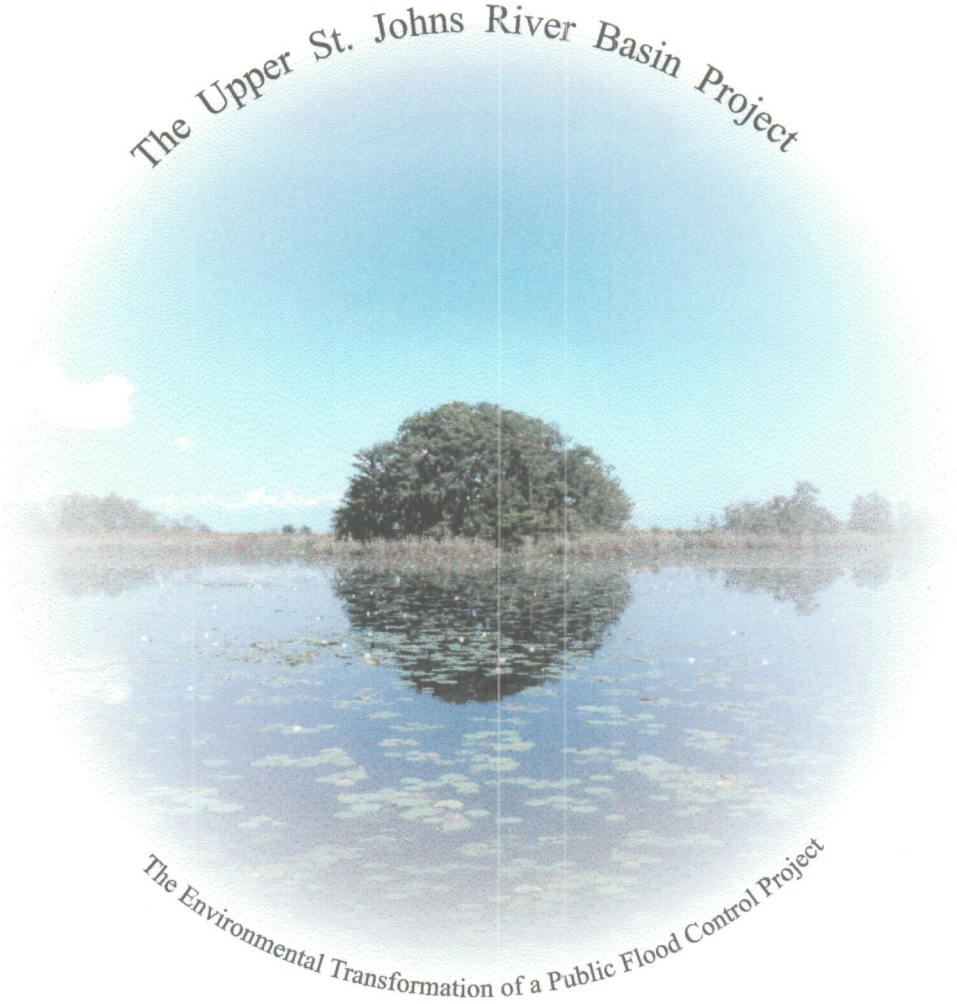


The Environmental Transformation of a Public Flood Control Project

Professional Paper SJ98-PP1

THE UPPER ST. JOHNS RIVER BASIN PROJECT

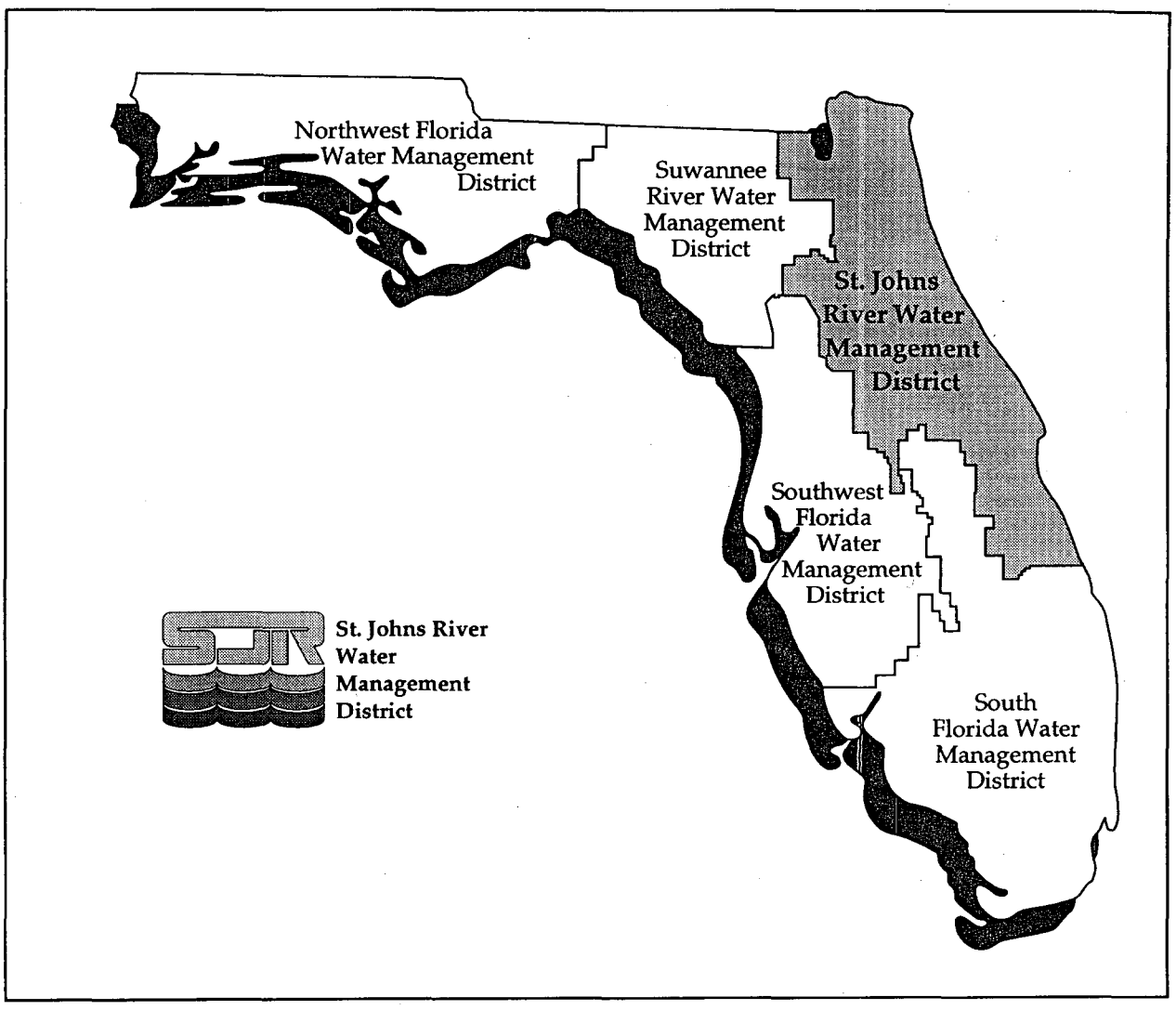
THE ENVIRONMENTAL TRANSFORMATION OF A PUBLIC FLOOD CONTROL PROJECT

by

Maurice Sterling
Charles A. Padera

St. Johns River Water Management District
Palatka, Florida

1998



The **St. Johns River Water Management District** (SJRWMD) was created by the Florida Legislature in 1972 to be one of five water management districts in Florida. It includes all or part of 19 counties in northeast Florida. The mission of SJRWMD is to manage water resources to ensure their continued availability while maximizing both environmental and economic benefits. It accomplishes its mission through regulation; applied research; assistance to federal, state, and local governments; operation and maintenance of water control works; and land acquisition and management.

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Professional Paper SJ98-PP1

The Upper St. Johns River Basin Project

The Environmental Transformation of a Public Flood Control Project

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St. Johns River Water Management District, Palatka, Florida

ABSTRACT

During the 1980s, the Upper St. Johns River Basin Project was transformed into a national model of modern floodplain management. The project is sponsored jointly by the St. Johns River Water Management District and the U.S. Army Corps of Engineers. With construction nearly completed, the project now represents one of the largest and most ambitious wetland restoration projects in the world.

Since the mid-1950s, the vast Central and Southern Florida Flood Control Project has included provision for major flood control works in the marshes of the Upper St. Johns River Basin. Changes in the late 1960s in the federal environmental arena, coupled with Florida's landmark water management and environmental legislation of the early 1970s, permanently altered the nature of what was once a conventional and highly structural flood control project.

The current Upper St. Johns River Basin Project is designed to balance the multiple uses of the river and to provide for major environmental habitat restoration and water quality protection benefits, while maintaining its primary mission of flood control. The project continues to evolve to meet both the ever-changing basin conditions and public demands. Because the current project relies more on a "semistructural" approach to managing the river as a natural ecosystem, the Upper St. Johns River Basin Project has been hailed as a sustainable model of water resources development and may well influence the course of future public water projects nationwide.

This paper tracks the dynamic transformation of this traditional federal flood control project to its current design and highlights how, as in the natural world, the project has changed in response to the need for successful adaptation and evolution.

INTRODUCTION

This paper traces the evolution of the Upper St. Johns River Basin (USJRB) Project, a joint flood control project of the St. Johns River Water Management District (SJRWMD) and the U.S. Army Corps of Engineers (USACE). The current project, under construction since 1988, was redesigned in the mid-1980s and subsequently refined in order to address several water management problems and environmental concerns. The current project plan reflects major design changes made since the original design was completed in 1957. This paper also presents detailed project information and current environmental factors that transformed the original project into a model for environmentally sustainable floodplain management.

The primary purpose of the project is flood protection; secondary project goals include environmental enhancement and water supply. The environmental objectives of the project are to preserve and restore freshwater marsh habitats, to improve water quality, and to decrease stormwater discharges to the Indian River Lagoon (interbasin diversion).

PROJECT AREA

The USJRB—part of which is the project area—is located in east-central Florida, extending

about 75 miles (mi) from the Florida Turnpike in southern Indian River County northward to Lake Harney in south Volusia County (Figure 1). The USJRB is a watershed 2,000 square miles (mi^2) in size and drains an area about the size of the state of Delaware. The St. Johns River starts in the USJRB, west of Vero Beach. There, water sheetflows across vast expanses of shallow marshes (Figure 2).

PROJECT HISTORY

In the late 1800s, ambitious pioneers waded deep into Florida swamps with survey rods and steam shovels, opening vast areas of the state's watery interior. Grand "reclamation" schemes of the day, however, were not limited to draining the Florida Everglades. Early plans also included water management "improvements" to control floods and drain extensive areas of the upper St. Johns River marshlands for agricultural production and private development.

A large drainage system in northwestern Indian River County was one of the first significant water management works constructed in the USJRB. A road grade and a drainage canal—the Fellsmere Canal—were constructed across the marsh to connect the hamlet of Fellsmere with the small outpost of Kenansville. Other canals followed, cutting through a low coastal land ridge that separated waters in the USJRB from the Indian River Lagoon—one of the most biologically diverse estuaries in North America. Through these canals, large amounts of freshwater were diverted from the St. Johns River watershed to the Indian River Lagoon and the Atlantic Ocean. As more dikes were constructed and large pumping stations were installed to meet private flood protection needs, thousands of acres of nutrient-rich floodplains were opened for agricultural production (Figure 3).

Over the past several decades, a significant loss of historical floodplain marsh in the USJRB resulted in major flooding and water quality problems. At the turn of the century, the 405,000-acre (ac) floodplain of the St. Johns River was a broad shallow marsh (Figure 4). Within seven decades, however, about 70% of those fertile wetlands had been converted into agricultural fields to support the production of citrus, row crops, and beef cattle. Loss of wetland habitat due to floodplain encroachment practices (e.g., farming) greatly reduced floodplain storage and conveyance capacity in the river and severely altered the natural hydrologic and ecological regime of the marsh ecosystem. The impact of lost floodplain storage and conveyance capacity was especially acute after major storms in the 1920s and 1940s resulted in devastating floods in the central and southern parts of Florida. Thus, the need for a massive flood control project became important during the 1940s.

The history of modern public flood control projects in Florida formally began in 1948 when the U.S. Congress authorized the Central and Southern Florida Flood Control Project and the Florida Legislature created the Central and Southern Florida Flood Control District (CSFFCD) to act as the local sponsor for the federal flood control project. The original congressional act, which did not include areas within the USJRB, was amended in 1954 to include project works within the USJRB portion of the larger flood control project. In coordination with the CSFFCD, the USACE Jacksonville District prepared a project plan that was completed in 1957. A modified plan was adopted in 1962, and initial construction of the project began in 1966.

Under the 1962 plan, flood stages would be reduced in the upper reaches of the St. Johns River by diverting large amounts of water during major storm events from the St. Johns River to the Indian River Lagoon via the C-54 canal (Sebastian Canal) (Figure 5). Downstream of C-54, flood stages would be attenuated by the detention and storage of surface water runoff in large upland reservoirs located west of the river valley. By 1969, the C-54 canal was fully operational and a major upland levee and reservoir system (L-73 and associated structures) was near completion.

Passage of the federal National Environmental Policy Act of 1969 required that an Environmental Impact Statement (EIS) be prepared for federally funded water projects. In 1970, USACE began preparation of the required EIS for the USJRB Project. Early findings indicated potentially serious adverse environmental impacts, and in 1972 construction within the USJRB was halted pending completion of a more comprehensive EIS. The state of Florida

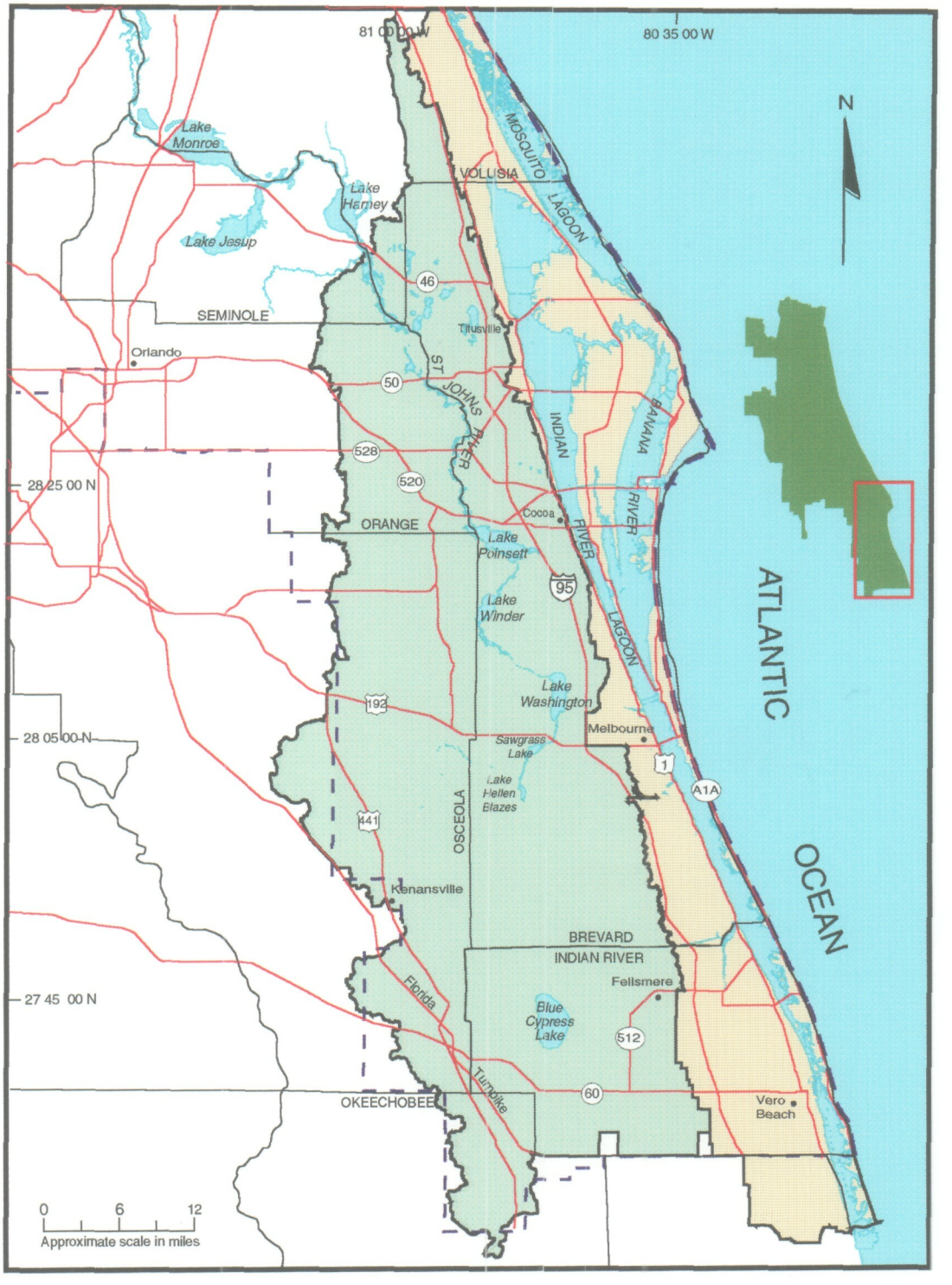
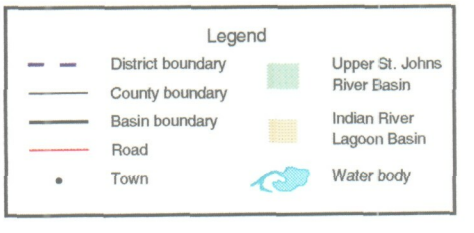


Figure 1. Location of the Upper St. Johns River Basin. *Located in east-central Florida, it drains approximately 2,000 square miles—a watershed the size of the state of Delaware.*



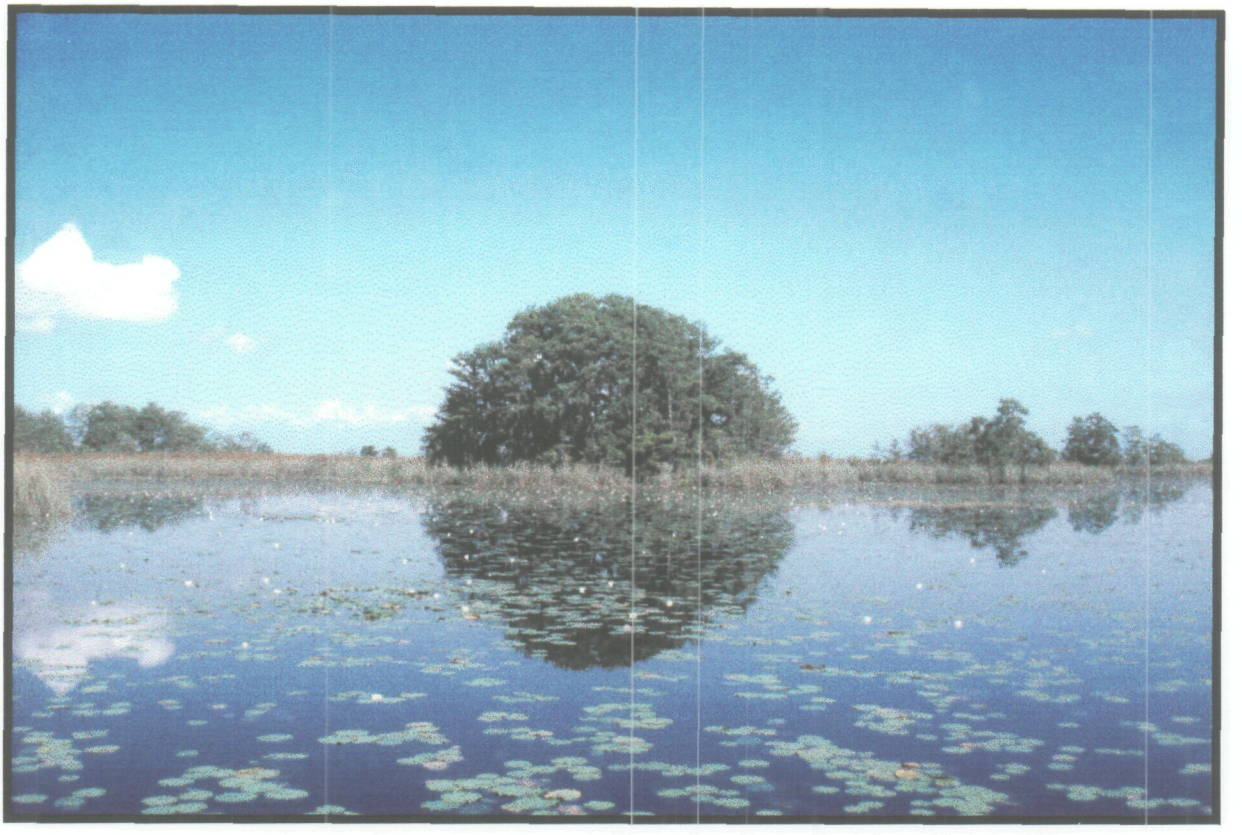


Figure 2. A cypress dome in the Upper St. Johns River Basin. *The river begins its slow migration to the sea, as water sheetflows across the vast expanses of shallow headwater marshes west of Vero Beach—the place where Florida's longest river is reborn every day.*

determined that the original project design was unacceptable because of the potential for significant environmental degradation to the upper St. Johns River ecosystem, and in 1974 the state withdrew its formal sponsorship of the project.

Environmental concerns included the potentially adverse impacts of large freshwater discharges to the Indian River Lagoon and the potential for severe water quality and habitat degradation both to the natural riverine marshes and to several large upland creeks and hardwood swamps. As a result, project construction was indefinitely suspended, but not before the project's primary flood control component—the 6,000-cubic feet per second-capacity C-54 canal—was fully operational and major flood control benefits to the USJRB agricultural interests were realized. The interim operational scheme for C-54 called for major freshwater releases to the Indian River Lagoon when water levels in the Blue Cypress Lake subbasin reached flood stage. Impacts of large stormwater discharges to the lagoon, although not fully documented in earlier years, are now understood to be detrimental to the lagoon's fragile ecosystem. It supports a thriving commercial shellfish industry, a sportfishing industry, and sea grasses.

In 1977, local sponsorship for the project was transferred from the CSFFCD to SJRWMD, which was established by Chapter 373, *Florida Statutes* (1972). SJRWMD completed an extensive reconnaissance report in 1979 describing the then-existing basin conditions. A citizens' advisory committee, whose members represented the various interests within the USJRB, worked with SJRWMD staff to develop a Basic Design Concept (BDC), which the SJRWMD Governing Board adopted in November 1980.

Figure 3. Typical levee system for a former floodplain. *Former floodplains encircled by levees were pumped dry to grow citrus or vegetables or to raise cattle.*

Reclaiming the Upper St. Johns River Marsh

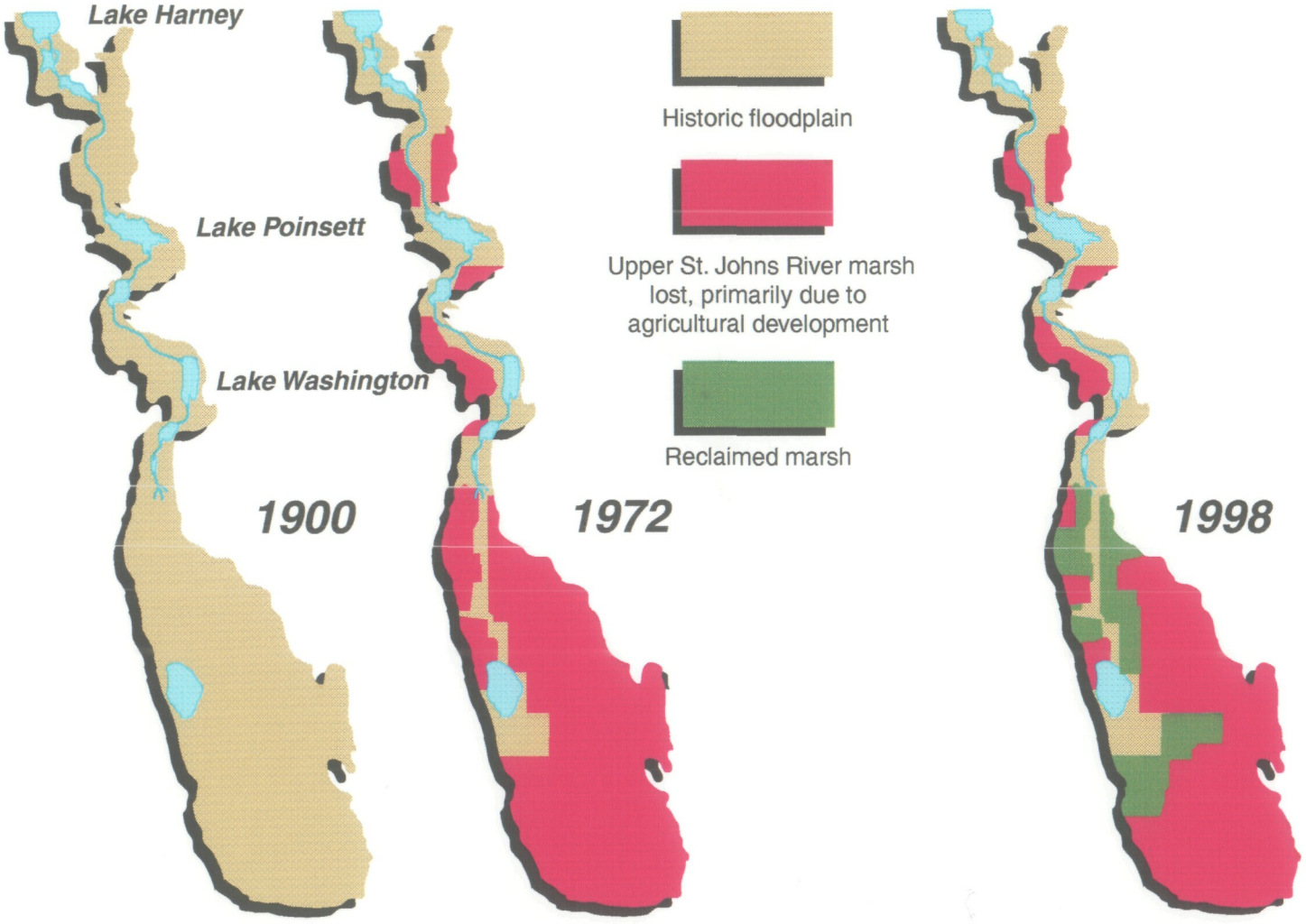


Figure 4. Extent and chronology of floodplain encroachment and reclamation. *By 1972, 62% of the marsh had been lost to agricultural development. By 1998, thousands of acres of former marsh have been reclaimed and reflooded.*

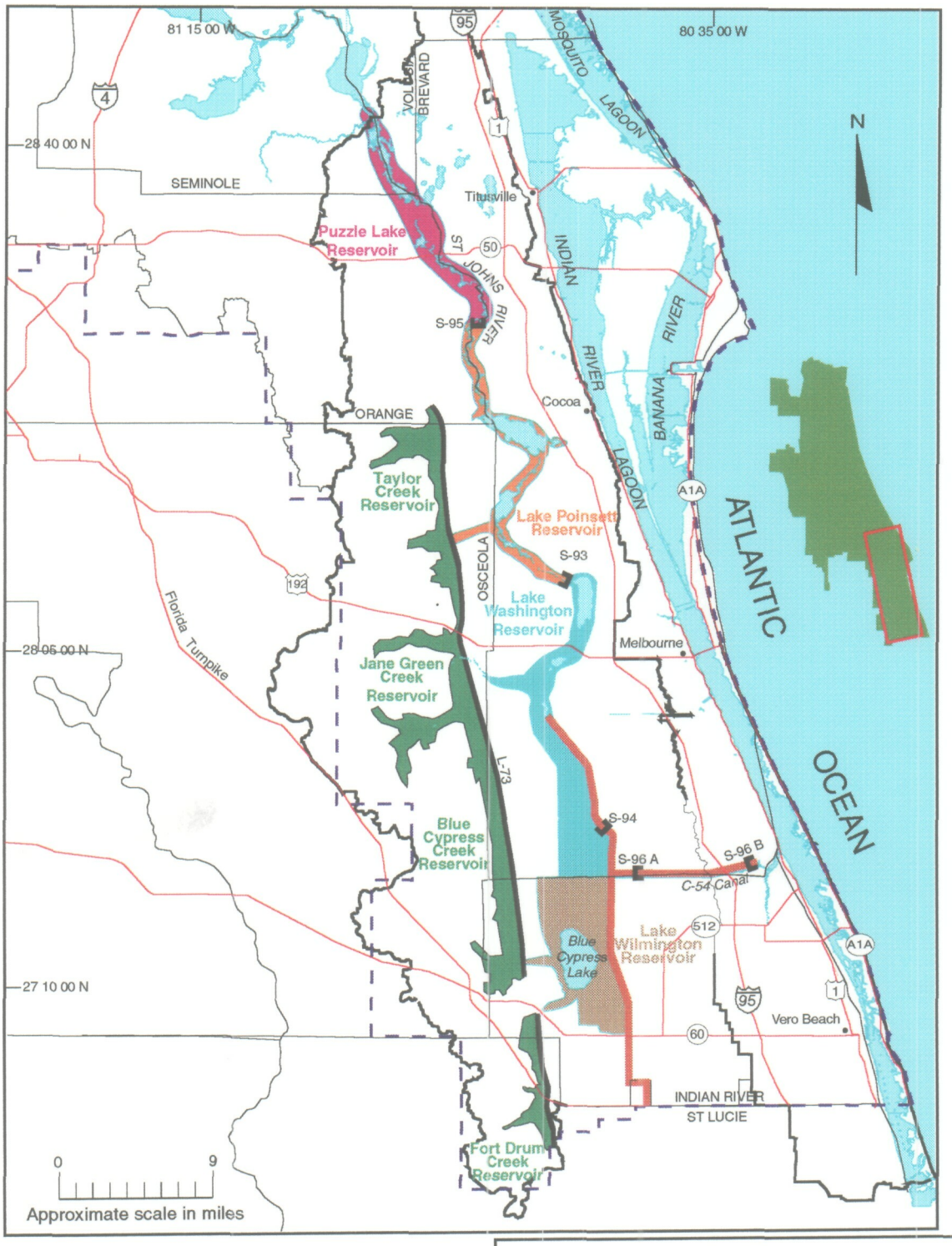


Figure 5. The 1962 plan—a structural project (modified from USACE 1962). *The project called for creating a channel in the floodplain, diverting floodwater eastward, and storing upland runoff in reservoirs.*

Legend

- District boundary
- County boundary
- Basin boundary
- Road
- Town
- Canal
- Levee
- Spillway or weir
- Water body

In 1982, USACE determined that a plan consistent with the BDC would be economically justifiable and warranted federal participation. After considering several alternative plans consistent with the BDC, the SJRWMD Governing Board adopted a plan in February 1983 and requested that USACE prepare a project plan and EIS. The current plan (including the EIS) was released in June 1985. The plan was approved by USACE's Chief of Engineers in August 1986. Since the plan was approved, the project design has been modified to meet local sponsor requirements. These changes are reflected in detailed engineering plans prepared by USACE prior to construction of each planned project component. The current project reflects these design changes (Figure 6).

Passage and subsequent legal interpretation of the federal Water Resources Development Act of 1986 delayed the start of construction and resulted in a new funding arrangement for the project whereby the federal government assumed responsibility for all construction costs for project flood control and water conveyance elements. Construction of the current project began in May 1988. A phased implementation of the project will be accomplished over about 12 years.

PROJECT PLANNING

A hydrologic simulation computer model—the Upper St. Johns Hydrologic Model—was developed by SJRWMD to enable water managers to plan and manage the project, as well as to assess current and future project performance. Hydrologic simulations of water resources systems are an essential tool not only for planning and managing multipurpose projects, but also for developing criteria for water-related environmental benefits.

Extensive hydrologic simulations were performed to generate hydrologic information not available from historical data. This information was needed (1) to balance flood control and water supply benefits and (2) to maximize environmental benefits by proper management of the project's four marsh conservation areas (MCAs) and two water management areas (WMAs). The model was used to generate 76 years of daily stage and streamflow data for the USJRB under historical (undeveloped), preproject (then-existing), and project conditions. These simulation results provided a basis for determining guidelines for management and control of water levels and discharges in each plan component.

The model consists of two main elements, a rainfall-runoff simulation routine and a routing routine. The rainfall-runoff routine takes into account evapotranspiration and continuously simulates soil moisture, surface retention, base flow, and surface runoff by applying water balance methods. For routing mainstream discharge, the upper St. Johns River—including its entire floodplain from the Florida Turnpike to State Road 46—was divided into 12 hydrologic reaches, including 60 subbasins. Five of the river reaches lie upstream of U.S. Highway 192 (within the immediate project area). Because of the flat topography of the river valley, the storage routing method was used with each reach. Each reach receives runoff from the adjacent subbasin tributaries and discharges into the downstream reach. The stage-storage-discharge data for different reaches were developed by the HEC-2 Water Surface Profiles Program using river cross-sectional data at over 100 locations.

SJRWMD staff developed an environmental water management plan, based on hydrologic simulation model results produced from hundreds of analyses of alternative management schemes. USACE incorporated the environmental plan into the master water control plan for the USJRB. The plan is followed when water levels within the project fall below flood control regulation schedules, that is, during normal or "low-flow" conditions.

Additionally, to ensure that environmental objectives are achieved, the project is designed to restore, to the greatest extent possible, the natural hydrologic regime of the USJRB ecosystem. By creating a hydrologic regime that mimics natural cycles, optimum soil and vegetation characteristics will be maintained. This mimicry, in turn, will help provide other environmental benefits such as enhanced fish and wildlife habitat and improved water quality.

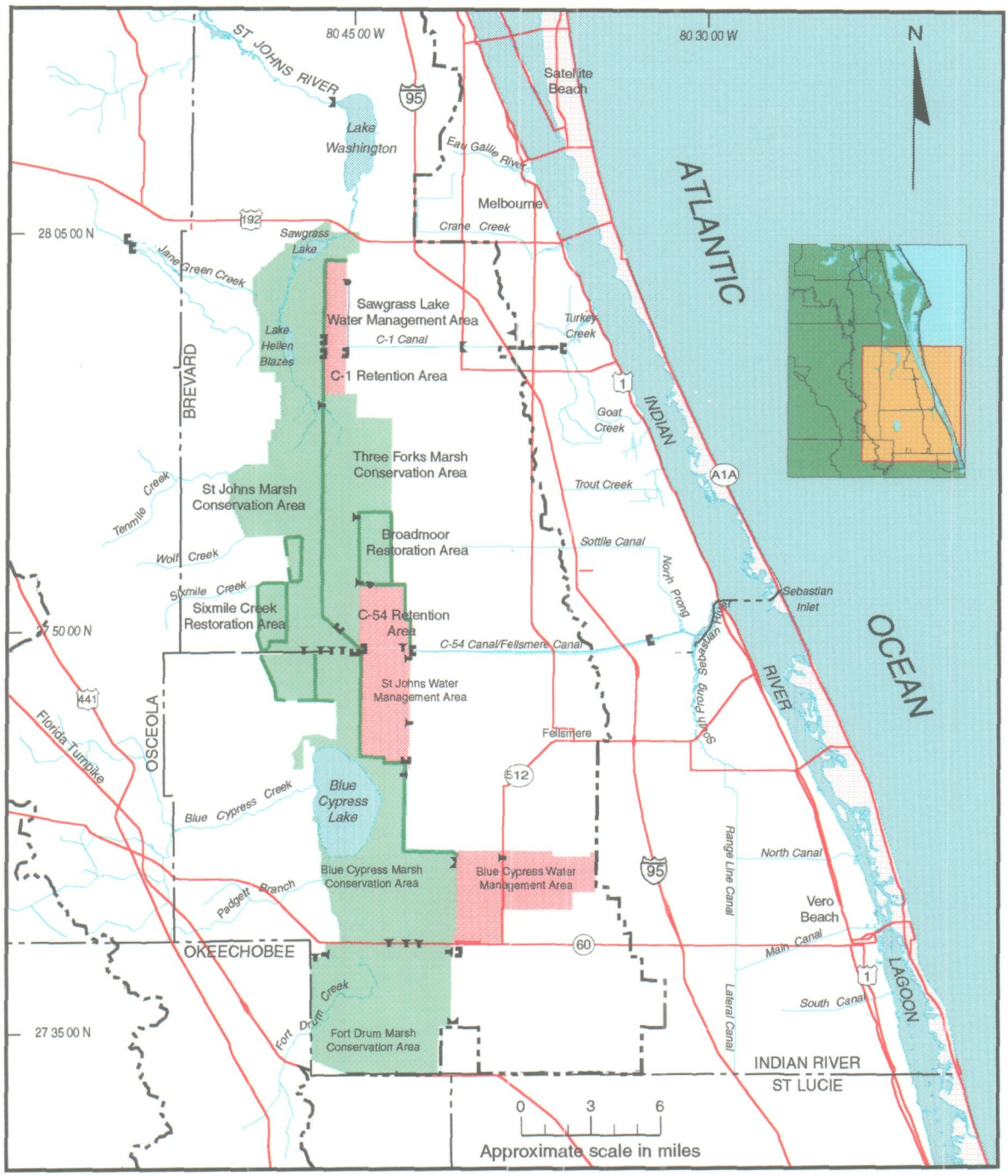
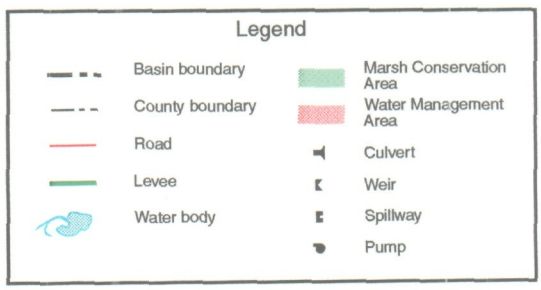


Figure 6. The current plan for the Upper St. Johns River Basin Project—a semistructural project. *The project relies less on artificial controls and more on natural floodplains to store and conserve water.*



Several hydrologic characteristics were identified as ecologically significant for a healthy marsh system. These characteristics are mean depths, inundation frequencies, maximum depths, magnitude of annual fluctuations, timing of fluctuations, recession rates, and minimum levels for natural lakes. Environmental criteria were developed for each hydrologic characteristic. The criteria comprise a series of hydrologic statistics (or constraints) that form the boundaries of an acceptable hydrologic regime for the USJRB. To meet environmental goals, the project must be managed within these boundaries.

Using the environmental criteria, water management schemes were developed using simulated hydrologic data derived from the SJRWMD hydrologic model. Using the model results, a number of management schemes were evaluated to determine which schemes best met the environmental criteria. Those management schemes were then incorporated into the plan.

Although the project may be managed to solve occasional short-term problems, the environmental criteria are designed to address long-term, basinwide hydrologic conditions. To assure the long-term health of the system, a comprehensive program to monitor biologic responses to project conditions has been developed. If monitoring data indicate that environmental objectives are not being met, or if environmental conditions change, the operating plan may be amended.

CURRENT PROJECT DESCRIPTION

The USJRB Project is a large, multipurpose, public water project. The project design represents a "semistructural" approach to water management, which attempts to balance various environmental and economic goals. The project is semistructural because it relies less on artificial controls and more on the function of the natural river floodplain to store floodwaters. While maintaining its primary flood control objectives, the USJRB Project also provides for restoration of major environmental habitats and benefits for protecting water quality.

The project does include, however, over 100 mi of levees, 6 large-capacity gated-spillway structures, and 16 smaller water control structures, culverts, and weirs. The project area totals some 150,000 ac or 235 mi^2 and is designed to accommodate the drainage of surface waters from over half of the 2,000-mi^2 watershed of the upper St. Johns River. During flood conditions, the project may contain over 550,000 acre-feet (ac-ft) of water—an amount that could cover an 86-mi^2 area, approximately 10 feet deep.

A more detailed description of the project's several major hydrologic features follows.

Marsh Conservation Areas

Four large MCAs are major environmental features of the current project. Composed of existing and restored marshes, MCAs are designed to provide temporary storage of floodwaters generated from adjacent upland areas and thus reduce the need to discharge potentially damaging quantities of freshwater to the Indian River Lagoon. Project design criteria included provisions to closely control water levels in MCAs within environmentally acceptable limits for the marsh.

There are two MCAs south of the Fellsmere Canal and two MCAs north of the Fellsmere Canal (Figure 6). Areas south of the canal include the Fort Drum MCA and the Blue Cypress MCA, a combined area of about 50,000 ac. Areas north of the canal include the Three Forks MCA and the St. Johns MCA, a combined area of over 32,000 ac.

Although some differences exist, MCAs in the USJRB Project will be similar in function to the large water conservation areas in the Everglades region. Design criteria for these four MCAs reflect the increased environmental influences of the 1970s and 1980s that were absent during the design and construction of the old CSFFCD project. Although MCAs will detain floodwaters—and thus occasionally function as shallow reservoir systems, releases from these areas will be made to mimic natural historic flow patterns and to restore seasonal low-flow conditions to downstream marshes. Environmental design criteria call for untreated agricultural drainage to be initially segregated from the MCAs and stored for reuse in large off-

line reservoirs called WMAs. The use of WMAs to store and treat agricultural water is expected to improve water quality of the marsh ecosystem.

Water Management Areas

In addition to extensive MCAs, over 16,000 ac of reservoir systems—WMAs—are located south of the Fellsmere Canal and east of the Blue Cypress MCA (Figure 6). These areas include the Blue Cypress WMA and the St. Johns WMA. The Sawgrass Lake WMA is located south of U.S. 192 and east of the St. Johns MCA. WMAs are now under construction on former agricultural lands within the existing river valley. Because of significant soil subsidence on these lands due to agricultural activities, WMAs will be "deep water" reservoirs (in contrast with the comparatively shallow MCAs) and will be operated to provide for long-term water supply and temporary flood storage of agricultural pump and gravity discharges from the eastern, or structural, portion of the USJRB. WMAs also will replace a portion of the floodplain storage lost to extensive floodplain encroachment.

The WMAs improve water quality conditions by separating agricultural discharge from better quality water in the St. Johns River marsh. Although the primary purpose of the WMAs is to provide conventional flood storage and agricultural water supply, management efforts are planned to increase and maintain the environmental values of these areas. Because WMAs are smaller than the MCAs, contain larger outlet structures, and are used to segregate and reuse agricultural waters, environmental management tools—such as artificial drawdowns—may prove effective in achieving environmental objectives. USACE and SJRWMD staffs are developing a comprehensive water control plan for the WMAs to provide flood control and water supply benefits, as well as environmental improvements.

Other Restored Areas

In the early 1980s, the St. Johns River marsh between the Fellsmere Canal and Lake Washington—the river reach located in southern Brevard County—totaled only 27,000 ac. This area accounted for less than 20% of the historical floodplain in this river reach. Current project plans include the restoration of an additional 36,300 ac of riverine floodplain in this area. These restoration areas were previously developed for private agricultural uses. The restoration of these lands will replace a portion of the flood storage and conveyance lost due to agricultural encroachment and restore the area to a viable marsh ecosystem (e.g., Sixmile Creek and Broadmoor restoration areas).

Other Project Features

Other notable environmental features of the project are as follows:

C-54 Retention Area. A supplement to the WMA system is the C-54 Retention Area. After release of the current project plan, SJRWMD acquired lands to construct and operate a 3,870-ac retention area north of the St. Johns WMA (Figure 6). Operation of the C-54 Retention Area will further reduce planned releases of freshwater to the Indian River Lagoon through the C-54 canal, lessening the potential for adverse environmental impacts from large freshwater discharges to the lagoon.

A public/private partnership with Ducks Unlimited has provided major funding for a waterfowl management area within the C-54 Retention Area. On-site management by the Florida Game and Fresh Water Fish Commission helps ensure a productive waterfowl area as part of the WMA system.

Canal Plugs. In 1986, SJRWMD, in cooperation with the Florida Department of Environmental Regulation (now the Department of Environmental Protection), constructed nine earthen canal plugs in existing borrow canals adjacent to remnant marshes in southern Brevard County. These plugs were part of an early implementation of the federal project within the St. Johns MCA. The plugs improve sheetflow and water quality conditions and limit the drainage of water from the marsh during dry periods.

Eight plugs are located in borrow canals along the east side of the St. Johns MCA. One plug was constructed in a borrow canal on the west side of the marsh. Additional canal plugs are planned for the west side of the valley and at

other river reaches north of the federal project area to further improve marsh conditions.

Improvements to Upland Areas West of the St. Johns River

A 35-mi-long levee (L-73) and several large gated-spillway structures were constructed along the western uplands of the river as part of the original 1962 project. If completed, the L-73 system would have created several connected upland reservoirs. However, when project construction was stopped in 1969, only one upland impoundment—the Taylor Creek Reservoir (Figure 5)—was fully operational. Under the current project, the L-73 upland system was modified to meet flood control and environmental objectives.

As part of the original L-73 system, the Jane Green Creek Detention Area upland of the spillway on Jane Green Creek (Figure 5) has been redesigned to provide temporary detention of upland stormwater without causing significant environmental degradation to the system. The detention area now consists of about 16,000 ac located west of L-73 and south of U.S. 192. A gated-spillway structure (S-161A) provides short-term detention of floodwaters and maintains base flow to the creek system and downstream river reaches during normal hydrologic conditions.

PROJECT COSTS

The benefit/cost ratio of the 1957 project was 2:1, that is, two dollars in benefits were projected for each dollar of cost. The 1985 project plan contained a favorable benefit/cost ratio of 1:.7; no economic values were calculated for purely environmental benefits. Total costs for the redesigned project through September 1997 are as follows:

Land acquisition	$86.2M
Capital construction costs (flood damage reduction)	50.1
Planning and design	18.0
Relocation costs for roads	11.1
Construction of recreational facilities	1.7
Administrative costs	5.5
Total project cost	$172.6M

Under the current cost-sharing arrangement, the federal government will pay all engineering design and capital construction costs. SJRWMD is responsible for all land acquisition costs. Costs to develop recreational facilities are shared 50/50.

Because land acquisition costs amount to nearly 50% of the total project cost, no discussion of project costs would be complete without describing the climate in which SJRWMD pursued an aggressive land-buying program to support project implementation. In the early 1980s, several factors contributed to conditions favorable for the public acquisition of environmentally sensitive lands. These factors include

- Successful SJRWMD bond efforts for land acquisition
- An increase in the documentary stamp for the Save Our Rivers program to fund purchases of environmental lands
- Positive public sentiment toward programs to improve environmental conditions
- A willingness of land owners to sell rather than meet more stringent development criteria
- An economic recession marked by high interest rates and rising land values.

As of December 1997, SJRWMD has exercised its eminent domain powers to acquire only two of the several large land parcels needed for the project. All other land acquisitions have been achieved through voluntary negotiation with local landowners.

PROJECT BENEFITS

Public benefits of the USJRB Project are summarized in the following sections.

Improved Flood Protection and Reduced Flood Damages

Although the USJRB Project represents an ambitious environmental river and wetlands restoration effort based on sound ecological criteria, the primary thrust of the current project is flood control and flood protection. Flood protection benefits are achieved through lowering peak flood stages and constructing or improving

flood protection levees to USACE standards. All project levees provide protection against a storm event that has a return period of more than 200 years.

Upon completion of the project, flood stages will be reduced by about 1.5 feet in the Blue Cypress Lake subbasin and by about 0.5 feet at Lake Washington at the downstream end of the project.

Improved Water Quality

Water quality improvements are expected because agricultural waters south of the Fellsmere Canal are stored in two WMAs (Blue Cypress and St. Johns) and the C-54 Retention Area. These waters are thus separated from MCAs (Fort Drum, Blue Cypress, Three Forks, and St. Johns) and the St. Johns River marsh downstream of these areas. Water quality is better in the MCAs than in the WMAs, and the water can be discharged to augment downstream flows. The storage of agricultural waters in the WMAs and the construction of canal plugs to restore sheetflow of water through the marsh will reduce the concentrations of suspended solids, turbidity, and nutrients.

Improved Water Conservation Storage

The creation of MCAs and WMAs will improve both temporary flood storage and long-term water storage. More water will be available because less water will be diverted out of the USJRB and discharged downstream during high-water conditions. Instead, excess water during the wet season can be stored and reused for beneficial purposes during the dry season. Computer simulations show that during a 1-in-5-year drought, about 50,000 ac-ft of additional water, on an annual basis, would be available under the current project plan. The water could be allocated from the WMAs to meet irrigation demands and to augment downstream flows for water supply and environmental enhancement.

Even with low-flow discharges made to the marsh north of the Fellsmere Canal, computer simulations show that, due to the increase in water storage in the WMAs and the Fort Drum MCA, the stage and duration of water levels in other MCAs under project conditions will be improved.

Reduced Interbasin Diversion

Under the current project plan, discharges through C-54 to the Indian River Lagoon will be reduced significantly. Computer simulations show that there will be no discharge through C-54 to the lagoon during a 10-year storm event. Therefore, the frequency of discharge to the lagoon will be less than once every 10 years. By operating the C-54 Retention Area, the frequency and volume of discharge to the lagoon will be reduced further.

In addition, a portion of the water historically diverted from the USJRB to the lagoon through the Fellsmere main canal now drains to the St. Johns WMA.

Improved Marsh Conditions and Wildlife Habitat

Throughout the USJRB, the environmental quality of the marsh will be improved, resulting in enhanced water quality conditions and an increase in productive fish and wildlife habitat. Upstream from the Fellsmere Canal, the Fort Drum MCA and the Blue Cypress MCA will provide major water storage benefits and augment downstream flows consistent with established environmental criteria. North of the Fellsmere Canal, the functional marsh will be increased by more than 32,300 ac. The hydrologic regime of the marsh will be improved through the storage and continued discharge of water from the MCAs.

Increased Opportunities for Public Recreation

Several public recreational sites are now under consideration as part of the project. These sites include the following: Fort Drum MCA multiuse recreation area, Blue Cypress Lake County Park, Blue Cypress MCA-WMA boat ramp, State Road 512 bank-fishing site, St. Johns WMA/C-54 boat ramp, C-54 bank-fishing site, Lake Washington County Park, and Jane Green Creek (Bull Creek) Detention Area.

The Upper St. Johns Recreational Advisory Council (RAC) was formed in 1985 to aid

SJRWMD in the development of a public recreation plan for the USJRB. Based on input from the RAC and SJRWMD, USACE has developed a comprehensive master recreation plan for the entire project area.

SUMMARY

The USJRB Project is a major public water project designed to address several water resource-related needs including increased flood protection, improved water supply, and improved water quality without adversely compromising the environment within the USJRB. A major objective of the project is to achieve these benefits through extensive floodplain restoration.

The project is called a "semistructural" water management project because nature's floodplains—rather than artificial upland reservoirs—will function to store and purify floodwaters. The project has been recognized by environmental groups and agencies as one of the most unique and ambitious environmental river restoration projects in the world. The Florida Department of Environmental Protection, in its review of the project plan, has hailed the current USJRB plan as a "national model of modern floodplain management," stating that the project will result in significant public benefits to the entire USJRB area.

Although the USJRB Project has been overshadowed by larger and more politically sensitive and controversial water projects, public plans have emerged and evolved to manage the headwaters of the St. Johns River for nearly 50 years. Had earlier versions of plans for the USJRB Project been completed, state water managers would be faced today with a much more costly cleanup of Florida's longest river. No viable options would be economically feasible to protect the Indian River Lagoon from unacceptable freshwater discharges. Compared with the skyrocketing price tag for the Kissimmee River restoration efforts and the cleanup of the Florida Everglades, state funds spent to restore the St. Johns River may yet prove to be one of the best public water deals of this decade.

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CONVERSION CHART

Multiply	By	To Obtain
acre (ac)	0.405	hectare (ha)
acre-feet (ac-ft)	1233.48	cubic meters (m^3)
cubic feet per second (ft^3/sec)	0.028	cubic meters per second (m^3/sec)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
square miles (mi^2)	2.590	square kilometers (km^2)