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FOR BOARD OF ENGINEERS FOR RIVERS AND HARBORS, KINGMAN BUILDING, FORT BELVOIR, VIRGINIA 22060-5576

I concur in the recommendations of the District Commander.

Encl

JOHN F. SOBKE
Major General, USA
Commanding

CENTRAL AND SOUTHERN FLORIDA PROJECT

ENVIRONMENTAL RESTORATION
of the
KISSIMMEE RIVER, FLORIDA

FINAL
INTEGRATED
FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

U.S. ARMY CORPS OF ENGINEERS
JACKSONVILLE DISTRICT
SOUTH ATLANTIC DIVISION

DECEMBER 1991

* THIS REPORT WAS PRINTED ON RECYCLED PAPER *

CENTRAL AND SOUTHERN FLORIDA PROJECT
ENVIRONMENTAL RESTORATION
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Responsible Agencies: The responsible lead agency is the U.S. Army Corps of Engineers, Jacksonville District. The responsible cooperating agencies are the U.S. Fish and Wildlife Service, the South Florida Water Management District, and the Florida Game and Fresh Water Fish Commission.

Abstract: The Kissimmee River is located in central Florida. The river's ecosystem and its environmental values have degraded as the cumulative result of local and Federal modifications for water resources development. The purpose of this study is to investigate the feasibility of restoring the river's ecological integrity. Using the tiering concept established by the Council on Environmental Quality, this document addresses restoration of both the Upper Basin, through the "Headwaters Revitalization Project", and the Lower Basin, through the "Level II Backfilling Plan"; however, the document focuses on the Lower Basin alternatives and recommendations as the action ready for decision making. Four Lower Basin restoration alternatives, which had been previously developed by the South Florida Water Management District, were evaluated by the Corps of Engineers (Corps). As a result, the Level II Backfilling Plan, as recommended by the South Florida Water Management District, was found to be the best alternative for restoration of the Lower Basin. A modification of the Level II Backfilling Plan was subsequently developed and evaluated by the Corps, and is the Recommended Plan for restoration of the ecological integrity of the Lower Kissimmee River Basin.

THE OFFICIAL CLOSING DATE FOR THE RECEIPT OF COMMENTS IS 30 DAYS FROM THE DATE ON WHICH THE NOTICE OF AVAILABILITY OF THIS FINAL EIS APPEARS IN THE FEDERAL REGISTER.

If you require further information on this document, contact:

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NOTE: This report includes an integrated environmental impact statement (EIS) within the report text; paragraphs required for compliance with the National Environmental Policy Act (NEPA) are noted by an asterisk in the Table of Contents.

CENTRAL AND SOUTHERN FLORIDA PROJECT
ENVIRONMENTAL RESTORATION
OF THE
KISSIMMEE RIVER, FLORIDA

SYLLABUS

SUMMARY

The Kissimmee River Basin is located in central Florida. Local water resource development of the Kissimmee River began in the late 1800's. A Federal channel for river navigation between the town of Kissimmee and Fort Basinger was authorized in 1902. In 1954, basin improvements for flood damage reduction were authorized as a part of the comprehensive Central and Southern Florida Project. The completed basin project includes the Upper Basin lakes improvements in the Orlando area south to and including Lake Kissimmee, and the Lower Basin improvements from Lake Kissimmee to Lake Okeechobee. Upper Basin works consist of channels and structures that control water flows through eighteen natural lakes into Lake Kissimmee. Lower Basin works consist of a flood control canal, called C-38, and six water control structures, called S-65 structures, which step water down over the canal's 56 miles from Lake Kissimmee to Lake Okeechobee.

Although the project has provided continuing navigation and effective flood control, it also resulted in long-term degradation of the natural ecosystem. The 103 mile river that historically meandered across and inundated about 35,000 acres of wetlands over a broad flood plain was reduced to a 56 mile canal that has successfully contained almost all flows since its completion. This channelization of flow, coupled with modifications of Lower Basin tributary watersheds and efficient control of flood waters and regulation of inflows from the Upper Basin, significantly altered hydrologic characteristics of the ecosystem. Natural flood plain inundation patterns and slow recession of flood waters were eliminated, and the flowing river/flood plain ecosystem was replaced by a series of impounded reservoirs. Alteration of the physical form and natural hydrologic characteristics had negative impacts on the fishery, waterfowl, wading birds and other natural resources. Wetlands were eliminated or degraded, and water quality declined.

Degradation of the Kissimmee River's water quality, wetlands, and ecosystem has been the subject of numerous Federal, State and local studies over the past twenty years. Major studies include the Corps' first Federal feasibility study from 1978 to 1985, the South Florida Water Management District's (SFWMD) restoration study from 1984 to 1990, and the second Federal feasibility study, which was authorized in the Water Resources

Development Act of 1990 and is documented in this feasibility report and environmental impact statement.

As a result of these and other studies, two restoration plans were developed which, when implemented together, will restore environmental values throughout the Kissimmee River Basin. These plans are the Headwaters Revitalization Project in the Upper Basin, and the Modified Level II Backfilling Plan in the Lower Basin; the Modified Level II Backfilling Plan is dependent upon the Headwaters Project being in place to function successfully. Both the Headwaters and Level II proposals were initially developed and evaluated at a general programmatic level. The Headwaters Revitalization Project and alternatives for the Upper Basin will be further analyzed and addressed in detail in later studies and documents, including appropriate environmental documents. Alternatives for the Lower Basin, including the Level II Backfilling Plan, are ready for decision making, and therefore were developed and evaluated in detail during this study. For the purpose of this study, the Headwaters Revitalization Project was assumed to be in place in the "without project" condition (which is the same as the "no action" alternative). This integrated feasibility report and environmental impact statement addresses the Lower Basin in site-specific detail, and the Upper Basin programmatically in general, based on the studies conducted to date and in accordance with the tiering approach established by the Council on Environmental Quality.

In accordance with the specific direction of this study's authorization, the purpose of this feasibility study is to determine the extent of Federal participation in the Level II Backfilling Plan for restoration of the Kissimmee River that was developed and recommended for implementation by the SFWMD. This study purpose was accomplished through a series of analyses. First, individual project components of the Level II Backfilling Plan were analyzed and modified to improve the effectiveness of the overall plan. Second, the Modified Level II Backfilling Plan and the other river restoration alternatives considered by the SFWMD were evaluated in accordance with traditionally required Federal evaluation procedures. The other plans were the Level II Backfilling Plan, Weir Plan, including both fixed and gated weir options, the Plugging Plan, and the Level I Backfilling Plan. This evaluation concluded that the Modified Level II Backfilling Plan is the best plan to accomplish restoration of the Kissimmee River's ecological integrity. Third, several analyses of the resulting Modified Level II Backfilling Plan were conducted to determine the extent of Federal participation in plan implementation, including a fish and wildlife restoration analysis, an incremental cost analysis, and a traditional evaluation of effects. These analyses affirmed the SFWMD's conclusions, and led to a determination that a Modified Level II Backfilling Plan, is the Recommended Plan.

The Recommended Plan consists of backfilling about 29 miles of C-38; excavating about 11.6 miles of new river channel; constructing a bypass weir and channel at S-65; shallowing and construction of weirs in the Lake Kissimmee outlet channel reach; modifications of the Pool B weirs, and S-65A and S-65E structures; construction of containment levees, bridge crossings at U.S. Highway 98 and the CSX Transportation Railroad, and new structures in Pool E; removing the existing S-65B, S-65C and S-65D structures, and local levees; and installation of navigation channel markers. About 67,843 acres of land will be acquired in fee or easement to meet restoration needs and preserve flood control in the Lower Basin. Numerous residences, businesses, and farms will be effected and, boat launching ramps, and utilities will be relocated. The estimated total cost of the Recommended Plan is $422,667,000; average annual costs are estimated to be $43,936,000 (July 1991 price levels). The estimated Federal share of this cost is $127,147,500; the estimated non-Federal share is $295,519,500.

The Recommended Plan will restore the essential physical and hydrologic characteristics of the Lower Kissimmee River Basin, including a more natural river channel and flood plain, with flows, depths, and hydroperiods like that of the historic condition. Restoration of these physical and hydrologic characteristics will provide the conditions necessary for natural reestablishment of an ecosystem similar to that which existed and functioned prior to construction of the basin's flood control project. The restored ecosystem will include 56 miles of restored river, about 29,000 acres of restored wetlands, improved water quality, and restored conditions for over 300 fish and wildlife species, including waterfowl, wading birds, alligators, and three endangered species.

Although this document meets the requirements of *Section 404(r) of the Clean Water Act (Public Law 92-500, as amended)*, as addressed in Annex B, the Corps will request a Section 401 State water quality certificate during the later preconstruction engineering and design phase.

This integrated feasibility report and environmental impact statement is being transmitted through the Division Engineer for the Washington-level Federal report review process, which will include reviews by the Washington Level Review Center, the Board of Engineers for Rivers and Harbors, the Chief of Engineers, and the Secretary of the Army. The Assistant Secretary of the Army for Civil Works, representing the Secretary of the Army, will coordinate the documents with the Office of Management and Budget, and send them to Congress. The study authority states that the Secretary shall transmit the final report of the Chief of Engineers to Congress not later than April 1, 1992.

MAJOR CONCLUSIONS

The Level II Backfilling Plan was analyzed to ensure that its design, construction, and operational components are the most effective means to accomplish the project's objectives. Based on this analysis, the plan was modified to include features that are more technically sound, lesser cost, or more environmentally beneficial. The resulting Modified Level II Backfilling Plan would produce the same environmental outputs as the plan recommended by the SFWMD.

The final array of alternatives formulated by the SFWMD, including the Level II Backfilling Plan recommended by the SFWMD for implementation, has been evaluated in accordance with traditionally required Federal evaluation procedures, including applicable procedures from the *"Principles and Guidelines"*, the *National Environmental Policy Act (NEPA)*, and other Federal environmental review and consultation requirements. The evaluation indicated that the Level II Backfilling Plan is the best plan of those considered to accomplish restoration of the Lower Kissimmee River Basin.

An analysis was undertaken to determine the extent to which fish and wildlife restoration, a subset of ecosystem restoration, could be accomplished. The analysis has shown that, given the range of fish and wildlife resources in the Lower Kissimmee River Basin, the Level II Backfilling Plan, as developed by the SFWMD and modified by the Corps, is the most effective comprehensive plan for restoration of the Kissimmee River's fish and wildlife values.

An incremental analysis considered both separable elements and incremental lengths of backfill. All separable elements were dropped from further consideration due to constraints related to each individual element. The Recommended Plan was found to have the lowest unit cost (financial cost per unit of environmental output) over the range of backfilling considered, and is the most cost effective increment for producing fish and wildlife outputs in the Lower Kissimmee River Basin.

The Recommended Plan also was evaluated in accordance with traditionally required Federal evaluation procedures, and was found to be in compliance with applicable Federal requirements.

The Headwaters Revitalization Project, which is expected to be approved and implemented pursuant to the standing continuing authority of *Section 1135 of the Water Resources Development Act of 1986, as amended*, is critical to achieving the Recommended Plan's fish and wildlife restoration outputs as described in this report. Implementation of the Headwaters Project prior to implementation of the Recommended Plan warrants the highest attention and priority to ensure the successful restoration of the Lower Kissimmee River Basin. An appropriate environmental document for the Headwaters

Revitalization Project will be subsequently prepared in accordance with the tiering concept established by the Council on Environmental Quality.

Consideration has been given to all significant aspects in the overall public interest, including engineering feasibility and economic, social, and environmental effects. The Recommended Plan described in this report provides the best solution for environmental restoration of the Kissimmee River.

AREAS OF CONTROVERSY

Two general interest groups are concerned about effects of restoration of the Kissimmee River. First, owners of affected lands, as well as residents and businesses located on those lands, are concerned about how restoration would affect their property interests, homes and places of business. The Recommended Plan will require acquisition of about 67,842 acres of land. Without implementation of flood proofing (such as the use of ring levees or modifications to site and structure elevations will be utilized whenever feasible) acquisition and relocation of 356 homes, 5 farms and 24 miscellaneous out buildings would be required. Approximately 900 people would be displaced if relocation is required. The adverse effects will be mitigated by providing appropriate financial compensation to owners of the affected lands, and relocation assistance to residents and farms in accordance with the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.*

The second group with a concern about the effects of restoration is recreational boaters, who believe that backfilling would reduce the number and quality of boating opportunities on the Kissimmee River. The Recommended Plan will result in a change in the river navigation experience - from navigation on a virtually straight 29 mile section of the C-38 canal to navigation on a 56 mile stretch of continuous, meandering, more natural river. In addition, channel depths in the restored river will depend on the availability of flowing water; thus, wet and dry seasons will have an effect on navigation. Larger craft, such as houseboats, which represent about two percent of the boats using the waterway, will not always be able to navigate the shallow, meandering turns of the restored river. Boating advocates have been opposed to these changes in the past.

UNRESOLVED ISSUES

Headwaters Revitalization Project

Final planning and evaluation for the Headwaters Revitalization Project in the Upper Basin has not been completed; therefore, the likely environmental effects of the plan have been only generally estimated and described at this time. An appropriate Corps report and environmental document will be completed as the basis for final approval of an Upper Basin project. This approval will occur prior to the start of construction of the Lower Basin project recommended in this document. A more complete description of the Headwaters Project is presented in later chapters of this document.

Cultural Resources

The Florida State Historic Preservation Officer has indicated that at least seventeen sites of historic and archeological significance were recorded for the Kissimmee River Basin, and up to an additional fifty unrecorded sites are likely to be present. The Florida Master Sites File includes at least fifty archeological sites recorded for the Basin, and about 3,000 properties are recorded for the four counties in the study area. Although no sites currently listed on the National Register of Historic Places are located in the immediate project area, significant prehistoric and historic period archeological sites are expected to be located in proximity to the river and affected by the project. The time available for this study precluded adequate cultural resources investigations at the level of detail normally undertaken for Corps feasibility studies. However, the Corps recognizes its historic preservation responsibilities and is preparing an expanded discussion of cultural resources, a detailed study and coordination plan, and specific costs, by task, for future studies and coordination. Additional investigations will be undertaken during later preconstruction engineering and design, to identify sites and assess their eligibility for the National Register, evaluate affects from construction and restoration, and develop any necessary mitigation measures.

Avon Park Air Force Bombing Range

The Department of the Air Force has noted several concerns about potential project effects on operations at Avon Park Bombing Range, including bird-aircraft strike hazards, security, and public safety. Additional investigations will be required to determine possible alternative solutions to these concerns.

Possible hazards to low-flying aircraft presented by increased numbers of waterfowl and wading birds as a result of the Recommended Plan has been expressed by the Air Force. They requested investigation of means to minimize the hazards, including bird frightening techniques. Although the restoration

project is not expected to increase the incidents of bird strikes over the Avon Park Bombing Range, conditions will be monitored and close liaison with the Air Force will be maintained for purposes of detecting any problems that may arise, so that corrective actions can be taken. During phased construction, monitoring would be expected to reveal any problems, should they arise. Corrective actions may require water level management in the vicinity of the range. Bird frightening techniques commonly cause birds to take flight or remain in the air near the place that holds an attraction such as food or roosting places. Usual techniques include explosive noises (compressed air or gun powder) and scarecrows. Unusual techniques include falcon releases. These techniques do not appear feasible on the scale required in the Avon Park Bombing Range area, nor are they likely to have the desired effect of causing waterfowl to leave an area.

The mound of dredged material along the bank of the canal at the Avon Park Bombing Range provides a secure boundary for the Range that would be lost with removal of the material for backfill. The mound delineates the boundary of a buffer zone and, with the canal, is a feature visible to pilots that indicates the zone where they may arm their weapon systems. Alternatives will be considered during preconstruction planning and design provide security and public safety at the Avon Park facility.

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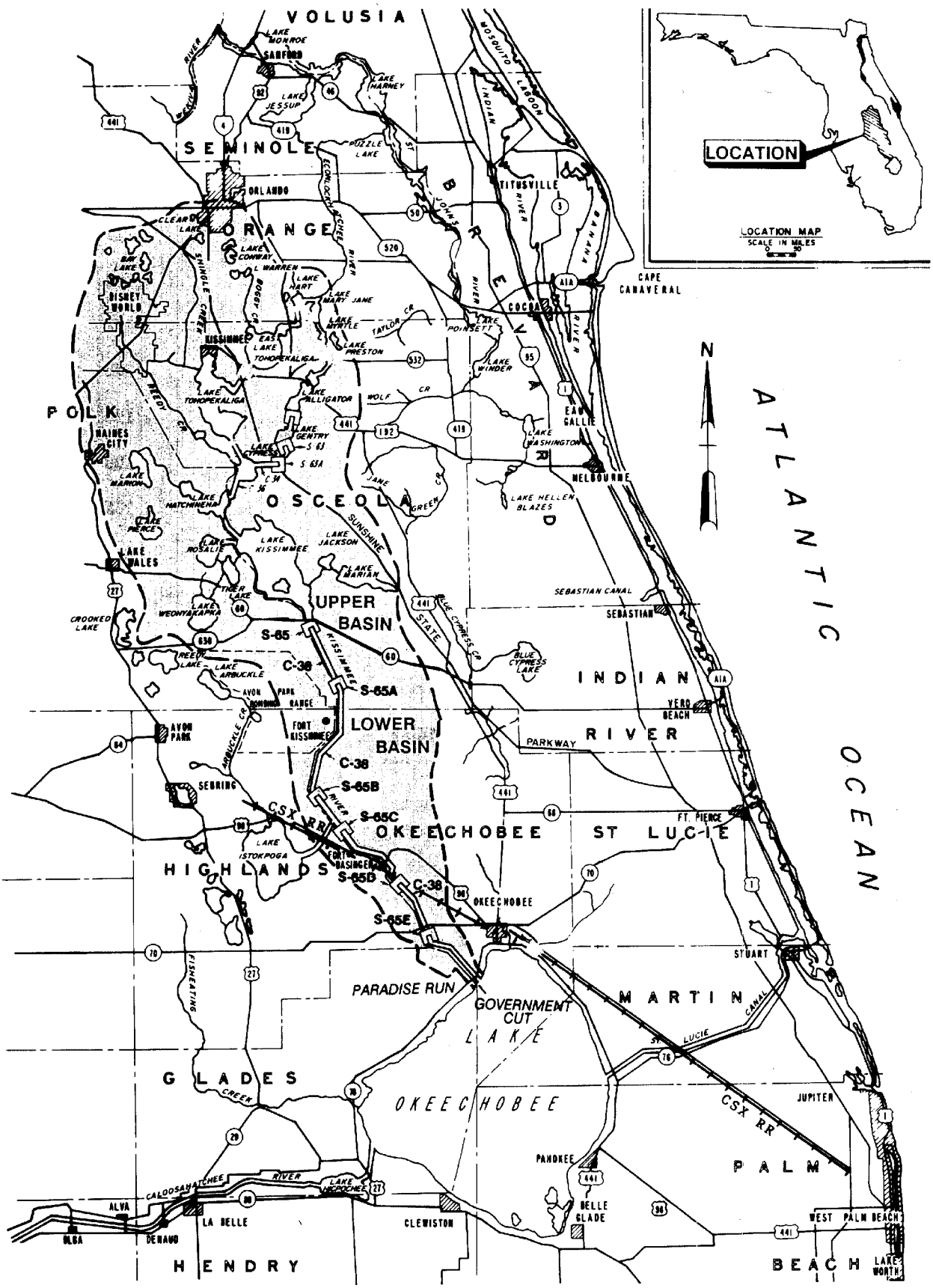


KISSIMMEE RIVER BASIN

FIGURE 1

SECTION 1

INTRODUCTION

The Kissimmee River Basin, as shown on Figure 1, is located in central Florida. In the 1960's, the river was channelized as part of the comprehensive Central and Southern Florida (C&SF) Flood Control Project. The focus of this feasibility report is restoration of the ecosystem that was affected by construction of the flood control project in the Lower Kissimmee River Basin. This effort has involved years of extensive work by the U.S. Army Corps of Engineers (Corps) and the South Florida Water Management District (SFWMD), as well as continuing participation by a variety of interests in Florida and throughout the Nation.

This section describes the feasibility study's authority, partners, purpose and scope; discusses compliance with the National Environmental Policy Act; and provides a brief overview of the Kissimmee River Basin.

1.1 STUDY AUTHORITY

This study was authorized by Section 116(h) of the Water Resources Development Act of 1990 (Public Law 101-640, November 28, 1990), which states:

> (1) **STUDY** *"The Secretary shall conduct a feasibility study of the Kissimmee River in central and southern Florida for the purpose of determining modifications of the flood control project for central and southern Florida, authorized by section 203 of the Flood Control Act of 1948 (62 Stat. 1176), which are necessary to provide a comprehensive plan for the environmental restoration of the Kissimmee River. The study shall be based on implementing the Level II Backfilling Plan specified in the Kissimmee River Restoration, Alternative Plan Evaluation and Preliminary Design Report, dated June 1990, published by the South Florida Water Management District.*
>
> (2) **REPORT** *"Not later than April 1, 1992, the Secretary shall transmit to Congress a final report of the Chief of Engineers on the results of the study conducted under this subsection, together with such modifications as are recommended by the Secretary.*
>
> (3) **POST-STUDY WORK** *"All work necessary to prepare the project recommended by the Chief of Engineers, as modified by the Secretary, for*

construction bidding, including Feature Design Memoranda, shall be completed by June 1994."

This feasibility report is in full response to subsections (1) and (2) of the authority.

1.2 STUDY PARTNERS

The South Florida Water Management District, an agency of the State of Florida, is the feasibility study cost sharing partner, and has expressed its intent to be the project sponsor. The SFWMD's outstanding assistance and cooperation contributed greatly to the completion of the study and this feasibility report. The SFWMD's report titled *Kissimmee River Restoration, Alternative Plan Evaluation and Preliminary Design Report,* dated June 1990 (hereafter referred to as the SFWMD *Restoration Report),* has been used extensively in the preparation of this report.

In addition to the SFWMD, other State agencies have actively participated in conducting this study, in particular the Florida Game and Fresh Water Fish Commission and the Florida Department of Environmental Regulation. The U.S. Fish and Wildlife Service (USFWS) provided updated information using the Habitat Evaluation Procedures (HEP) to determine habitat values for individual species in the Kissimmee River and flood plain.

1.3 STUDY PURPOSE AND SCOPE

1.3.1 Study Purpose

The purpose of this study is to determine the extent of Federal participation in the Level II Backfilling Plan, as developed by the SFWMD, for restoration of the Kissimmee River and flood plain ecosystem. It is expected that restoration will restore the ecological integrity of the river system. The study has been conducted in accordance with current Federal water resources planning procedures and guidelines, with assistance and support from numerous State and Federal agencies and other interests.

1.3.2 Study Area

The Kissimmee River Basin, as shown in Figure 1, comprises 3,013 square miles, and extends from Orlando southward to Lake Okeechobee, the second largest freshwater lake in the United States. The area is bounded on the north by the lakes of the Orlando area, on the west by the Peace River Basin, on the

south by Lake Okeechobee, and on the east by the Upper St. John's and the Taylor Creek-Nubbin Slough Basins. The watershed is about 105 miles long and has a maximum width of 35 miles. Studies were focused on the area which extends from Lakes Cypress, Hatchineha, and Kissimmee in the Upper Basin southward down the Kissimmee River to Lake Okeechobee.

1.4 NATIONAL ENVIRONMENTAL POLICY ACT REQUIREMENTS

The National Environmental Policy Act of 1969 (NEPA), as amended, is the nation's charter for environmental protection. NEPA establishes policy, sets goals, and provides means for carrying out the policy. Section 102(2) of the Act contains action-forcing provisions to make sure that Federal agencies act according to the letter and spirit of the Act, including a provision to prepare a detailed statement - now called an environmental impact statement (EIS) - on the effects of a proposed Federal action. The Federal regulations for implementing the procedural provisions of NEPA were published by the Council on Environmental Quality (CEQ) in the Code of Federal Regulations (CFR) as 40 CFR Parts 1500-1508 (43 Federal Register 55978-56007, November 29, 1978).

This report documents the Corps study of environmental restoration of the Kissimmee River in compliance with NEPA requirements. It employs two concepts established in CEQ's NEPA regulations - integration and tiering - that are not frequently used, but are appropriate to the planning and design process and schedule for Kissimmee River restoration.

Integration is based on the CEQ provision to combine documents, which states that *"any environmental document in compliance with NEPA may be combined with any other agency document to reduce duplication and paperwork"* (40 CFR 1506.4). Corps regulations permit an EIS ("environmental document") to be either a self-standing document combined with and bound within a feasibility report ("agency document"), or an integration of NEPA-required discussions in the text of the report. In view of the environmental nature of the Kissimmee River restoration project, and to reduce paperwork and redundancies, and consolidate documentation into one consistent report, the Corps elected to integrate discussions that normally would appear in an EIS into the feasibility report. Sections in this integrated report that include NEPA-required discussions are marked with an asterisk in the Table of Contents to assist readers in identifying such material.

Tiering was established by CEQ to provide *"coverage of general matters in broader environmental impact statements (such as national program or policy statements) with subsequent narrower statements or environmental analyses (such as*

regional or basin-wide program statements or ultimately site-specific statements).... Agencies are encouraged to tier their environmental impact statements to eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for decision at each level of environmental review" (40 CFR 1508.28 and 1502.20). Tiering has been applied to proposed Federal actions for restoration of the Kissimmee River as follows:

* Restoration of the Kissimmee River will occur with two projects - the Headwaters Revitalization Project in the Upper Basin and the Modified Level II Backfilling Plan in the Lower Basin. The Upper Basin Project must be in place for the Lower Basin Plan to function successfully.

* This document is both a programmatic EIS and a site-specific EIS. As a programmatic EIS it addresses, at a general level, the alternatives and environmental effects of the overall project, including the Headwaters Revitalization Project in the Upper Basin and the Modified Level II Backfilling Plan in the Lower Basin. As a site-specific document, it addresses the alternatives and environmental effects of the Modified Level II Backfilling Plan for the Lower Basin in sufficient detail for final decision making and for full compliance with NEPA requirements.

* A preliminary study of Upper Basin alternatives has identified a Headwaters Revitalization Project as a possible Upper Basin proposal, and a preliminary evaluation of its effects has been accomplished. The Headwaters proposal and its likely environmental effects are generally described in Section 4 of this document, which indicates that, for the purpose of this feasibility study, the Upper Basin proposal is assumed to be in place in the future "without project" condition (the same as the "no action" alternative). A subsequent site-specific environmental document, which would be either a supplemental EIS or an environmental assessment (EA), will build upon this integrated document, and address the Upper Basin proposal in sufficient detail for final decision making and for full compliance with NEPA requirements.

* Preparation, processing and final approval of this integrated feasibility report and EIS will not preempt the decision making process for the Upper Basin proposal. For example, while this study assumes that the Upper Basin proposal would be constructed in the future, subsequent Corps studies may conclude that an Upper Basin project should not be recommended. If that occurs, the Lower Basin proposal would not be implemented since it is dependent upon implementation of an Upper Basin proposal to function successfully. Additionally, although an Upper Basin project has been assumed to be in place, numerous permit decisions and other environmental review and consultation requirements for the Upper Basin remain to be addressed during later detailed studies. These include any actions necessary to fully comply with

the requirements of, for example, the Clean Water Act of 1977, as amended, the Fish and Wildlife Coordination Act of 1958, as amended, the Endangered Species Act of 1973, as amended, the Coastal Zone Management Act of 1972, as amended, and the National Historic Preservation Act of 1966, as amended. At this time, there is no evidence that any such requirements may not be met for an Upper Basin proposal. However, in the spirit of CEQ's tiering concept, these requirements will be fully addressed when action on an Upper Basin recommendation is ready for decision making.

1.5 KISSIMMEE RIVER BASIN

The Kissimmee River Basin is the largest watershed providing surface water to Lake Okeechobee. It is divided into a 1,633 square mile Upper Basin, which includes Lake Kissimmee and the east and west chain of lakes area in Orange and Osceola Counties, and a 758 square mile Lower Basin, which includes the tributary watersheds of the Kissimmee River between the outlet in Lake Kissimmee and Lake Okeechobee. The 622 square mile Lake Istokpoga area provides tributary inflow to the Lower Basin. Project works in the basin for flood control and navigation were constructed by the Corps as part of the Central and Southern Florida Project.

The Upper Basin, often referred to as the "headwaters", includes the upper "chain of lakes", consisting of Lakes Tohopekaliga, East Tohopekaliga, Hart, Mary Jane, Myrtle, Preston, Alligator, Gentry, and Cypress. Upper Basin lakes also include Lakes Marion, Hatchineha, Pierce, Rosalie, Weohyakapka, Tiger, Marian, Jackson, and Kissimmee. These lakes range in size from a few acres to 54 square miles, and their total surface area at normal water surface elevations is more than 10 percent of the sub-basin's area. Lake levels are controlled by a system of canals and water control structures. The Upper Basin is bounded on the south by State Road 60 where the basin's largest lake, Lake Kissimmee, discharges into the Kissimmee River. At this point, the Kissimmee River becomes a feature of the basin's flood control project, with the project feature name of Canal 38 (C-38).

The Upper Basin is the more heavily populated and intensively developed part of the watershed. Main municipalities are the southern half of Orlando, Kissimmee, which is the hub of the cattle industry in central Florida, St. Cloud and Haines City. Walt Disney World is located in the Reedy Creek Improvement District in the upper portion of the basin.

The Lower Basin includes the channelized Kissimmee River as a 56 mile earthen canal extending from Lake Kissimmee to Lake Okeechobee. The lower reach of the canal, an 8 mile section known as Government Cut, was

hydraulically separated from the Lower Basin by earlier project works and is not considered a part of the Kissimmee restoration program. The Lake Istokpoga Basin, although a tributary to the Lower Basin, now provides only a portion of its historical flows to the Kissimmee River. Because of this connection, and the possibility of basin effects associated with restoration in the Lower Basin, the Istokpoga Basin is included in this study.

The Lower Basin contains large areas devoted to improved and unimproved pasture for dairy and beef cattle. The Avon Park Air Force Bombing Range is located on the west side of the Kissimmee River. This military facility maintains an active resource management program for its large areas of natural grazing lands and wetlands.

SECTION 2

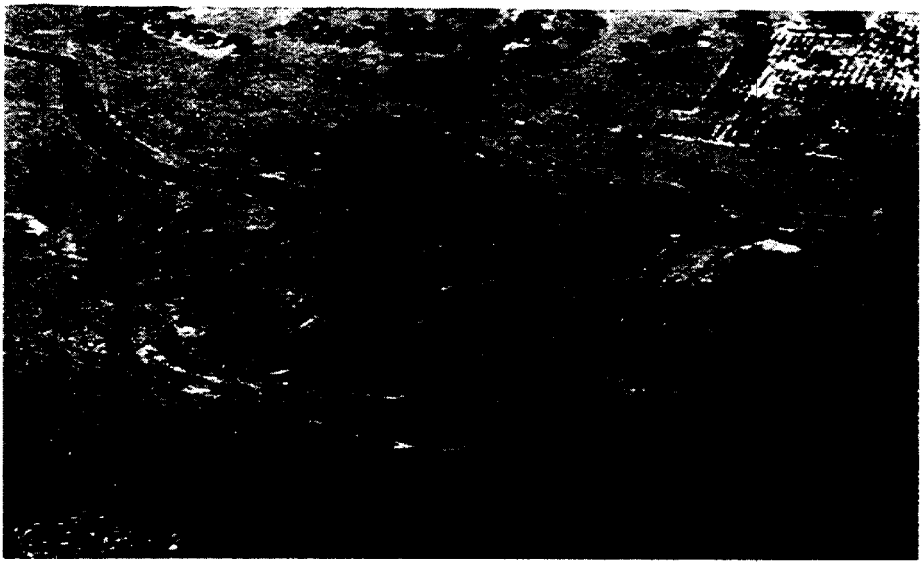
HISTORIC CONDITION

This section provides an historic overview of the Kissimmee River Basin, highlighting its changes from a natural setting to modifications for navigation and flood control.

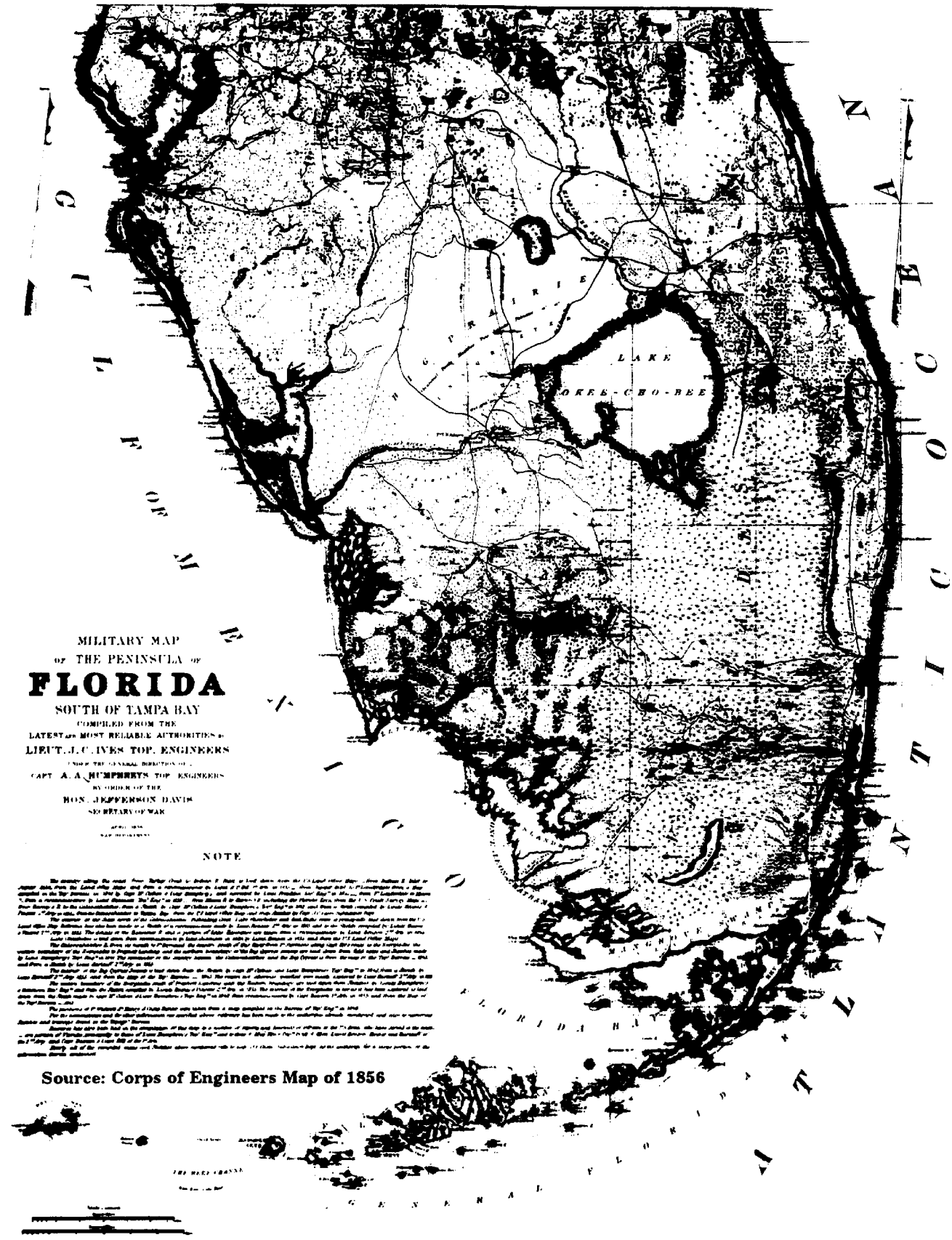
2.1 NATURAL ENVIRONMENT

Historically, the Kissimmee River meandered approximately 103 miles within a one to two mile wide flood plain. The flood plain, approximately 56 miles long, sloped gradually to the south from an elevation of about 51 feet at Lake Kissimmee to about 15 feet at Lake Okeechobee; falling an average of about one-third of a foot in elevation over each mile of the river. Under historic conditions, river flows generally exceeded 250 cubic feet per second (cfs) 95 percent of the time, while overbank flooding occurred when flows exceeded 1,400 cfs in the upper reaches to 2,000 cfs in the lower reaches. The river moved very slowly, with normal river velocities averaging less than two feet per second. Figure 2 shows the south Florida region in the mid-19th century.

The historic flood plain of the project area (from Lake Kissimmee to the lower limit of Pool E) was 44,000 acres (USFWS, 1991). Wetlands, wildlife, waterfowl, fisheries and other biological components were once part of an integrated and resilient river-flood plain ecosystem that provided an estimated



KISSIMMEE RIVER IN THE 1950's



Source: Corps of Engineers Map of 1856

HISTORIC KISSIMMEE RIVER ECOSYSTEM

FIGURE 2

340,000 habitat units. Resilience and persistence were emergent of the ecosystem which were derived from the spatial mosaic of habitats, properties intricate food webs, stable energy flow, and other complex physical, chemical and biological interactions and processes.

Based on the U.S. Fish and Wildlife Service's (1991) interpretation of 1954 photography of the Lower Kissimmee River Basin, the historic flood plain contained approximately 35,000 acres of wetlands. Major plant communities found within these wetlands included maidencane and beakrush wet prairies, broadleaf marsh, and woody shrub. Other plant communities common in the wetlands, but not distributed extensively, included wetland hardwoods, cypress stands, oak-cabbage hammocks, switchgrass, sawgrass, and floating mats or tussocks (Pierce et al., 1982). Table 1 lists acreages of wetland habitats in the prechannelization ecosystem.

Distribution and maintenance of plant communities within the flood plain wetlands depended on prolonged inundation and seasonally fluctuating water levels (Dineen et al., 1974; Toth, 1991). A fluctuating hydroperiod, along with the undulating topography of the flood plain, a meandering river channel, oxbows, and natural discontinuous levees, enhanced and maintained habitat diversity, including a mosaic of intermixed vegetation types (Perrin et al., 1982).

In the mid-1950's, the river fishery produced about 81,000 pounds (1957 instantaneous fish biomass measurement) in the 90-mile reach between the center of the current Pool A and the Government Cut at the lower end of the river. The rough fish (gar and bowfin) to game fish ratio is believed to have been about two-to-one. The Kissimmee River was especially renowned for its largemouth bass fishery. During normal water conditions it was estimated that greater that 75% of the total fishing effort on the river would be directed toward black bass.

In the 1950's, the Kissimmee River flood plain harbored a large and diverse wintering waterfowl population, including ring-necked ducks, American widgeon, northern pintail, and blue-winged teal (USFWS, 1958). The historic winter duck population was estimated at about 12,500 birds. Wet prairie was the most valuable of the wetland communities to waterfowl. Under historic hydrologic conditions, wet prairies were typically dry from spring through early summer, allowing annual plants such as wild millet to germinate and produce seed. Fall and early winter flooding made wet prairies attractive feeding sites.

South Florida's wetland habitats have historically supported a great diversity and abundance of wading birds - one of the largest centers of abundance in the world (Kushlan and White, 1977). Despite the 95% reduction in wading bird population in the state reported since the 1800's, all fourteen species of wading

birds found in the eastern United States were reported nesting in Florida in 1977 (Custer and Osborn). The historic number of wading birds on the Kissimmee River flood plain prior to channelization was estimated at 18,000 birds (USFWS, 1991). White and glossy ibis were common in the grassy wet prairies and flooded pastures of the Lower Kissimmee Basin.

The river and flood plain were not discreet and independent ecosystems, and the ebb and flow of their life was closely interrelated. In November, ducks and probers, such as snipe and ibis, fed in the sloughs, potholes and wet prairies in upland areas near the tree line. Many of the same populations used the potholes, oxbows, backwaters, and marshes of the flood plain in February, and the river and the deepest marshes and cypress swamps near the river in May. In the 1950's, peak populations of ducks and wading birds centered in and around Lake Okeechobee ranged out to the Kissimmee, the Upper St. Johns, areas known as the Water Conservation Areas south of Lake Okeechobee, and the northern reaches of Everglades National Park when and where water and feeding conditions were most favorable.

TABLE 1

HISTORIC ACREAGE OF WETLAND HABITATS IN THE KISSIMMEE RIVER FLOOD PLAIN*

TYPE	POOL A	POOL B	POOL C	POOL D	POOL E	TOTALS
WETLAND FORESTED						
Cypress	0	44	40	122	49	255
WETLAND PRAIRIE						
Rhynchospora	0	19	0	0	0	19
Aquatic Grass	726	1587	1084	1226	766	5389
Maidencane	109	2018	1525	0	0	3652
WETLAND SHRUB						
Buttonbush	2279	357	627	0	0	3263
Willow	101	754	443	393	71	1762
BROADLEAF	3026	4131	5032	4778	2800	19767
SWITCHGRASS	287	70	17	70	0	444
TOTALS	6528	8980	8768	6589	3686	34551

*From U.S. Fish and Wildlife Service, 1991.

2.2 NAVIGATION

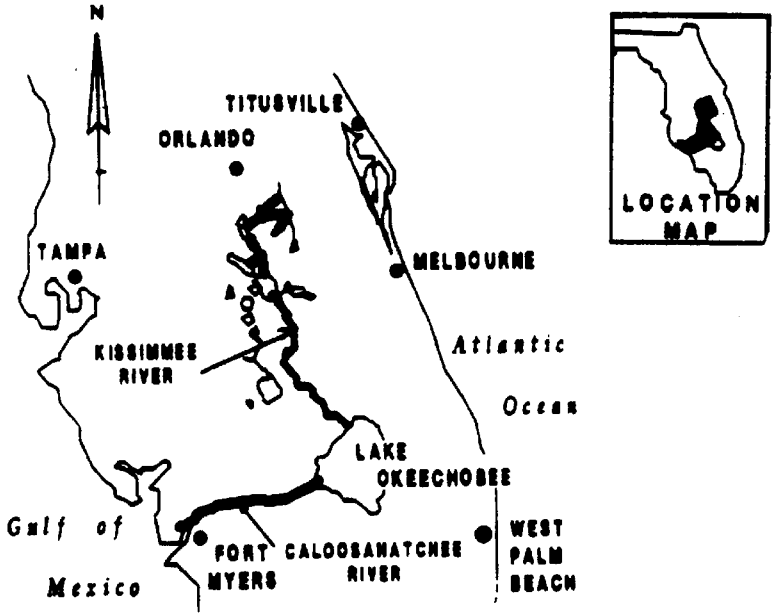
Occupation of Florida dates back to about 12,000 years ago, and developed through numerous cultures until the first Spanish explorers and colonists arrived in the 1500's. Native Florida tribes subsequently were decimated by European diseases and conflict, and by the eighteenth century, migrants from other southeastern groups were moving into the vacant interior of the state. These migrants eventually coalesced into the Seminole Tribe, which lived in dispersed hamlets, subsisting by farming, hunting, and raising cattle. From the 1820's to 1850's, U.S. Army outposts along the Kissimmee River at Fort Kissimmee and Fort Basinger were used during the Seminole Indian Wars.

Small numbers of settlers began moving into south Florida in the mid-1800's, and the conclusion of the Third Seminole War in 1858 opened the Kissimmee Basin to settlement. The earliest settlers were ranchers and farmers, and turpentine and timber industries were major economic activities. Swampland drainage opened the area to more homesteaders and development. This movement was accelerated by the Swamp and Overflowed Land Grant Act of 1850, which encouraged development and expansion by transferring Federal lands to the State for use as currency.

The reclamation project was spurred by the State's proposal to raise revenues by selling swamp and overflowed lands to interested entrepreneurs willing to drain such wetland areas for agricultural use. In the late-1800's, Hamilton Disston, an industrialist from the northeast, began a ditching and drainage project in central Florida. As part of his plan to convert some four million acres of wetlands into productive farmlands, Disston connected many of the Upper Kissimmee Basin lakes, and began dredging and clearing a navigable route from the Gulf of Mexico into Lake Okeechobee along the Caloosahatchee River. As a result of this action, water levels within the upper Kissimmee Basin dropped approximately six feet or more. Figure 3 depicts the Disston reclamation effort within central Florida.

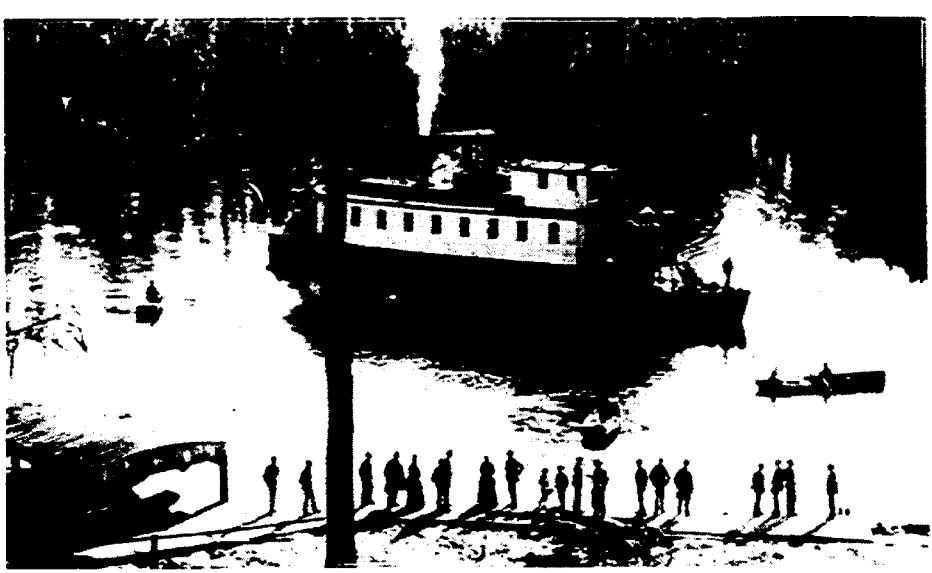
After dredging was completed by the Atlantic and Gulf Coast Canal and Okeechobee Land Company in the 1890's, navigation was possible in the upper chain of lakes from Lake Tohopekaliga through East Lake Tohopekaliga, and continuing through to Lake Gentry (and possibly at times to Lake Cypress). In the nineteenth century, commerce on the Kissimmee River gained impetus with the availability of new lands from drainage and from the connection of waterbodies by canal systems.

Initially, the mode of transportation on the river was primarily crude flat-bottomed boats, but increased accessibility led to the establishment of regularly



DISSTON PROJECT WORKS 1881 - 1894
FIGURE 3

scheduled steamboat trips up and down the river as far as the Gulf of Mexico. The survey report for the Kissimmee River (House Document 57-176) observed that, at the turn of the century, *"...navigation on the upper reach of the route enables the town of Kissimmee to serve as a supply depot for the extensive cattle interests between that point (Kissimmee) and Fort Basinger. Many of the passenger steamboats were luxurious, with mahogany decks, chrome trimming and attracted influential passengers."*



STEAMBOAT ON THE KISSIMMEE RIVER IN EARLY 1900's

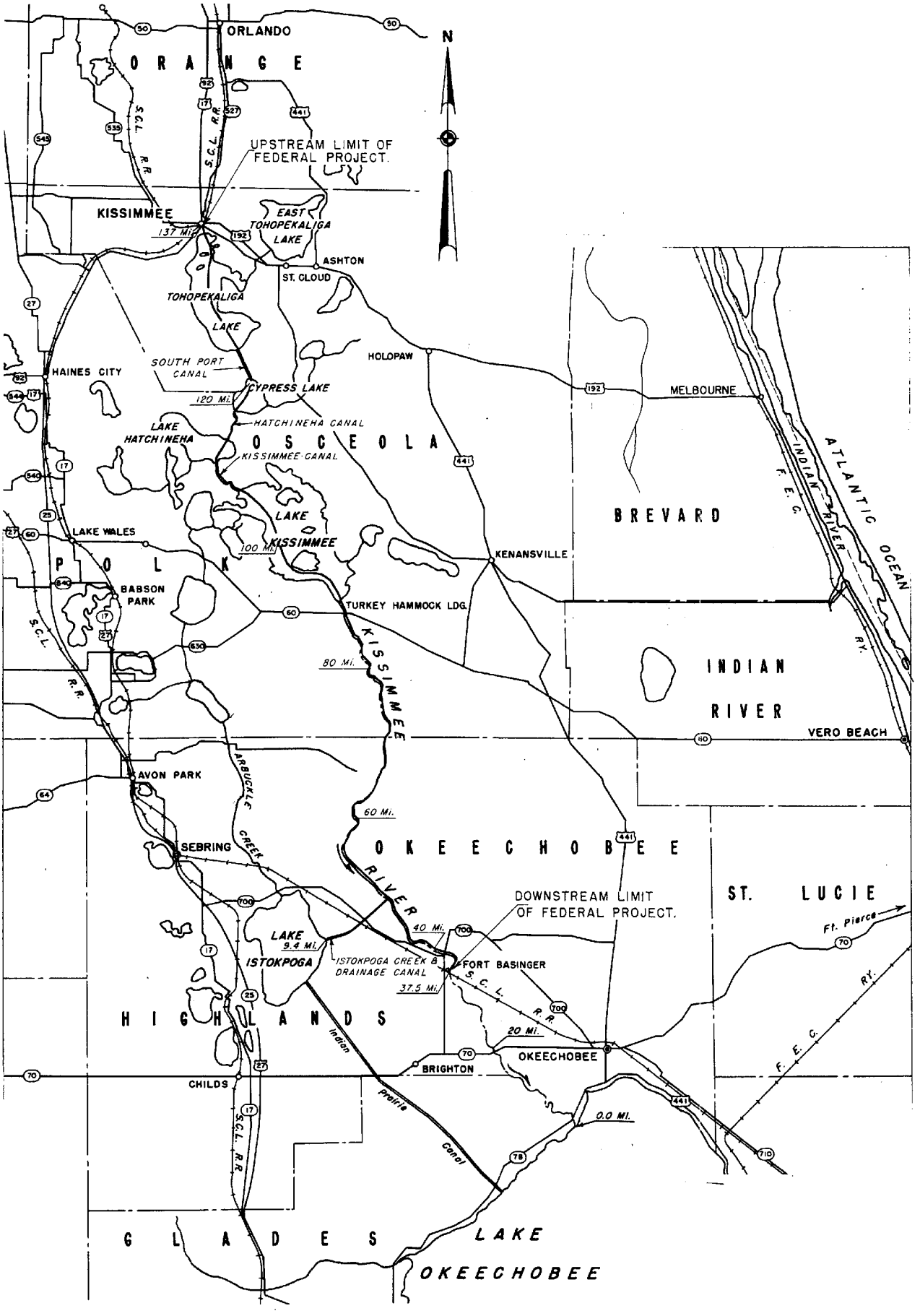
During this period the Kissimmee River flowed freely. The main channel of the river consisted of extreme meanders and varied in bottom widths from 100 feet near Lake Kissimmee to 300 feet near Lake Okeechobee, at an average depth of about 4 feet. The shallowest depth in the original river channel was about 1.5 feet. Clearing and snagging operations were conducted along the river to keep the waterway open for steamboat traffic. Steamboats, some as large as 75 feet in length, carried grain, groceries, clothing, tools, and household goods to settlers in the interior. Oranges, hides, resin, wood, fish, and turpentine were carried on return trips.

To aid navigation along the river, Congress in 1902 authorized a Federal navigation project with *"a channel width of 30 feet and depth of 3 feet at the ordinary stage of the river"*, from the Town of Kissimmee to Fort Basinger, and in Istokpoga Creek. The length of the project is about 109 miles, including 9.4 miles in Istokpoga Creek. Figure 4 shows the extent of the navigation project. The development of railroads, and later highway systems, in the early and mid-twentieth century led to greatly reduced use of the river for commerce. By the 1920's, railroads had replaced most of the commercial traffic on the river. The last Federal maintenance under the Kissimmee River navigation authority was in 1927. Current recreational navigation use on the river is discussed in subsequent sections of this report.

2.3 FLOOD CONTROL

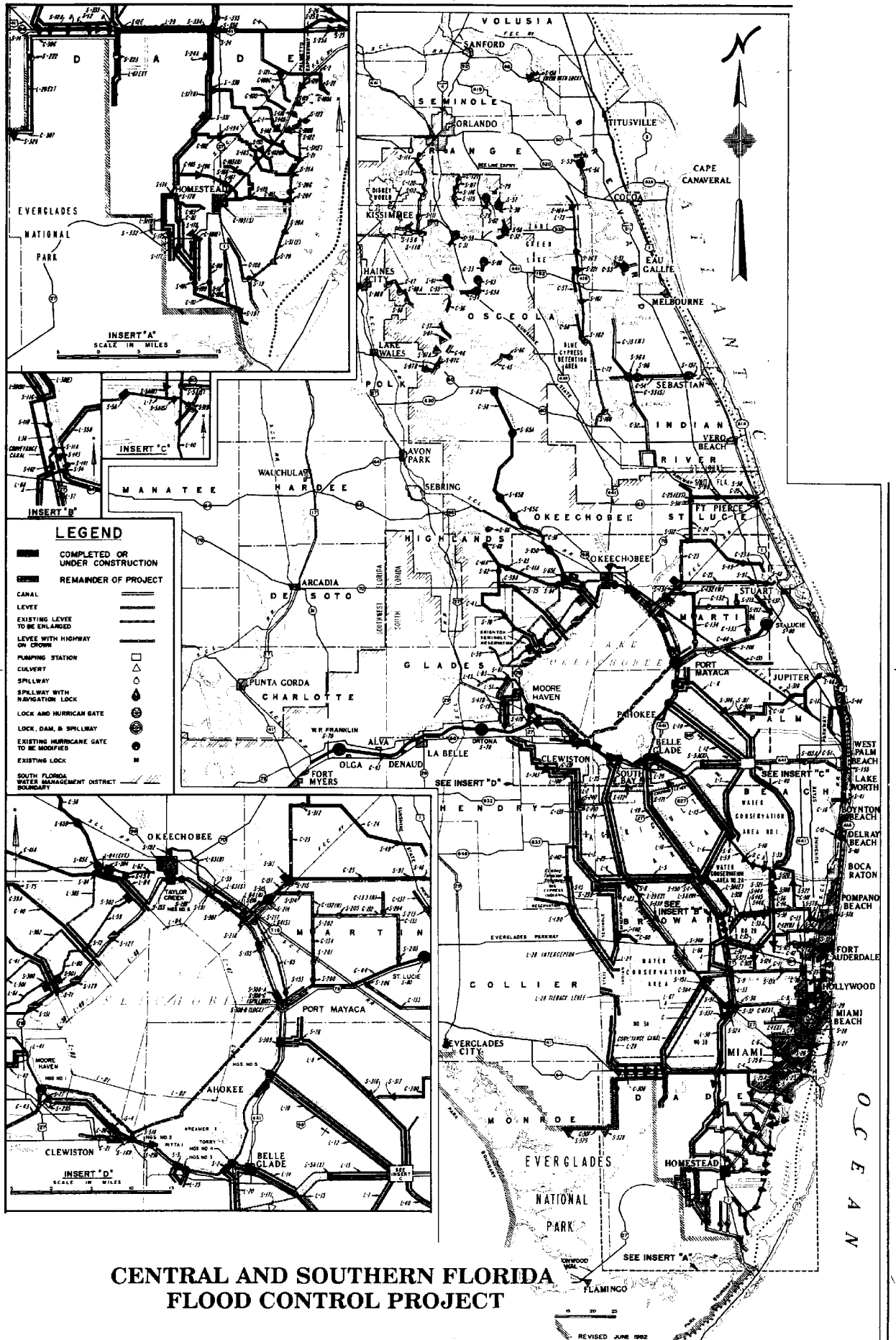
Creation of the Everglades Drainage District by the State of Florida in 1907, and passage of the State's General Drainage Act in 1913, further encouraged development in central and south Florida. Resulting development, coupled with inadequate hurricane protection, led to the loss of three thousand lives around Lake Okeechobee during storms in 1926 and 1928. In response, Congress authorized the Corps to modify the Kissimmee navigation project to include flood control. The modified plan, described in a report on *"Caloosahatchee River and Lake Okeechobee Drainage Areas"*, included numerous levee and channel improvements to reduce flood damage primarily throughout the Lower Basin.

Prior to World War II, the Kissimmee Basin was still very sparsely settled. Orlando was a quiet, winter vacation and retirement community surrounded by citrus groves and cattle ranches. All of the lowlands within the basin were open lands used primarily for cattle grazing. Fort Basinger and Cornwell, located along U.S. Highway 98 in Highlands County, were the only settlements along the Kissimmee River. When the Kissimmee River portion of the Central



KISSIMMEE RIVER NAVIGATION PROJECT

FIGURE 4



CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL PROJECT

FIGURE 5

and Southern Florida flood control project initially was formulated in 1947, the total population of Florida was approximately 2.5 million. The 1950 census recorded 2.7 million in the state. Orlando was a city of 52,000, while the cities of Kissimmee and Okeechobee had 4,300 and 1,800 residents, respectively.

Early flooding conditions in the Kissimmee River Basin were the result of runoff accumulation on the basin's flat lands and the subsequent rise of lake levels within the Upper Basin, which remained at high levels because of poor outlet capacity. During major floods the Kissimmee River resembled a wide lake. In 1947 over half-a-million acres were flooded. In addition to flooding from runoff, hurricane winds over Florida create problems of tide generation on the larger lakes which add to the local flooding.

The drought of 1944 - 1945 and a major hurricane in 1947, which caused extensive flooding in the Kissimmee Basin, illustrated the inadequacy of the basin's water control system. Increasing population growth and developmental pressures, primarily in the Upper Basin, intensified public pressure to reduce the threat of flood damage. As a result, the State of Florida requested the Federal government to prepare a plan for flood control for the central and southern part of the state. In response to this request, the Corps of Engineers prepared a comprehensive plan for the area in 1947; and in 1948, Congress authorized the Corps to undertake construction of the Central and Southern Florida (C&SF) Project for flood control and other purposes. Figure 5 shows the features of the overall project. The C&SF Project resulted in a series of reports and design memoranda used in planning and designing the comprehensive flood control and water management system now in place in south Florida.

In 1954, Congress specifically authorized the Kissimmee River portion of the C&SF Project, which was subsequently planned and designed between 1954 and 1960. Features of the Kissimmee River flood control project are shown in Figure 1. Regulation of the Upper Kissimmee Basin lakes took place over a 6-year period from 1964 to 1970, with interim regulation schedules adopted as lake outlet works were completed. Work within the Lower Basin, which included channelization of the Kissimmee River, was initiated in 1962 and completed in 1971. Channelization of the river was selected as the means for flood damage reduction within the basin primarily because of the plan's cost effectiveness.

Between Lake Kissimmee at the upper end of the Kissimmee River and Government Cut at the lower end, approximately 48 miles of the river and flood plain, was channelized under the 1954 flood control project authorization. Combined with Government Cut, C-38 provided complete channelization of the river between Lakes Kissimmee and Okeechobee, a distance of 56 miles.

SECTION 3

EXISTING CONDITION/AFFECTED ENVIRONMENT

This section provides an overview of the resources that currently exist within the Kissimmee River Basin. These resources will be assessed relative to the river and flood plain restoration efforts now underway within the Lower Basin.

3.1 GEOLOGY AND SOILS

The Kissimmee River Basin is located in the coastal lowlands topographic division of Florida. The physiography includes the Osceola and Okeechobee Plains, and the Lake Wales ridge system of the Wicomico shoreline. The Osceola Plain has little relief but generally slopes southward to a low elevation of 40 feet NGVD[1] in Okeechobee County. The plain is bounded by the Lake Wales Ridge and the Polk Uplands on the west and the Eastern Valley on the east. Drainage is mainly to the Kissimmee River Basin.

The Okeechobee Plain lies to the south of the Osceola Plain and is characterized by gently sloping, poorly drained sands and organic deposits. Elevations range from elevation 40 feet in the north to elevation 15 feet at Lake Okeechobee.

The Lake Wales Ridge forms more than 100 miles of the western boundary of the Kissimmee Basin. This ridge, along with the smaller Orlando, Mount Dora, and Bombing Range Ridges include the highest lands in the basin, with elevations from 90 to 100 feet.

The sandy soils found throughout the Kissimmee River Basin are primarily derived from marine deposited silica sands. The majority of soil types found in the Upper and Lower Basin's are classified under the Smyrna-Myakka-Basinger soil association. Other predominant classifications are the Myakka-Basinger category and the Myakka-Immokalee-Basinger category. Weathering, erosion, climatic conditions, vegetation effects, and topographical locations of resident soils have resulted in the numerous differences in soil characteristics. These characteristics are undergoing continual alteration due to normal seasonal climatic conditions and longer term climatic changes.

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[1]All elevations refer to the National Geodetic Vertical Datum of 1929 (NGVD).

The study area also has soils with hardpan one to two feet below the surface. Over the long period of natural evolution of these soils, organic and mineral materials leached downward and accumulated at the top of the locally prevailing water table.

In the early history of the Kissimmee River Basin there were extensive areas of water table related and perched wetland conditions. Agriculture and other land use activities over the past 100 years have drained these wetlands by surface drainage systems and by breaking up the original hardpan. As a result of this process, the high organic fraction of these original soils has been rapidly oxidized by exposure to the air. Additional information may be found in the Geotechnical Investigations Appendix of this report.

3.2 WATER MANAGEMENT

The system of water control works now in place in the Kissimmee Basin conforms closely with the general plan outlined in the 1948 report to Congress and authorized for construction in 1954. The project was designed to provide flood damage prevention for thirty percent of the standard project flood (SPF). This equates to protection against a five-year flood event. Water levels within the basin are controlled by a complex system of canals and control structures which are managed by the SFWMD in accordance with regulations prescribed by the Secretary of the Army.

The major lakes of the "Headwaters" area, (the Upper Basin) are connected by channels. Most of the channels were excavated by private interests in the 1880's and subsequently enlarged to varying degrees under the congressionally authorized plan. Nine control structures regulate water levels and flows in the lake system. For more details on the existing flood control project, refer to the U.S. Army Corps of Engineers *Kissimmee River, Florida - Final Feasibility Report and Environmental Impact Statement* (1985).

Prior to the project, lake outlets within the "Headwaters" region had been dredged for drainage and navigation, but were uncontrolled, and over-drainage often occurred. Dredged outlets did not provide adequate flood control and the Upper Basin did not have enough outlet capacity (sometimes termed "get away" capacity) to remove flood waters within a "reasonable" time frame to avoid flood impacts.

To provide adequate outlet capacity from the Upper Basin, approximately 15 miles of canal, the outlet channel, was required immediately downstream of Lake Kissimmee. This length is a function of canal size, Lake Kissimmee

outlet structure size, and the very flat terrain immediately downstream of the lake.

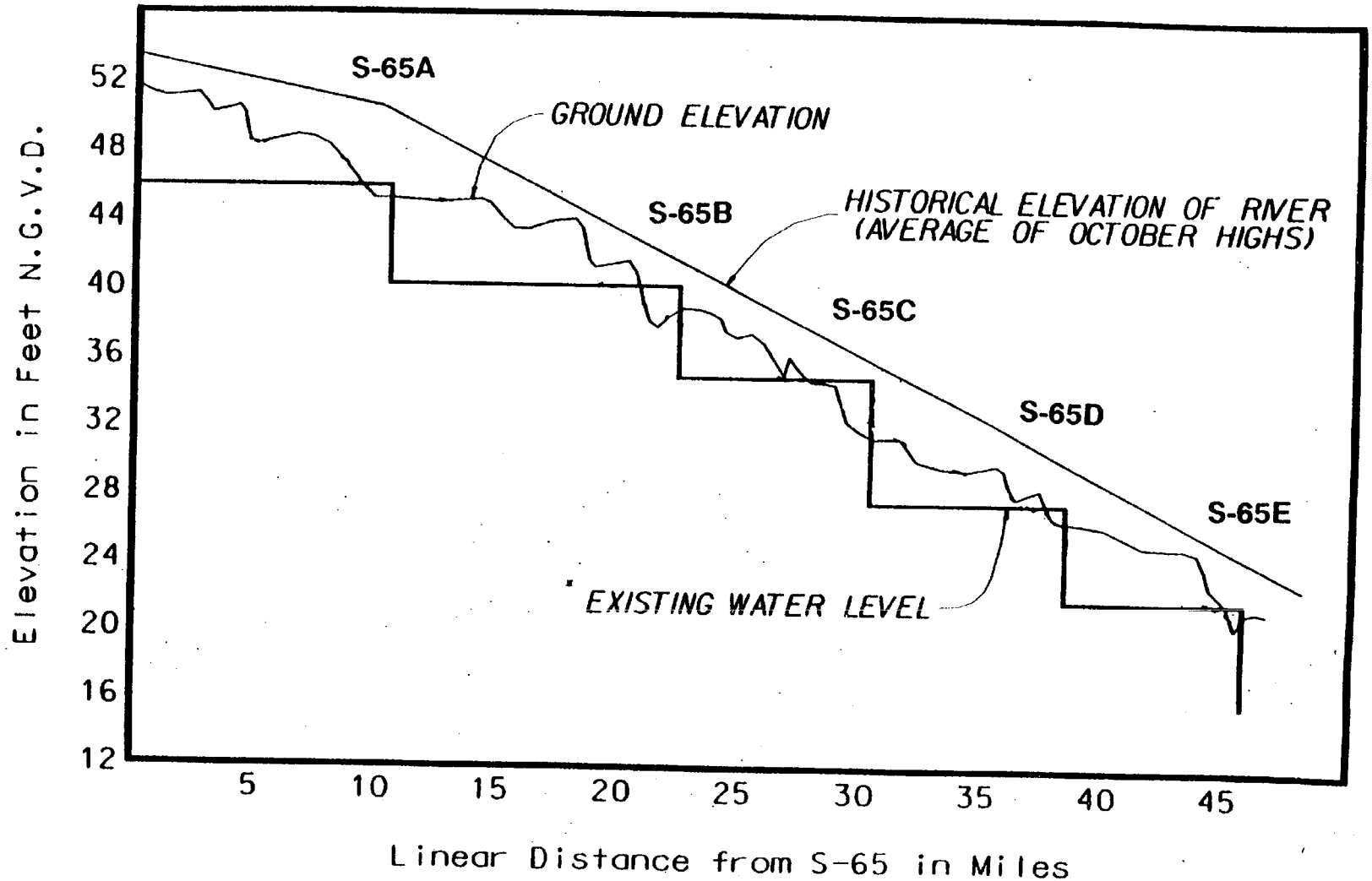
An earlier project, the Herbert Hoover Dike around Lake Okeechobee, had modified the original lower end of the Kissimmee River with a borrow area immediately upstream of Lake Okeechobee. This eight mile section of canal, known as Government Cut, was modified and enlarged during construction of C-38, and is inside the Lake Okeechobee containment levee. This section of the canal diverted flow from a downstream portion of the Kissimmee River, creating an isolated remnant of the river known as Paradise Run. Paradise Run, immediately west of Government Cut, retains most of its original topography; however, diversion of natural flows has lowered water levels and former wetland areas have been converted to grazing and pasture land.

Between the outlet channel at the upper end of the Kissimmee River (C-38), and Government Cut at the lower end, approximately 33 miles of the river and flood plain, referred to as the central reach, also was provided flood control. Some consideration was given to non-structural approaches (e.g., levee the uplands from the flood plain); however, channelization was determined to be more cost effective at that time. Combined with Government Cut, the new canal provided complete channelization of the entire 56-mile river-flood plain from Lake Kissimmee to Lake Okeechobee.

The natural fall of the land from Lake Kissimmee to Lake Okeechobee is about 36 feet. Construction of Canal 38 (known as C-38) included six water control structures, S-65, 65A, 65B, 65C, 65D, and 65E from north to south, which form a series of five pools between S-65 and Lake Okeechobee.

The S-65 structures act as dams, and were located to step the canal water level down in increments of about six feet. In doing so, the natural slope of the river was removed, and flat pools (impoundments) resembling stair-steps were created as shown in Figure 6. The water level of each pool generally is held constant, with little fluctuation or slope. This action has lowered water in the northern reach of each pool, and has created flooded marsh in the southern or lower end of each pool. A water surface area of 7,600 acres are included within these pool areas under existing regulation schedules.

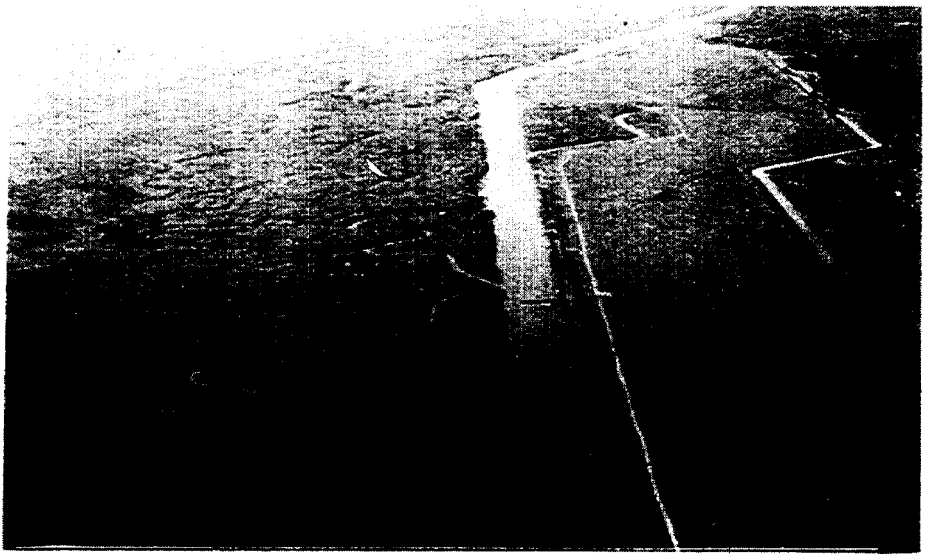
C-38 is generally 30 feet in depth, but varies in bottom width from 90 feet near Lake Kissimmee to 300 feet above S-65D. The canal's length, width, and water level vary in each pool. The head, or difference in water level above and below each structure, varies from structure to structure and with rate of discharge, but is typically about six feet.



STEP DIAGRAM OF KISSIMMEE RIVER POOLS

FIGURE 6

During construction of C-38, a temporary easement was used to obtain areas adjacent to the canal for deposition of dredged material. The material was hydraulically deposited in linear alignments covering some 8,000 acres along the canal, with elevations averaging 15 feet above pre-project topography. The material consisted of hydraulically sifted subsoil sands and clays with limited



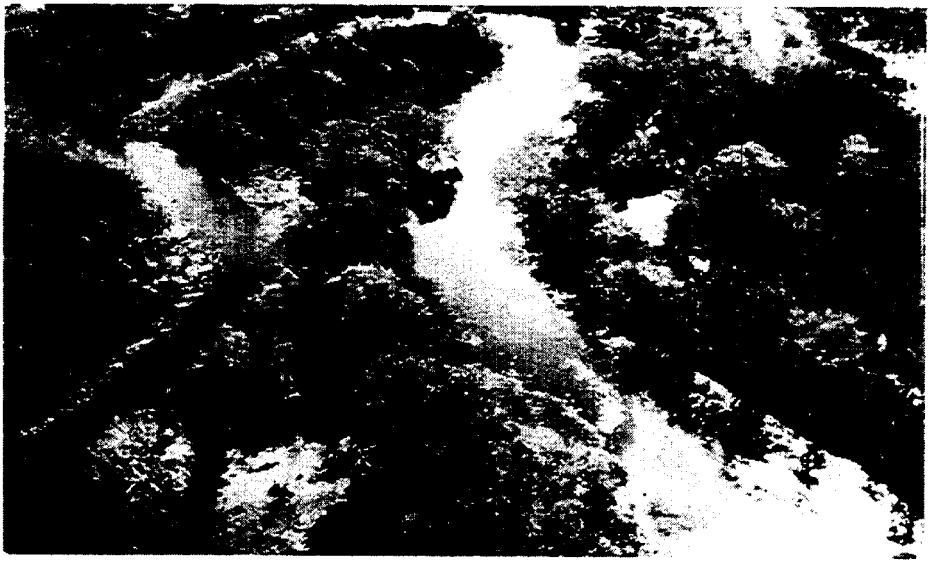
CANAL 38, KISSIMMEE RIVER

organic fraction, and high percolation rates. The material became part of the property upon which it was deposited. A number of land owners subsequently used the material to fill low areas on their property; and, at two locations in Okeechobee County, flood free, fly-in, residential subdivisions were built on the material. Where material was left undisturbed, xeric vegetation emerged on many of these deposits.

The CS&F Project works improved navigation opportunities originally provided in the Congressional Act of 1902. Each water control structure includes a 30-foot by 90-foot navigation lock which can accommodate boats with drafts up to 5.5 feet. The canal provides continuous navigation; however, inter-pool navigation is limited to daylight hours of lock operations.

The approximately 68 miles of river oxbows which exist within each of the five C-38 pools represent secondary channels of widely varying water depths. Many of these channels are very shallow, but only those which receive tributary inflows have any flow. Culverts within the tie-back levees at Structures S-65B, 65C, and 65D provide modest amounts of circulation flow in the existing river channels below the levees.

Approximately 50 tributaries provide inflow into the Lower Kissimmee Basin. These tributaries are characterized by relatively constricted central channels with pasture lands usually extending along the channel.



NATURAL MEANDERS OF THE KISSIMMEE RIVER

3.3 WATER SUPPLY

The Kissimmee River Basin contributes about 30 percent of the water input to Lake Okeechobee and is second only to rainfall in the lake's water budget. Prior to channelization, the Kissimmee Basin, which included the Istokpoga Basin, contributed an average annual inflow of about 4,300 acre feet/day (2,200 cfs) at its outlet.

The volume of water reaching the Lower Kissimmee Basin has experienced a decline in recent years. The majority of the decline has occurred in the Upper Basin, where, for example, the mean discharge has declined from 1,241 to 722 cubic feet per second at the gage site near S-65. A small portion of the decline may be attributable to an increase in water supply withdrawals, and current water management practices; however, this reduction is most likely the result of a reduction in basin rainfall compared to pre-project rainfall conditions (Obeysekera and Loftin, 1990). In the Lower Basin below Lake Kissimmee, the basin yield, after adjusting for Lake Istokpoga outflow, has remained virtually unchanged.

Since 1970, the South Florida region has experienced an apparent change in rainfall characteristics, and most basins in the region have received less than normal annual rainfall. The Kissimmee River Basin has had about 10 percent less rainfall compared to pre-1970 records. Land use in the Kissimmee Basin also has undergone substantial change over the last thirty years. Combined effects of upland drainage and construction of the basin's flood control works, have changed the hydrologic response from upland/flood plain retention and slow runoff, to upland/flood plain drainage with rapid runoff. The flow regime has undergone a major shift from predominantly baseflow runoff, to surface (direct) runoff with increased volume discharged at a faster rate during flood events (Huber et al., 1976, Obeysekera and Loftin, 1990).

The net hydrologic effect of the canal and control structures was to shorten the residence time of water in the basin during periods of high water (floods) and to increase residence time during low-flow (drought) periods. Based on a review of historical U.S. Geological Survey data under similar hydrologic conditions, the overall volume of water delivered to Lake Okeechobee from the Lower Kissimmee River Basin via the canal was found to be relatively the same as those volumes experienced under pre-project conditions. The timing of those water deliveries has been changed, however, which is reflective of current water management practices for flood control and water conservation purposes within the basin.

3.4 WATER QUALITY

Water quality in the Upper Basin has improved for most water chemistry indices since the 1970's and early 80's (Loftin et al., 1990b; Jones, 1983). Water chemistry sampling by the SFWMD and Florida Game and Fresh Water Fish Commision have revealed considerable reductions in ortho and total phosphorous, total nitrogen and chlorophyll a in the Upper Basin lakes and particularly in Lake Tohopekaliga. Water quality improvements have generally been attributed to the removal of sewage and other point-source discharges from surface waters. Improved water quality conditions will be maintained provided the conversion of agricultural uplands to residential, commercial and lake front development and point-source discharges is controlled.

Lower Basin water quality concerns initially focused on the level of nutrients within the channelized Kissimmee River following construction of C-38, and the effect of possible nutrient-laden flow being delivered to Lake Okeechobee. Another water quality concern is the low dissolved oxygen levels found within both C-38 and remaining Kissimmee River oxbows. While the canal delivers a significant phosphorous load, ortho and total phosphorous concentrations are among the lowest of any inflow to the lake. While good quality water enters

C-38 from Lake Kissimmee, progressive water quality degradation in C-38, resulting from nutrient loading from local inflows, becomes apparent at the downstream end of the canal. Implementation of Best Management Practices (BMPs) and other measures which address the source of local water quality concerns are expected to improve basin water quality. Existing low dissolved oxygen levels within C-38 and adjacent river oxbows continue to be of concern. This concern is further discussed in the Problems and Opportunities section of this report.

3.5 ENVIRONMENTAL RESOURCES

The 35,000 acres of wetlands that existed prior to channelization are estimated to have declined to about 14,000 acres in the existing condition (U.S. Fish and Wildlife Service, 1991). As during prechannelization, the dominant post-channelization wetland communities are broadleaf marsh, wet prairie and wetland shrub. Existing habitat types are listed in Table 2. There are an estimated 123,000 habitat units in the existing condition (U.S. Fish and Wildlife Service, 1991).

The river has experienced a substantial decline in largemouth bass fishery *"for which the Kissimmee River had gained nationwide recognition"*, and the loss of six indigenous fish species (Perrin et al., 1982). This decline has been attributed to low dissolved oxygen levels in the canal, the drainage of wetlands which have reduced food and foraging habitat for river fish species, and the lack of river habitat diversity on the channelized waterway (Toth 1990). Florida Game and Freshwater Fish Commission data indicate the rough fish (gar and bowfish) to game fish ratio presently is about three-to-one. Total fish biomass in the historical Kissimmee River was reported to be 340 times more than in Government Cut, an adjacent canal, and marsh habitat adjacent to the river produced over 190 times more fish biomass than did the canal (Loftin, Toth and Obeyesekera, 1988).

During and since construction of the Kissimmee Flood Control project, several wading bird counts were made (Toland, B. 1991) and summarized (Montalbano et al., 1979; Perrin et al., 1982). An interpretation of Toland's work yields an estimate of an average population of 3,500 birds on the flood plain, exclusive of cattle egrets (2,500-4,500 range est. by Toland, B. 1991). One species, the wood stork is on the Federal threatened and endangered list. Three other species are listed by the Florida Game and Fresh Water Fish Commission as endangered or as a species of special concern: tri-colored heron (endangered), little blue heron (species of special concern), and snowy egret (species of special concern). The SFWMD Demonstration Project resulted in

a 1,000 percent increase in the aquatic wading bird utilization of affected sections of the Pool B flood plain (Toland, 1990).

TABLE 2

EXISTING ACREAGE OF WETLAND HABITATS IN THE KISSIMMEE RIVER FLOOD PLAIN*

TYPE	POOL A	POOL B	POOL C	POOL D	POOL E	TOTALS
WETLAND FORESTED						
Cypress	0	120	21	83	38	262
WETLAND PRAIRIE						
Rhynchospora	0	755	249	0	0	1005
Aquatic Grass	493	1068	2794	383	136	2359
Maidencane	815	1081	834	0	13	2743
WETLAND SHRUB						
Buttonbush	395	39	0	365	4	803
Primrose Willow	112	89	355	135	3	693
Willow	580	559	228	222	50	1639
BROADLEAF	59	1441	1107	648	192	3447
SWITCHGRASS	117	215	55	84	0	471
TUSSOCK	19	243	193	94	81	630
TOTALS	2590	5610	3321	2014	517	14052

*From U.S. Fish and Wildlife Service, 1991.

Wildlife in the area consists of deer, small mammals, alligators and small reptiles, wading birds and ducks. An alligator census in 1978 found 1.78 per mile. Coot, Florida ducks, blue-winged teal and ring-necked ducks constitute the bulk of the basin's waterfowl. The present waterfowl population estimate is about 140 in the Lower Basin; available winter water is estimated to be about 27,000 acre-days annually. A study by the Florida Game and Fresh Water Fish Commission (Perrin et al., 1982) reported that about 80 percent of the wintering waterfowl population utilized the Upper Basin while use of the

river/flood plain accounted for the remaining 20 percent. This study also disclosed that coot and water-fowl usage of the flood plain decreased by over 90 percent after channelization of the Kissimmee River. A significant exception was Paradise Run which is influenced by periodic water level fluctuation and hence, has habitat conditions that are more attractive to waterfowl, and which had substantially more waterfowl utilization than any of the five pools of C-38.

WOOD STORKS

Because of the large expanse of area involved, the following species could occur in both the Upper and Lower Basins: bald eagle, snail kite, indigo snake, Audubon's crested caracara, wood stork, and the grasshopper sparrow. The bald eagle requires large expanses of aquatic habitat for feeding. Flooded wetlands and shallow lakes provide desirable prey species. The wood stork nests when drying flooded areas are concentrating aquatic organisms in isolated holes and ponds. The snail kite will use any area that has sufficient submerged vegetation to support an adequate population of apple snails (Pomacea paludosa) that can be reached from the air. Audubon's crested caracara is a raptor that preys both upon carrion and living prey, preferring open dry prairie and pasture with scattered cabbage palm clumps for nesting. The grasshopper sparrow is endemic to central Florida and occurs in the Avon Park bombing range. It is not known to occur in any of the areas that would be inundated during restoration. Indigo snakes prefer sandy upland habitats; inundation of pastures is expected to have no impact, either beneficial or adverse, on this species. Coordination with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act has been completed (Annex E).

Vectors in the study area include ticks, mosquitoes, biting flies and midges. These vectors may transmit Lyme's disease (ticks), encephalitis (mosquitoes and flies), and malaria (Anopheles mosquitoes); rabies is present to varying degrees among wild mammals, notably raccoons, skunks and foxes. While these vectors or hosts are likely present in the study area, there are no known public health problems related to vectors in the basin.

Lake Okeechobee is a 700 square mile lake at the southern end of the Kissimmee River. With a drainage area of 5,600 square miles, the lake is the principal natural reservoir in southern Florida. Waters of this shallow lake are impounded by the encircling Herbert Hoover Dike, which forms a multipurpose reservoir for navigation, water supply, flood control, and recreation. The 35-foot high dike was designed to both prevent flooding which historically accompanied tropical storms, and increase the lake's water storage capacity. Technically, the lake is classified as eutrophic based on phosphorus and nitrogen loads in lake water (SFWMD Technical Report 81-2, 1981), with phosphorus being 40 percent above the predicted excessive loading rate and nitrogen 34 percent above the excessive loading rate. Lake Okeechobee is an integral part of the SFWMD's Surface Water Improvement and Management (SWIM) program which is discussed in subsequent sections of this report.

Due to their weedy potential, water hyacinth and water lettuce are aggressively managed in Lake Okeechobee and Lake Kissimmee, as well as on the old Kissimmee River runs and C-38. Although these species are currently under maintenance control in these water bodies, large quantities of plants are controlled annually. In the old Kissimmee River runs and C-38, approximately 3,300 acres of water hyacinth and water lettuce were controlled in Fiscal Year 1986. This figure was down to 1,000 acres in Fiscal Year 1989.

3.6 POPULATION

The six counties which make up the study area of this report include Glades, Highlands, Okeechobee, Orange, Osceola, and Polk. Population growth and economic activity within the study area and in the state overall has had and is expected to continue to influence the socio-economic trends and characteristics of the Kissimmee Basin. The State of Florida began showing tremendous population growth after World War II. The state's population grew from 2,771,300 in 1950 to 12,937,900 in 1990 primarily because of migration. Over this period the state's share of the U.S. population increased from 1.8 to 5.2 percent.

Within the six-county Kissimmee River Basin study area, the 1990 population totalled 1,296,251. The majority of the population resided in Orange

County, with Orlando being one of the nation's leading tourist areas. There are no major urban areas within the Lower Basin. The largest urban concentration in the area is Okeechobee, located within the Taylor Creek-Nubbin Slough sub-basin. Table 3 provides population figures for the study area over the period 1970 through 1990. Additional population and demographic data can be found in Socio-Economics Appendix.

TABLE 3

POPULATION
KISSIMMEE RIVER BASIN

COUNTY	1970	1975*	1980	1990
GLADES	3,669	4,689	5,992	7,591
HIGHLANDS	29,507	37,448	47,526	68,432
OKEECHOBEE	11,233	15,087	20,264	29,627
ORANGE	344,311	402,646	470,865	677,491
OSCEOLA	25,267	35,289	49,287	107,728
POLK	277,222	270,345	321,652	405,382
TOTAL	641,209	765,504	915,586	1,296,251

* Estimated
Source: 1986 OBERS and 1990 Florida Census of Population, US Department of Commerce, Bureau of Economic Analysis and Bureau of Census.

3.7 LAND USE

Orlando, at the headwaters of the Kissimmee River Basin, is the primary economic and transportation center in the study area. Once the center of the state's orange production, the local economy of Orlando and the surrounding area now focuses on tourism. Kissimmee, located in Osceola County, is located eight miles east of Disney World and seventeen miles south of Orlando, and is influenced largely by tourism activities in the Orlando area. The other major incorporated area of Osceola County, the city of St. Cloud, is primarily a retirement community.

Land uses in the Upper Basin around the perimeters of Lakes Kissimmee, Hatchineha, Cypress, Rosalie, Tiger and Jackson are primarily pasture, some agriculture, and a large amount of wetlands. Marinas, fish camps, and various public facilities, such as boat launching sites and picnic areas, are located around the lakes. Lake Kissimmee State Park is on the extreme northwestern periphery of Lake Kissimmee, and the Three Lakes Wildlife Management Area and Prairie Lakes Preserve border the southeastern half of Lake Kissimmee. Small residential and commercial areas are also scattered around most of the lakes. Development is more intense upstream of Cypress Lake, particularly in the Lake Tohopekaliga - East Lake Tohopekaliga (Toho) chain.

Agriculture continues to play an important role in the region. In the Lower Basin, most of the area between Lake Kissimmee and Lake Okeechobee is in fewer than fifty large, private land holdings and several hundred subdivided property holdings. Agriculture remains the primary land use activity within the Lower Basin, being dominated by extensive beef cattle production and dairy activities.

The Avon Park Air Force Bombing Range is located within the Polk County portion of the Lower Basin. This 107,000-acre Federal facility is used both as a training facility for Armed Forces personnel, and as a management area for wetlands adjacent to the Kissimmee River.

Table 4 provides generalized land use categories found within the Lower Kissimmee River Basin. Lower Basin lands have undergone substantial change over the last twenty years. Most notable is the conversion of unimproved pasture land to improved pasture at an accelerated pace during the period 1958 to 1972.

In the Upper Basin, most of the development susceptible to flood damage is urban, where damage is primarily a function of the depths of flooding inside structures or the stage of flooding. Single family residential land use is the primary type of development affected by flooding in the Upper Basin. Major affected areas are located around the towns of Kissimmee and St. Cloud, which cover only six percent of the damage susceptible flood-prone area but account for almost half of the basin's standard project flood damage. Other affected areas include Lake Hart, Lake Mary Jane, Pells Cove, Hidden Lake, Lake Hatchineha, Lake Alligator, Lake Rosalie, and the area west of the southern part of Lake Kissimmee. Existing average annual equivalent flood damages in the Upper Basin are estimated to be $1,226,300 (8 1/2% rate).

TABLE 4

LAND USE
LOWER KISSIMMEE RIVER BASIN

LAND USE	1958	1972	1980**
Urban	0	1,300	3,100
Crops	300	1,600	5,400
Improved Pasture	32,900	223,200	187,100
Unimproved Pasture*	280,600	133,200	141,500
Citrus	1,300	1,000	1,700
Forest	3,200	7,500	35,800
Marsh	133,700	84,200	54,900
Total	452,000	452,000	429,500

(Source: Obeysekera and Loftin, 1990)
* Most of the unimproved pasture was wet prairie.
** Area for 1980 does not include the sub-basin below S-65E.

In the Lower Basin, mobile homes located around Pool E are the primary areas that would be affected by flooding. Although this land use would account for most of the damages from a standard project flood and 100-year event, it is not susceptible to damage during smaller floods. Other damages occur due to the duration of flooding on pasture land. Although agricultural use is the primary land use in the Lower Basin, flood damages are relatively minor for this activity due to the short duration of flooding, a result of the existing project works. Existing average annual equivalent damages in the Lower Basin are estimated to be $97,900 (8 1/2% rate).

3.8 RECREATION

Recreation within the Lower Kissimmee River Basin has increased substantially in recent years, and both public and private facilities have been developed or expanded to accommodate the increasing demand for recreational opportunities. Public facilities include Okee-Tanti Park, located at the mouth of the Kissimmee River, which provides camping, picnicking, boat ramps, and restrooms with showers. Other public facilities include Lake Kissimmee State Park, located upstream of the channelized Kissimmee River, and the Avon Park Bombing Range, the latter offering camping, picnicking, hiking trails, and hunting. The Bombing Range is utilized during the week for practice bombing

flights. As a result, the number of low-flying jet aircraft using the range tends to disrupt the audible aesthetics of the river.

Private facilities include the River Ranch Resort located at the upper end of the Kissimmee River, which offers a marina, and multi-purpose recreational opportunities. An additional seven privately-owned fish camps are located between State Highways 60 and 70, offering boat ramps and other services along the waterway.

Recreational use in the Lower Basin is primarily concentrated at each end of C-38, with emphasis on camping, general boating, boat fishing, and bank fishing. There is limited access to the river on C-38 for bank fishing, but boaters have access to almost any point along the waterway from existing boat ramps. However, available facilities are not used at full capacity. Most of the land along the river remains in private ownership. Those using the area for fishing, hunting, and wildlife observation may only utilize the river banks and adjacent lands with permission of the landowners.

Thirty-six miles of the Florida National Scenic Trail were dedicated in June 1990 along the flood plain of the Kissimmee River. Additional sections of trail will be developed as contiguous parcels of land are acquired by the state under the Save Our Rivers program. According to the SFWMD, the long range plan is to extend the trail the full length of the river.

Heaviest boat usage occurs within the Lake Kissimmee and Lake Okeechobee areas located at the northern and southern ends, respectively, of C-38. This is most likely the result of the larger numbers of boat owners who keep their boats at marinas on these lakes, more waterfront property owners with their own moorage facilities, and more convenient access to these larger water bodies than to the river. Heaviest fishing use occurs during the four to five months from late fall to early spring, although fishing occurs on a year round basis.

A 1978-1980 fishing census by the Florida Game and Fresh Water Fish Commission found about 26,000 fishing days annually. Effort by species was 43% for bass, 41% for crappie, and 16% for panfish. Non-residents accounted for 28% of the fishing. Boat traffic through the six locks is 20,000 passages per year (1991).

Prior to construction of the C&SF Project in the Kissimmee Basin, efforts were made by local recreational boating interests to demonstrate the need to continue navigation on the river. As a result of this interest in the maintenance of navigation, locks were included in the Federal project with the local sponsor responsible for maintenance of the navigation portion of the

project. The SFWMD has continued to operate and maintain the navigation locks which are used by recreational craft.

The existing flood control project modified the Congressionally-authorized 3-foot navigation project, and the waterway now provides daylight only year-round navigation from Lake Kissimmee to Lake Okeechobee. Navigation is now primarily along the canal (C-38), instead of the meandering alignment of the original river. The waterway provides opportunity for day use recreational boating, canoeing, and fishing. The organized Kissimmee Boat-A-Cade currently utilizes the channel for an annual floating pilgrimage of some 300-400 boats from the city of Kissimmee through Lake Okeechobee to the coast.

Field observations of boaters using the channelized Kissimmee River indicate that recreational power boats are dominant crafts using the waterway. Annual lockage data for the six navigation locks on the Kissimmee also indicates to some extent the utilization of the system. These lockage figures are provided in Recreation and Navigation Appendix.

Although portions of the original river are presently unnavigable, many of the original river oxbows remain intact and are accessible via small boats or canoes. Some 60 miles of oxbow and meander area of the original river are accessible by canoe, bass boat, jon-boat, and similar shallow-draft craft.

3.9 CULTURAL RESOURCES

In 1985, the State Historic Preservation Officer (SHPO) indicated that at least 17 sites of historic or archeological significance were recorded within the Kissimmee River Basin, and that thirty to fifty additional unrecorded sites were likely to be present. In a letter dated June 18, 1991, the SHPO reaffirmed the archeological and historical potential of this region. Inspection of the Florida Master Site File in Tallahassee revealed that at least fifty archaeological sites are now recorded in the river basin. Approximately 3,000 archeological and historical properties are recorded in the four-counties included in the Lower Basin. Although no sites currently listed on the National Register of Historic Places are located in the project area, significant pre-historic and historic period archeological sites are expected to be found in proximity to the river.

At the Avon Park Air Force Range, a number of occupations directly along the Kissimmee River meet the eligibility criteria for listing in the National Register of Historic Places, including the Fort Kissimmee site, an historic period Second Seminole War fort site and residential homestead site, a Gaging Station site, and the Orange Hammock site (Austin and Piper, 1986).

Four prehistoric earthworks are located in or near the study area (Johnson, 1990). Three are rectangular or square earthwork structures, and the other is a semi-circular and linear embankment earthwork similar to other sites recorded around Lake Okeechobee (Carr, 1985). Three of these sites were apparently partially affected during construction of C-38; portions of two of the affected sites may remain buried under C-38 disposal piles.

A large, dense Belle Glade village midden with ceramics and well preserved faunal material is located on the River Ranch property on Long Hammock, adjacent to the Kissimmee flood plain west of C-38 (Austin 1990). The site is significant for its potential to establish chronology, studying Belle Glades life-ways, and the interaction among St. Johns, Kissimmee and Lake Okeechobee culture areas. An unrecorded burial mound is reported to be located directly south of this site.

Most of the existing structures in the Lower Basin (Annex F) flood plain do not appear to meet the eligibility criteria for listing in the National Register of Historic Places. These include each of the S-65 water control structures along C-38, the four bridges which cross C-38 (CSX Transportation Railroad, State Highways 60 and 70, and U.S. Highway 98), and most of the residential, farm and other standing structures.

The cultural overview for the Lower Basin also is generally applicable to the Upper Basin. The potential for significant Paleo-Indian and early Archaic period archeological sites increases in the Upper Basin. Since the Upper Basin was more densely populated than the Lower Basin during the nineteenth and early twentieth centuries, significant cultural resources from this period are more likely to be discovered in the Upper Basin.

3.10 AESTHETICS

The Headwaters lakes exhibit a patchwork development pattern with numerous subdivisions as well as commercial enterprises and agriculture dotting the lake shores. Large tracts of undeveloped land used by wildlife for roosting, feeding and nesting are interspersed along stretches of the lakes, and are more extensive than the developed shorelines. This patchwork type of development allows those who use the lakes the opportunities to view a tremendous variety of wildlife from short distances away from shorelines. The Upper Chain of Lakes provide an excellent example of the contrasts between development and a more natural lacustrine environment.

With the exception of developed areas around major road crossings, and near the various locks, the Lower Basin is largely undeveloped and presents many

miles of water in which boaters can travel without seeing signs of human habitation. However, the canal offers little in the way of vegetative or scenic interest. The canal is wide and straight, and this contributes to the lack of variety.

The remnants of the old river are associated with the large, older trees and denser vegetation, as well as submerged and emergent plants. These have not established themselves on the canal cut because of deeper water and steep sides. The taller trees overhanging the oxbows provide shade which is missing from the main canal.

The aesthetics are adversely affected in the vicinity of the Avon Park Bombing Range, which is used during the week for practice bombing flights. The planes approach the range from any direction at low altitudes and at high speeds with the resulting noise associated with such low flying aircraft. This has a tendency to shatter the audible aesthetics of the river.

3.11 AIR QUALITY

Air quality is that of a rural, non-industrial area. Pesticides are not applied from aircraft. There are no air quality issues.

3.12 SAVE OUR RIVERS PROGRAM

The State of Florida's Save Our Rivers (SOR) Program uses bond proceeds, supported by the general revenue portion of the State's Documentary Stamp Tax, to acquire lands for the purposes of water management, water supply, and the conservation and protection of the State's water resources. Manageability, surface and ground water systems, and the formation of corridors for the critical interaction of wildlife populations are major considerations in the land acquisition process. Prime requisites in managing these public lands are to ensure that the water resources, fish and wildlife populations, and native plant communities are maintained in an environmentally acceptable manner, and made available for appropriate outdoor recreational activities consistent with their environmental sensitivity.

The Florida State Legislature approved the Kissimmee River Valley for land acquisition under the SOR Program. The SFWMD is responsible for acquiring critical water resource lands for the SOR Program in the Kissimmee River Basin. Land acquisition in the Lower Kissimmee Basin began in 1984, and as of May 1991, approximately 27,300 acres have been acquired as part of the

Kissimmee River restoration program. At the present time, about 29,700 acres remain to be acquired under this program.

SECTION 4

FUTURE "WITHOUT PROJECT" CONDITION

This section provides a forecast of future conditions in the Kissimmee River Basin that are likely to occur if no Federal project is implemented to restore the river. The future "without project" condition is synonymous with the "no action" alternative required pursuant to the National Environmental Policy Act of 1969, as amended.

4.1 KISSIMMEE RIVER PROJECT

In the future "without project" condition (without a restoration project), the existing Kissimmee River Project for navigation and flood control would remain in place and would continue to be operated and maintained. The "without condition" for this study assumes, however, that a Headwaters Revitalization Project will be implemented in the Upper Kissimmee River Basin by the Federal government under authority of Section 1135 of the Water Resources Development Act of 1986, as amended.

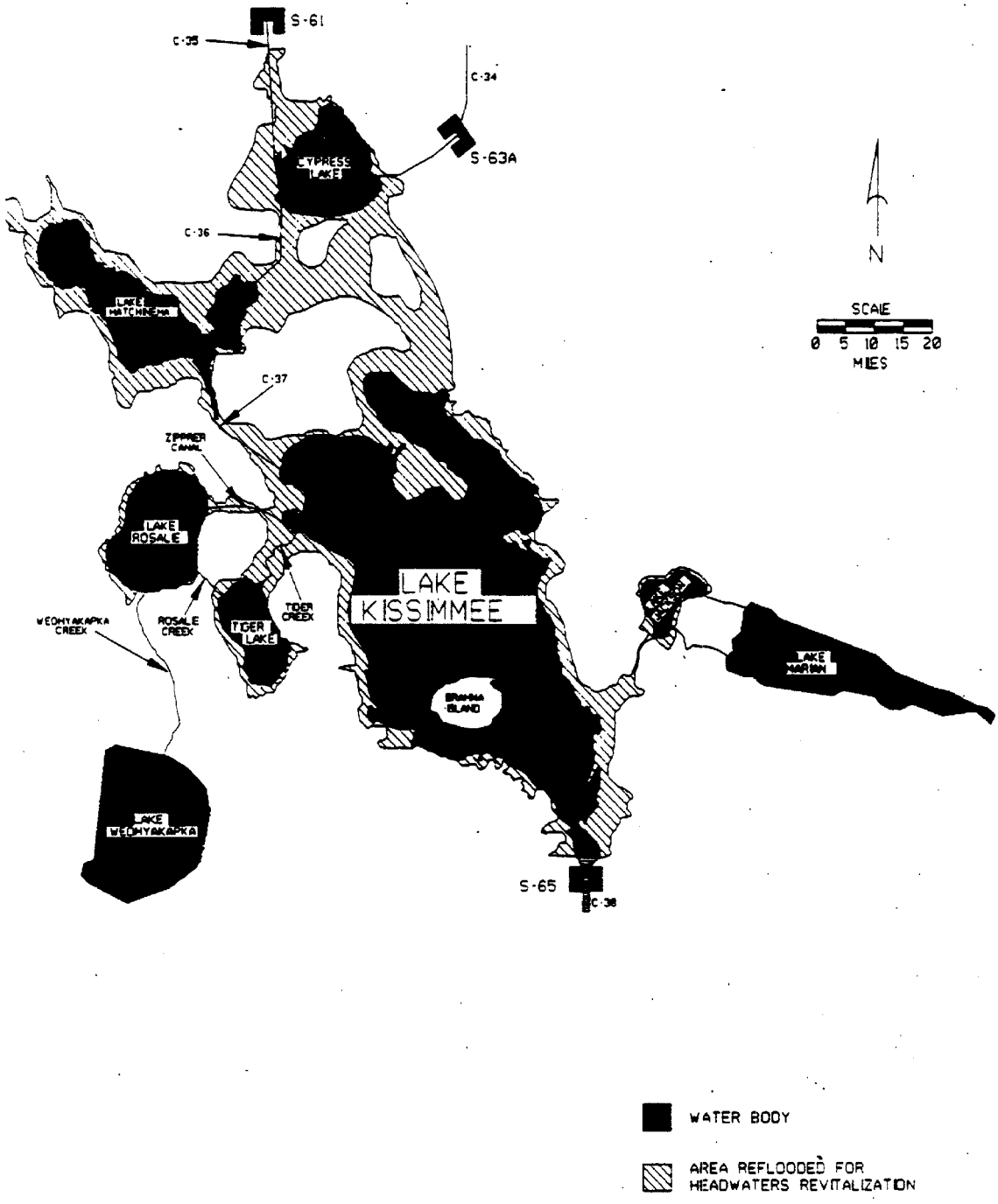
4.2 HEADWATERS REVITALIZATION PROJECT

Hydrologic conditions in both the Upper and Lower Kissimmee River Basins have been modified as a result the Kissimmee River Flood Control Project. In the Upper Basin, water levels in Lakes Kissimmee, Cypress and Hatchineha are regulated between elevations 48.5 and 52.5 feet. On occasion, these lakes are drawn down several feet as a fishery management measure to consolidate organic sediments and allow native vegetation to reestablish. When required for flood protection of the Upper Basin, water is released to the Lower Basin, sometimes in sudden pulses. As a result of the narrow regulatory range and little flood or conservation-pool storage in these lakes, regulatory operations often cause rapid changes in water levels in the lakes. No releases to the Lower Basin are made during dry periods. Modification of the regulation schedules for the Upper Chain of Lakes would provide for greater, and more natural fluctuations of water levels in the lakes, as well as capability to simulate the historic seasonal flow from Lake Kissimmee to the Lower Basin. This capability is a prerequisite for successful restoration of the Lower Basin ecosystem.

In an effort to provide conditions necessary to restore more natural flows in the Kissimmee River, the SFWMD has developed a proposal to modify seasonal water storage operations in the Upper Basin. This program, referred to as "Headwaters Revitalization", is critical for successful river restoration in the Lower Kissimmee River Basin. Specifically, an Upper Basin project is necessary to meet two of the five hydrologic conditions (criteria) that must be reestablished to restore the Lower Basin ecosystem. These conditions, which are explained in detail in Section 8 of this report, are the reestablishment of continuous flow with duration and variability characteristics comparable to prechannelization records; and reestablishment of stage hydrographs that result in flood plain inundation frequencies comparable to prechannelization hydroperiods, including seasonal and long-term variability characteristics. These conditions can only be met, and Lower Basin restoration will only be successful, if an Upper Basin project is implemented.

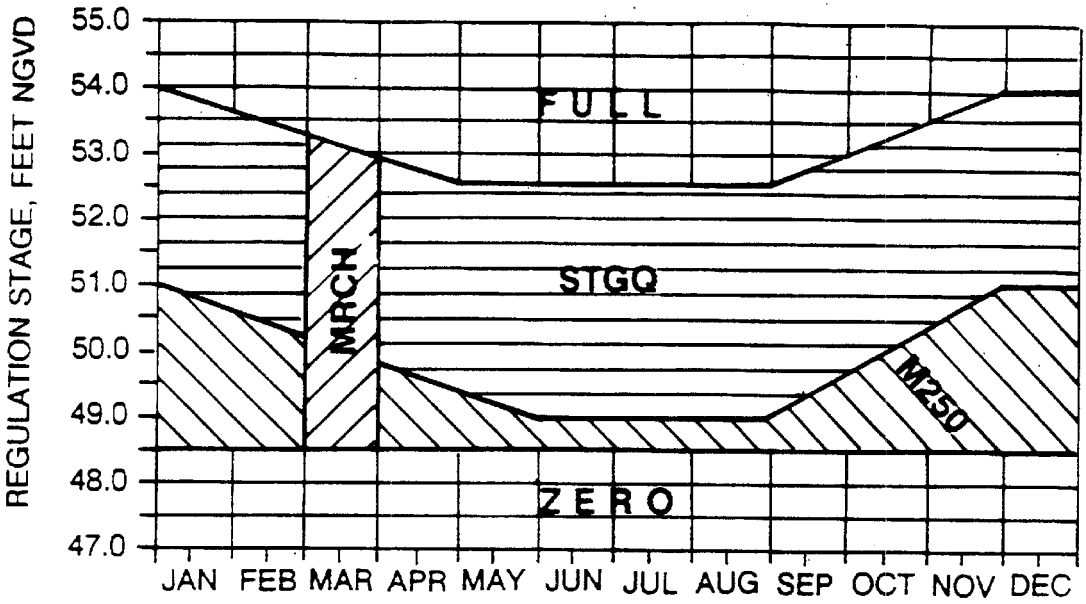
Alternative plans consist of: "no action", which would leave the existing Upper Basin works in place and operating with existing schedules; modification of the regulation schedules for various combinations of the Upper Basin Lakes; and various combinations of land acquisition and structural modifications, such as canal dredging, to control effects of changed water levels. These alternatives will be formulated and evaluated in more detail in later studies, including hydrologic modeling and environmental analyses. At this time, a viable alternative is the Headwaters Revitalization Project developed by the SFWMD as an integral part of the restoration studies that led to its 1990 *Restoration Report*. Based on preliminary planning, Headwaters Revitalization would include the following features, as shown in Figure 7:

* **Modification of the Upper Chain of Lakes Regulation Schedules -** Modification of the Upper Chain of Lakes' regulation schedule would restore the ability to simulate the historic seasonal flow from Lake Kissimmee to the Lower Basin, and provide higher fluctuations of water levels in the lakes. Although additional analyses and hydrologic modeling must be performed, the SFWMD developed the preliminary regulation schedule shown in Figure 8 to provide the desired flow from Lake Kissimmee; this schedule was used in the analyses conducted during this feasibility study. The upper level of the preliminary schedule would be increased from elevation 52.5 feet to elevation 54.0 feet, and the schedule would be zoned to provide varying discharges based on season and water levels. The revised schedule will seasonally reflood land between elevations 52.5 and 54.0 feet in Lakes Kissimmee, Hatchineha, and Cypress. It is expected that flood damage reduction afforded by the existing Kissimmee River Flood Control Project can be maintained with implementation of a zoned schedule.



HEADWATERS REVITALIZATION PLAN

FIGURE 7



DESCRIPTION OF OPERATION RULES USED FOR
PRELIMINARY SCHEDULE EVALUATION

ZONE CODE NAME	DESCRIPTION OF DISCHARGE RULE
FULL	Full discharge: Releases from the lake are made as rapidly as possible. This zone is always above the top line of the schedule.
STGO	Historic stage-discharge relation: Releases from the lake are made according to the historic stage-discharge relationship at S-65.
M250	Minimum 250 cfs: Discharges are maintained at a minimum of 250 cfs.
MRCH	The March Rule: During March, changes in Lake Kissimmee stages are limited to 0.1 ft per week. Discharges are made accordingly.
ZERO	Zero discharge: Discharge from the lake is not allowed.

CONCEPTUAL REGULATION SCHEDULE

FIGURE 8

This lake regulation schedule is not considered the final or ultimate water management solution for the upper lakes region. A similar zone or another schedule may be developed to improve the water management capability within the headwaters region. The revised schedule is expected to increase seasonal water storage capacity by 100,000 acre-feet, according to studies by SFWMD.

* **C-34, C-35, C-36 and C-37 Dredging** - These canals connect the Upper Basin group of lakes. Because of increased tailwater stage at S-65 caused by the modified regulation schedule, these canals would be enlarged to flatten the flood profile through the upper lakes and prevent excessive flood effects.

* **S-65 Bypass Spillway and Gate Extensions** - Modifications to the existing S-65 structure would be needed because of the higher stages in Lake Kissimmee and to provide higher discharge capacity. While these modifications are necessary features of Headwaters Revitalization, they have been considered in the formulation of the plan recommended by this feasibility study.

* **Tributaries** - A revised regulation schedule could affect runoff from tributary sub-basins. Effects could be mitigated by acquisition of real estate interests, or by structural modifications to improve conveyance capacities.

* **Lands** - The SFWMD plans to acquire the necessary rights to reflood land below elevation 54.0 feet under the State's Save Our Rivers Program. Approximately 17,300 acres bordering the three affected lakes must be acquired; about 4,750 acres had been acquired through May 1991.

The likely environmental effects of the Headwaters Revitalization Project have been addressed at a general, programmatic level of detail for this feasibility study. More detailed analyses will be accomplished and documented in an appropriate NEPA document during the later Corps study of this proposal, as described below. At this time, the following assessment indicates that no significant adverse effects are expected.

Beneficial environmental effects in the Upper Basin resulting from the Headwaters project include expansion of lake littoral zones by up to 17,300 acres, and associated benefits to fish and wildlife on Lakes Kissimmee, Hatchineha, Cypress, Tiger, and Jackson. Additional benefits are expected because of increased spatial and temporal dynamics produced by long-term fluctuations of seasonal water levels. The entire regulated fluctuation zone of 5.5 feet will not be used every year. During wet years the upper end of the zone will be used, while the lower end will be used in dry years. These dynamics are expected to increase the overall quality and productivity of littoral habitat, and create a significant area of wetlands.

A buildup of organic sediments often occurs in certain areas of over-stabilized lakes in Florida. Physical removal of these sediments during draw-downs has been a last resort for managing some of the lakes in the Headwaters. Increased seasonal fluctuation will allow for more frequent natural removal of organic sediments from these lakes, via oxidation and wind erosion of dried lake bottom sediments during periods of low water. Also, with greater long-term fluctuations over the regulated zone, no particular elevation will be susceptible to buildup of organic sediments.

The U.S. Fish and Wildlife Service has determined that Headwaters Revitalization will benefit the endangered bald eagle, snail kite and wood stork (see Annex E). The increased storage capacity and expanded littoral zone would result in expanded riparian and wetland feeding habitat and increased food supply for the eagle, kite and wood stork. The crested caracara, grasshopper sparrow and indigo snake would be unaffected.

Lake water level fluctuations in the Upper Basin typically occur in response to rainfall. Rain pools, water incidentally caught in tree holes and herbaceous vegetation, and higher lake levels commonly produce surges in mosquito populations that would be noticed by residents. Headwaters Revitalization would not aggravate such natural conditions normal to lake levels, and the incidence of mosquito-borne diseases in unlikely to be affected by the project.

Informal consultation and a preliminary assessment by the State Historic Preservation Officer indicates that structural and operational modification to the Upper Chain of Lakes could have an adverse effect on significant cultural resources, primarily from increased fluctuations in lake water levels. Surveys to locate and identify significant archaeological and historical resources will be performed during later studies, and appropriate mitigation measures will be developed in consultation with the State Historic Preservation Officer.

Upper Basin recreational activities would continue unchanged after implementation of the Headwaters project. Only during lower than normal draw-downs would any effects be noticed by boaters and anglers, and these will not be significant or of long duration. Neither the navigation nor the flood control functions of the existing Kissimmee River project would be adversely affected by the Headwaters Revitalization.

In the Lower Basin, the Headwaters Revitalization Project would result in hydrologic characteristics that are critical to successful ecosystem restoration. Hydrological, hydraulic, and ecological analyses of alternative Lower Basin restoration plans by the SFWMD (1990) produced evidence that the combination of backfill in the Lower Basin and Headwaters Revitalization would reestablish continuous flow and stage characteristics that are needed to

achieve river restoration objectives. Maintenance of continuous flows would produce the physical aeration and mixing that is needed to restore favorable dissolved oxygen regimes in the restored river channel. Reestablished discharge characteristics from Lake Kissimmee also would improve habitat diversity in the 56 miles of restored river channel, and provide water that is necessary to restore flood plain wetlands and associated fish and wildlife values.

In the event that a Headwaters Project is constructed and a Lower Basin Project is not constructed, the expected environmental effects in the Upper Basin, such as improved littoral zone habitat, would still occur. Incidental Lower Basin environmental benefits, such as some improvements to dissolved oxygen regimes immediately below structures, would be minor and negated, because the Headwaters Project alone will not reestablish the full range of hydrologic conditions necessary to restore the Lower Basin' ecosystem. Specifically, the Upper Basin Project alone would not provide the flow velocity, overbank flow and recession rate characteristics of a more naturally functioning hydrologic system. Degraded Lower Basin conditions that are related to the existing controlled hydrology, such as periodic fish kills and lack of a full complement of wetland habitats, would persist. Conversely, if a Headwaters project is not implemented, the hydrologic conditions required for successful restoration of the Lower Basin ecosystem could not be achieved. Thus, without Upper Basin modifications, a Lower Basin project would be largely ineffective and its construction would be unjustified. While a Headwaters Revitalization Project could function and produce some environmental benefits, only the combined Upper and Lower Basin Projects together will produce the necessary hydrologic conditions for restoration of the Kissimmee River ecosystem.

The Corps intends to study and develop a recommendation for the Headwaters Revitalization Project using the standing continuing authority of Section 1135 of the Water Resources Development Act of 1986, as amended. This authority permits the Corps to modify completed projects to achieve environmental improvements. Section 46 of the Water Resources Development Act of 1988 directs the Secretary of the Army, *"to proceed with work on the Kissimmee River demonstration project, Florida, pursuant to section 1135 of the Water Resources Development Act of 1986,"* and funds have been appropriated for this work.

The current schedule for Headwaters Revitalization includes preparation of a separate Corps "1135 Report", including a NEPA document, in 1994 (see Section 1 for a discussion of tiered NEPA documentation). The report will document the results of hydrologic modeling, fish and wildlife evaluations, Section 404 analyses, cultural resources investigations, required coordination with other agencies and the public, and other analyses necessary for decision making and to satisfy Federal requirements. The report will define the Federal

role in the Headwaters Project as the basis for project approval. Assuming that the project is approved using Section 1135 authority, Upper Basin construction would be completed (currently scheduled for 1997) before Lower Basin backfilling is started (currently scheduled for 1998) to ensure that the Lower Basin can function as intended.

For the purpose of this feasibility study, the Headwaters Revitalization Project is assumed to be in place and functioning in the "without project" condition.

4.3 CLIMATE

Since 1970, the entire south Florida region has experienced an apparent change in rainfall characteristics. Average annual rainfall has been below normal in most of the twelve basins within the boundaries of the SFWMD over the period 1970-1985. The Upper and Lower Kissimmee River Basins were among the basins where the reduction was most evident. The Lower Basin received below normal wet season rainfall in eleven consecutive years beginning in 1975. The reduction has been attributed to drier, shorter wet seasons, less heavy storms, and less rainfall associated with tropical storms. The Kissimmee River Basin has not experienced a major tropical storm since 1969, and the flood control project has not been fully tested against a major flood event.

For planning the environmental restoration, a conservative assumption has been made that there will be a continuation of the dry period through the period of analysis. Modeling conducted by the SFWMD during its recent restoration study used a period of record that was primarily within the time frame between 1970 and 1987. This assumption also has been included in Corps analyses for this study. A return to "normal" rain patterns would enhance restoration benefits. While this dry cycle of 1970 and 1987 was used for hydroperiod predictions for restoring ecosystem values, the entire period including all of the wet hurricanes was used for the flood control portion of the analysis.

4.4 POPULATION

Each of the six counties in the Kissimmee River Basin - Orange, Osceola, Polk, Highlands, Okeechobee, and Glades - are expected to continue the population growth experienced in recent years. Table 5 shows expected growth by county over the period of analysis. The center of regional growth is expected to remain around the Orlando area of Orange County, and other

major growth areas are expected to remain in the Upper Basin chain of lakes, primarily in Orange and Polk counties.

In the Lower Kissimmee Basin, Glades, Okeechobee, and Highlands Counties also are expected to continue growth in population, though not to the extent of the Upper Basin. The City of Okeechobee, located in the Taylor Creek-Nubbin Slough Basin, remains the largest population center within close proximity of the Lower Basin.

TABLE 5

PROJECTED POPULATION
KISSIMMEE RIVER BASIN

COUNTY	1995	2000	2005	2015	2035
GLADES	7,646	7,986	8,288	8,787	9,598
HIGHLANDS	70,937	76,097	80,286	87,303	97,722
OKEECHOBEE	31,526	33,836	35,722	39,064	44,164
ORANGE	678,401	726,581	764,895	838,109	945,069
OSCEOLA	106,038	118,970	129,101	146,744	173,365
POLK	433,988	461,073	483,872	524,377	584,801
TOTAL	1,328,536	1,424,543	1,502,164	1,644,384	1,854,719

Source: US Department of Commerce, Bureau of Economic Analysis, OBERS 1986

4.5 LAND USE

In the Upper Kissimmee Basin, the expanding economic base of the Orlando area is expected to continue to place increased demands on the area's resources. Cattle ranches and orange groves will continue to give way to suburban subdivisions. Metropolitan development is rapidly moving toward the cities of Kissimmee and St. Cloud in Osceola County. This urban development is expected to continue in the Upper Basin as the population continues to expand.

In the Lower Basin, where the local economy is geared toward agriculture, large acreage remains in improved pasture for dairy operations and beef cattle production. The basin is expected to remain an agrarian economic area. The number and intensity of dairy operations in the Lower Basin are expected to decline. Resource management practices currently used in the Avon Park Bombing Range are expected to continue.

4.6 FLOOD DAMAGE REDUCTION

Current flood damage reduction in the Kissimmee Basin would be expected to be maintained under the "without project" condition. The current project provides flood damage prevention for thirty percent of the standard project event, or approximately a 5-year event. Structural components in the Lower Kissimmee River Basin, C-38 and the existing water control structures, would continue to maintain water level control within that basin; prescribed regulation schedules and operation of discharge structures would maintain flood damage reduction in the Upper Basin lakes.

between 5-yr + 2-yr

4.7 RECREATION

Large urban populations around Orlando, the Tampa Bay area, and the central coastal cities are all within a one to two hour drive of the Kissimmee River study area. As such, it is expected that the basin will experience increasing demand for recreational opportunities. The current, predominant recreational use in the study area is recreational boating, and fishing from both boats and adjacent banks of the basin's lakes and the Kissimmee River (C-38). Both public and private recreational facilities are available, offering camping, picnicking, fishing, hiking, and boating opportunities.

Demand for these types of recreational opportunities are expected to increase with greater population growth in the region. Continued use of C-38 by a variety of recreational vessels, including houseboats and other larger craft, would be expected in the Lower Basin under the without project condition.

4.8 WATER QUALITY

Water quality concerns are expected to continue to focus on two areas: (1) the nutrient content of the basin's waters and effects of those nutrients on Lake Okeechobee, and (2) low dissolved oxygen levels in C-38 and Kissimmee River oxbows.

Nutrient inflows to Lake Okeechobee from C-38 are not presently as major a concern as inflows from Taylor Creek-Nubbin Slough and other tributary areas to the Lake. Nutrients from these areas have been addressed primarily by implementation of best management practices which alleviate nutrient flows at the source of the problem. While this program has met with success, it alone is not expected to solve the total nutrient concern within the basin. Further action at the State and local level would be required to maintain the desired water quality in future flows entering Lake Okeechobee.

Existing low dissolved oxygen levels in C-38 and remaining river remnants are expected to continue in the without project condition. Adverse ecological effects associated with low dissolved oxygen would therefore continue to degrade the basin's natural resources.

The SFWMD has given priority to Lake Okeechobee as a water body of regional and statewide significance under the State of Florida's Surface Water Improvement and Management Act (SWIM). This legislation requires each water management district to design and implement plans and programs for the improvement and management of the state's surface waters. The water quality of many of the surface waters of the state has been degraded, and the intent of this program is to enhance the environmental and scenic value of these surface waters. The Lower Kissimmee River Basin below structure S-65 is within the drainage basin of Lake Okeechobee, and as such, the Kissimmee River (C-38) is an integral part of the state's SWIM program. Management practices are prescribed within the basin to control pollution of state surface and ground waters due to the discharge of waste water and runoff from agricultural land uses. The SFWMD has prepared a report entitled *Interim Surface Improvement and Management (SWIM) Plan for Lake Okeechobee,* dated March 1989, to implement the legislative intent of the SWIM program.

4.9 ENVIRONMENTAL RESOURCES

Immediate environmental impacts associated with construction of flood control works within the Lower Kissimmee River Basin have stabilized somewhat, however, long-term affects are expected to continue to degrade the basin's fish and wildlife resources under the "without project" condition. Water level stabilization, continued deposition of organic matter within remnant river channels, and continuation of low dissolved oxygen levels in C-38, are likely to further degrade the basin's natural resources.

Maintenance of stable water levels is expected to lead to continued deterioration of wetland communities and associated fish and wildlife resources within impounded portions of each pool. Stable pool stages will facilitate

continued buildup of plant litter and thereby accelerate succession from a wetland to terrestrial environment. Although the rate at which this transition to a non-wetland state is occurring has not been determined, the "without project" condition will eventually result in a steady elimination of the existing 14,000 acres of wetlands. As the acreage of wetlands declines, there will be a coincident loss of fish and wildlife habitat (e.g., decrease in the existing 123,000 HEP habitat units), including a decrease in the estimated 3,500 wading birds and 140 waterfowl which currently utilize the flood plain. Thus, the "without project" condition can be expected to exacerbate the long-term decline of wading bird and waterfowl populations in the southeast.

In the absence of flow, the "without project" condition also will allow for continued deposition of dead plant litter, and as a result, a similar loss of wetland (open water) habitat in remnant river channels. Although these remnant channels are currently in a degraded state, they provide some fish habitat during winter and spring months, when dissolved oxygen levels are suitable. If remnant river channels are allowed to eventually fill with organic deposits, the resultant loss of open water habitat will reduce the fish carrying capacity of the system.

Data collected by the Florida Game and Fish Commission indicates low Dissolved Oxygen levels within the system also will continue to degrade fisheries. Increased dominance by rough fish species such as gar and bowfin, with a commensurate decline by game fish species is expected. As a result, projected fishing pressure (recreational use) will be less than the 57,000 annual fishing days of usage that would be expected based upon predicted population increases for the region.

Degradation of remaining natural resources also could result from future developmental encroachment and/or land use modifications in the basin. Further loss of the basin's natural resources could be expected in the "without project" condition, unless action is taken to prevent intensive development and/or land use changes, such as conversion of more of the flood plain or tributary watersheds to improved pasture. Implementation of the Headwaters Revitalization Project would protect some of the Upper Basin's remaining natural resources, but would not eliminate the pending, imminent threat to the Lower Basin's resources that could occur with future growth.

4.10 MANAGEMENT

Current aquatic plant control programs within the Kissimmee Basin include herbicide treatment and other programs in an effort to control water hyacinth, water lettuce, and the submersed exotic hydrilla. Hydrilla is the most

problematic submersed exotic threatening the basin's water resources, and this threat is expected to continue. The ongoing control effort which includes C-38, portions of the old Kissimmee River runs and oxbows, as well as Lakes Kissimmee and Okeechobee, is expected to continue in the same magnitude as at the present time. The invasive nature of these plants mandates continued control to avoid adverse impacts to navigation, flood control, recreation, wildlife habitat, as well as public health and safety within the Kissimmee Basin.

Exotic plant species such as *Melaleuca and Schinus* (Brazilian pepper) presently are not a problem in the Kissimmee River Basin; should they become established an eradication program will be developed and implemented during project construction.

Management of the basin's water resources would likewise continue as presently managed, with strict adherence to current lake regulation levels and structure design discharge criteria. Continuation of these water management practices are not expected to improve the basin's ecological resources.

SECTION 5

PROBLEMS AND OPPORTUNITIES

Construction of C-38 reduced the flood threat in the Lower Kissimmee River Basin, enabling more intensive land uses to occur. However, it also led to a number of environmental impacts, such as a loss of fish and wildlife habitat, a reduction in the nutrient assimilative capacity of the river's flood plain, and loss of aesthetic qualities inherent in a natural meandering river system. This section discusses problems and opportunities in two major areas of concern: water quality and ecological degradation of the Lower Kissimmee River Basin.

5.1 WATER QUALITY

The first major concern following completion of the Kissimmee River channelization was water quality - in particular, the water quality of Lake Okeechobee. In 1972, the Central and Southern Florida Flood Control District, (now the SFWMD) conducted public meetings concerning possible environmental damage associated with river channelization. The two primary areas of concern which emanated from those sessions were: (1) Kissimmee River water quality and its effect on the eutrophication of Lake Okeechobee, and; (2) loss of environmental values in the Lower Kissimmee River Basin, specifically wetland reduction on the flood plain.

In 1973, the Florida Legislature established and funded the Special Project to Prevent the Eutrophication of Lake Okeechobee. Its purpose was to establish a sound scientific data base upon which necessary future governmental decisions could be made regarding the health and well being of the lake, which is vital to the water supply of south Florida. Of major concern at that time, and remaining so to date, is the volume of nutrients, primarily phosphorous, that is delivered to Lake Okeechobee by local inflows. Early concerns suggested that channelization was accelerating eutrophication of Lake Okeechobee by providing a direct route for rapid transport of sewage effluent which was being discharged into the Kissimmee headwater lakes (Marshall et al., 1972).

In the early to mid-1970s, Huber et al. (1976) determined that the Kissimmee chain of lakes was assimilating nutrient loads associated with this effluent. This analysis and a later study by Federico (1982) showed that C-38 has fairly low nutrient concentrations from the outlet of Lake Kissimmee to S-

65C; however, between S-65C and S-65E, tributary inflows lead to an increase in phosphorus levels. From 1974-78, for example, total phosphorus concentrations averaged 0.032 milligrams per liter at S-65, 0.044 milligrams per liter at S-65C, and 0.092 milligrams per liter at S-65E, and tributary inflows to pools D and E accounted for 60 percent of the total annual phosphorus load passing through S-65E. High nutrient loads downstream of S-65C originate as runoff from areas with intensive agricultural land use, and are transported to river tributaries through extensive drainage networks which have been installed in many Lower Basin watersheds.

A report prepared for the Corps by Atlantis Scientific, entitled *"An Assessment of Water Resources Management in the Central and Southern Flood Control District,"* was published in 1973. Its purpose was to review and evaluate environmental reports on the Kissimmee River Basin and Lake Okeechobee, and consider the consequences associated with channelization of the Kissimmee River and the extent of the apparent trend toward the eutrophication of Lake Okeechobee. The report suggested implementation of a water quality improvement program which could exercise discretionary control over the entire south Florida system.

In 1975, the Central and Southern Florida Flood Control District published a report entitled, *Lake Okeechobee-Kissimmee Basin Proposals for Management Actions,* which described management proposals for the lower Kissimmee River Basin, Lake Okeechobee, Taylor Creek-Nubbin Slough Basin, the north-central portion of the Everglades Agricultural Area, and Chandler Slough.

Environmental Resources Management Studies in the Kissimmee River Basin, by Huber, Heaney, Bedient, and Bowden of the University of Florida, was published in 1976 for the Central and Southern Flood Control District. The report discussed the historical evolution of the existing flood control system in the basin and the project's subsequent impacts. The report stated that, *"management for environmental quality focuses on maintaining high proportions of subsurface flow, high detention times, and natural hydroperiod, and upon utilization of natural marshes and swamps for water quantity and quality control".*

In 1976, the *Final Report on the Special Project to Prevent Eutrophication of Lake Okeechobee* was published. The major findings of the report included: (1) rain water should be retained in the basins' uplands by wetland storage in those areas; (2) publicly owned lands in the flood plain of the Kissimmee River, around the Upper Basin chain of lakes, and in the Everglades Agricultural Area, can and should be used to alleviate water quality problems and improve water use and conservation within the area; and, (3) improved farming and ranching techniques should be employed to improve water quality and to benefit water use and conservation. These and other recommendations were presented as a

strategy for the protection of water quality in Lake Okeechobee, and as a long term management tool for the region.

In its April 1977 report to the Florida Legislature, the Coordinating Council on the Restoration of the Kissimmee River Valley and Taylor Creek-Nubbin Slough Basin, referred to as the Kissimmee River Coordinating Council (KRCC), recommended several specific projects to analyze the most effective way to deal with water quality problems, including an upland detention/retention demonstration project, a feasibility study of potential animal waste recovery, and a nutrient abatement program for the Taylor Creek watershed. The Council's report also presented two Kissimmee River restoration alternatives, one calling for partial backfilling of C-38, and the other calling for creation of wetlands along the canal. Each of these measures addressed the specific concern of improving the quality of waters providing surface deliveries to Lake Okeechobee.

In response to the 1976 Kissimmee Restoration Act's mandate for development of measures *"to restore water quality of the Kissimmee River Valley"*, several studies were initiated to determine nutrient assimilation capabilities of flood plain wetlands. The most appropriate data was collected in the Pool B flood plain, where Davis (1981) found that reestablishment of wetlands with hydrologic characteristics and plant species composition resembling pre-channelization conditions resulted in at least a 40 percent reduction in total phosphorus and inorganic nitrogen concentrations of river water (reduced concentrations resulted from annual retention of a mean of 3.8 pounds per acre of total phosphorus and 13.1 pounds per acre of inorganic nitrogen). Moreover, Davis (personal communication) has found that this "cleaning effect" has persisted for ten years following reestablishment of the marsh. Although these results may not be transferable to portions of the system where nutrient loadings are higher, such as Pools D and E, the loss of nutrient assimilation capabilities that resulted from drainage of flood plain wetlands may have led to an increase in the annual phosphorus load transported by the system to Lake Okeechobee.

Assuming natural flood plain wetlands are capable of reducing phosphorus loads by 40 percent when loadings are comparable to that found in Pools A, B and C during 1974-1978, impacts of channelization may have accounted for as much as 22 percent of the mean annual total phosphorus load that passed through S-65E during this period.

Although the canal contributes a significant load of nutrients to Lake Okeechobee, ortho- and total phosphorous concentrations are among the lowest of any inflow to the lake. The primary water quality concern in the basin focuses on the Taylor Creek-Nubbin Slough Basin, which has experienced more

intensive agricultural land use. Best Management Practices and other techniques have been implemented in that basin to address the potential source of water quality concerns.

From a restoration perspective, the most significant water quality problem in the channelized system is low dissolved oxygen regimes. Monitoring has revealed extremely low concentrations of dissolved oxygen during summer and fall months in both C-38 and old river segments. Although detailed oxygen budgets have not been determined, the low surface to volume ratio of this deep, reservoir-like system likely prevents maintenance of favorable dissolved oxygen profiles, particularly in C-38. In the old river runs, organic deposits exacerbate this problem. Ecological ramifications of low dissolved oxygen levels indicate that this factor is a primary contributor to degradation of environmental values of the system. Figure 9 provides a graphic depiction of current dissolved oxygen levels and associated species diversity impacts for the existing project.

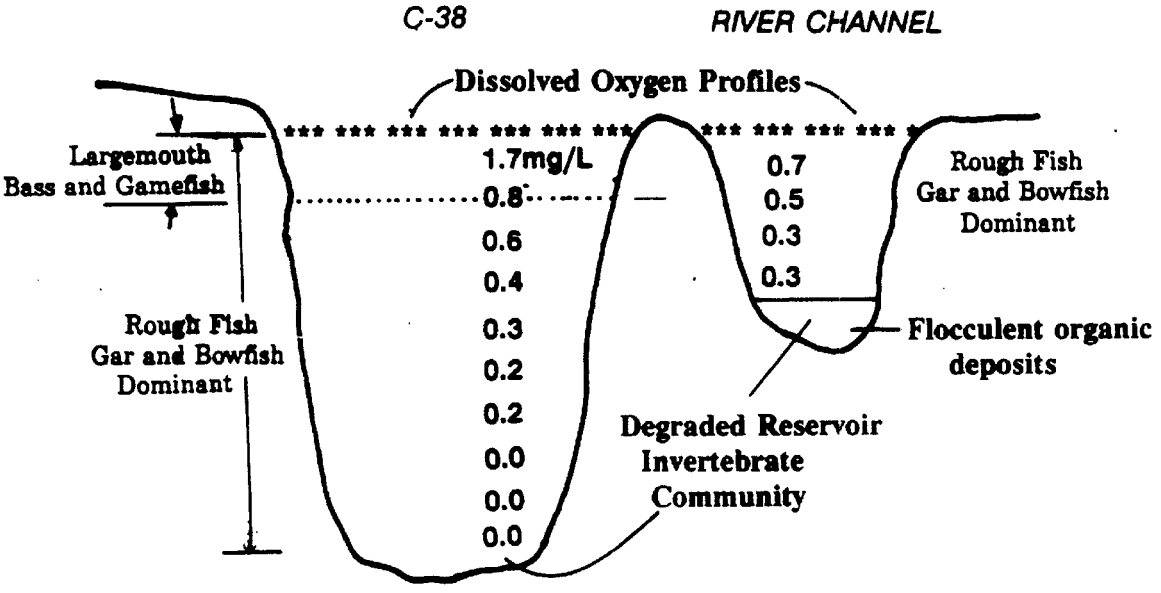
5.2 ECOLOGICAL DEGRADATION

Following resolution of the water quality issues associated with channelization of the Kissimmee River and its affect on Lake Okeechobee, the second major concern that arose was the effect of channelization on the loss of environmental values in the Lower Kissimmee River Basin. River channelization, upland drainage practices, and other hydrologic modifications have caused numerous environmental changes in the Kissimmee River ecosystem, including a loss of the basins' biological resources. These changes stem from alteration of key determinants of ecological integrity of the river and flood plain ecosystem.

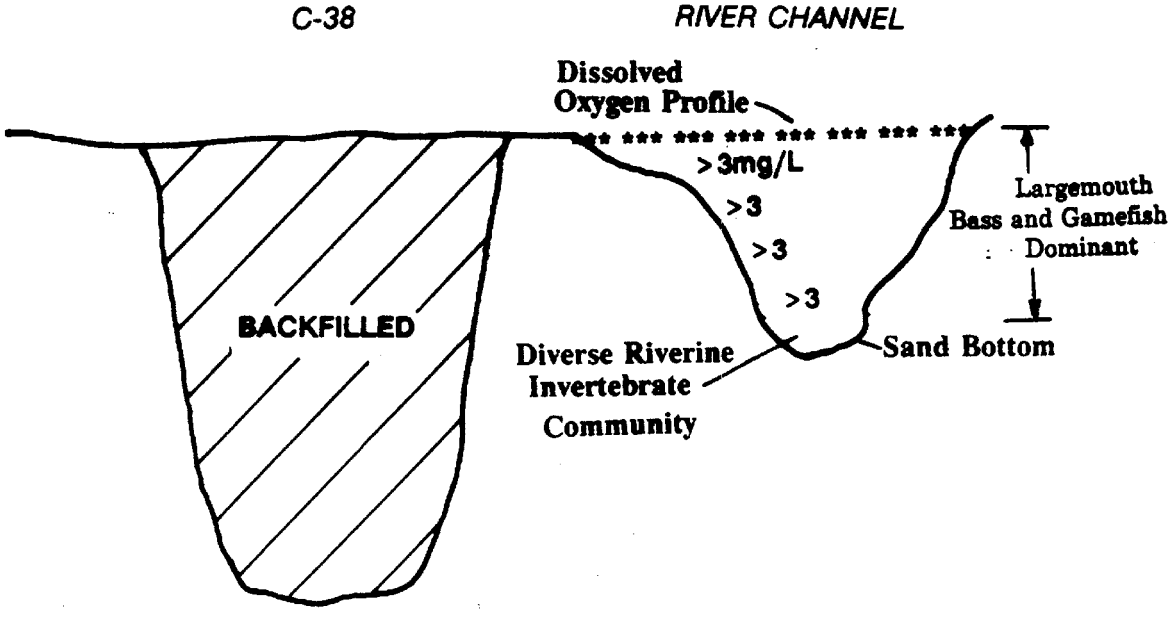
Effects on flood plain wetlands resulted primarily from alterations in the Lower Basin's hydrologic regimes and by channel excavation and dredged material placement. About 20,000 of the original 35,000 acres of flood plain wetlands were either drained, covered with material dredged during canal construction, or converted to canal. Most of the broadleaf marsh, wetland shrub, and wet prairie communities that once dominated the flood plain have been converted to unimproved and improved pasture, while maintenance of stable water levels has reduced plant species diversity and eliminated spatial heterogeneity of wetland plant communities within remaining inundated portions of each pool.

Channelization and other modifications of these wetlands have had wide-ranging ecological consequences, including loss of fish and wildlife habitat and virtual destruction of a complex food web that these flood plain wetlands once

EXISTING CONDITION



LEVEL II BACKFILLING



CANAL/RIVER DISSOLVED OXYGEN (DO) LEVELS
AND ASSOCIATED FISH SPECIES DISTRIBUTIONS

FIGURE 9

supported. For example, since channelization, there has been a 94 percent reduction in wintering waterfowl use of the Lower Basin (Perrin et al., 1982). Drainage of wetlands and maintenance of stable pool stages, as managed today, has eliminated plant species and community diversity that is necessary to attract and support large waterfowl populations.

Loss of wetland habitat diversity also has resulted in limited post-channelization usage of the flood plain by wading birds (Perrin et al., 1982). Prior to channelization, wading birds were provided accessible and concentrated forage in seasonally inundated wet prairie communities which were colonized by fish and invertebrates from adjoining marshes. Remaining flood plain wetlands do not provide favorable feeding habitat for wading birds because vegetation within existing broadleaf marshes is too dense, or water levels are too deep, for efficient foraging activity.

CATTLE WITH EGRETS

Drainage of flood plain wetlands also resulted in a loss of associated fish and invertebrate production. Based upon average densities in remaining marshes (Milleson, 1976), over five billion small fish and six billion freshwater shrimp existed in the flood plain marsh that was drained. In addition to providing forage for wading birds, these small fish and invertebrates were an important food source for riverine fish. Kissimmee River marsh samples (Florida Game and Freshwater Fish Commission, 1957; Milleson, 1976) indicate that most river fish, including game fish species, utilized wetland resources on the flood

plain during at least part of their life cycle. When water levels receded, fish species in the river fed upon small fish and invertebrates that were imported from adjoining flood plain marshes. However, because this transfer of organisms was most significant during receding stages, when water drained off the flood plain, maintenance of stable water levels has restricted this important interaction between the river and flood plain.

As in the flood plain, channelization had both direct and indirect effects on river channel habitat and associated biota. Approximately 35 miles of former river channel and backwater habitat were impacted by canal excavation and the deposition of dredged material. Discontinuance of flow has resulted in severe habitat degradation in the remaining 68 miles of river channel. Dissolved oxygen regimes are indicative of effects of lack of flow on habitat quality of remnant river channels. During summer and fall months, dissolved oxygen concentrations in the river and canal fall well below 3 milligrams per liter (Federico, 1982; Perrin et al., 1982).

Lack of flow-related hydrodynamic processes also has resulted in decreased depth diversity along remaining river cross-sections and accumulations of thick deposits of decomposing organic matter on the river bottom (Figure 9). These deposits have been generated primarily by continuous sloughing of emergent and floating vegetation, and generate a high biological oxygen demand which contributes to prevailing low dissolved oxygen conditions in remaining river runs.

Effects of channelization on dissolved oxygen regimes and river habitat diversity are primary causes of degradation of river biological communities. This includes a decline in the largemouth bass fishery and the loss of six indigenous fish species from the river system (Perrin et al., 1982). For fish species, summer and fall dissolved oxygen regimes create a "bottleneck" period during which all except the most tolerant species concentrate in limited suitable habitat at or near the water surface (Figure 9). During this bottleneck period, biological processes, such as competition, predation, and disease, reduce fish populations to sizes that can be supported by the constricted habitat space. Thus, summer and fall dissolved oxygen regimes may limit production of species intolerant of anthropogenic impacts, such as most game fish species, and cause continual community shifts in favor of tolerant species like gar and bowfin.

The food base of river fish communities also has been affected. Benthic invertebrate communities in the canal and remaining river sections are characteristic of a reservoir rather than a riverine environment (Toth, 1990). Bottom habitat in both the canal and remnant river runs support low invertebrate densities and diversity, and are dominated by organisms that are

tolerant of degraded habitat conditions. In addition to low dissolved oxygen concentrations, unsuitable substrates, and reduced habitat diversity, river invertebrate communities have been subjected to altered energy inputs. Due to hydrologic changes, wax myrtle has replaced willow as a dominant riparian species and source of allochthonous organic matter inputs along much of the remaining river channel. This represents a shift in the energy base with which the pre-channelization river invertebrate community and associated food chain co-evolved.

In summary, in addition to the loss of river and flood plain habitat which resulted from canal excavation and deposition of dredged material, channelization and other basin modifications have significantly affected the environmental values of the Kissimmee River ecosystem primarily through altered hydrologic regimes. Ecological consequences of altered flood plain hydrology and drainage of former swamps, marshes and backwater habitat include diminished flood plain habitat diversity, reduction of waterfowl and wading bird usage of the flood plain, and loss of habitat for forage, as well as, larger riverine fish species. Elimination or modification of river and flood plain interactions has affected the functional integrity of both the river and flood plain. Other river impacts have resulted from interruption of flow. Lack of flow associated with a meandering river system has degraded water quality, led to excessive sedimentation of river substrates, diminished habitat quality and diversity, and degraded river biological communities.

SECTION 6

FORMULATION OF ALTERNATIVE PLANS: INTRODUCTION

Water resources development in the Kissimmee River Basin has gone through an extensive and complex history of events and trends that cumulatively have led to today's public desire to restore the river. The following sections present the plan formulation process that resulted in the selection of the recommended plan for river restoration. They briefly trace the history of the Corps' Kissimmee River flood control project's development through completion in 1971, and present highlights of the growing public concerns that evolved even while the project was under construction. They summarize the resulting major planning studies that were undertaken in response to these concerns: the first Federal feasibility study by the Corps (1978-1985), the SFWMD restoration study (1984-1990), and the Corps' current Federal feasibility study. Key events in the overall process are shown in Table 6.

A more complete discussion of the plan formulation process is included in the two previous reports that are the foundation of this report - the Corps' 1985 *Feasibility Report* and the SFWMD's 1990 *Restoration Report*. These reports are incorporated by reference and may be consulted for more detailed descriptions and explanations of the plan formulation process.

6.1 KISSIMMEE RIVER PROJECT CONSTRUCTION AND REACTION

6.1.1 Project Construction

The existing Kissimmee River project for *"flood control, drainage, and related purposes"* was described in the Chief of Engineers Report on Central and Southern Florida, dated February 19, 1948, and subsequently published in *House Document 643, 80th Congress, 2nd Session*. Based on that report, the project was authorized by Congress for construction in *Section 203 of the Flood Control Act of 1948 (Public Law 858, 80th Congress, 2nd Session), and Section 203 of the Flood Control Act of 1954 (Public Law 780, 83rd Congress, 2nd Session)*.

Construction in the Upper Basin was started in the early 1960's. Regulation of the levels of some of the major lakes started in 1964. Construction in the Lower Basin started shortly thereafter, with the lowest

TABLE 6

KISSIMMEE RIVER RESTORATION TIMELINE

FEDERAL	STATE OF FLORIDA	SOUTH FLORIDA WATER MANAGEMENT DISTRICT
1948 Central and Southern Florida (C&SF) Project Authorized for Construction		
1954 Kissimmee River Flood Control Project Authorized for Construction		
1961 Construction Started		
1971 Construction Finished		
1971 U.S. Geological Survey report identified environmental concerns	1971 Governor's Conference on Water Management in South Florida Identified Environmental Concerns	
	1972 First Public Meeting on Environmental Concerns	
	1976 Florida's "Kissimmee River Restoration Act"	
First Corps Feasibility Report		
1978 Congressional Study Authority	1976 Kissimmee River Coordinating Council (KRCC) Established	
	1981 Florida's "Save Our Rivers" Program Initiated	
	1983 Governor's "Save Our Everglades" Plan Released	
	1983 KRCC Endorsed Canal Backfilling	
1985 Final District Report Objectives: Wetlands and River Restoration Water Quality Improvement Alternatives: Partial Backfill Combined Wetlands Demonstration Project Pool Stage Manipulation Paradise Run Best Management Practices Recommendations: No Federal Action Congressional Authority of 1135	1983 Governor's Executive Order-Kissimmee River - Lake Okeechobee Everglades Coordinating Council (KOECC) Established 1985 Governor's "Kissimmee River Restoration Strategy" Released	SFWMD Restoration Study 1984 - 1989 Demonstration Project Construction and Monitoring 1986 - 1989 Model Study 1988 Kissimmee Restoration Symposium
Current Corps Feasibility Study 1990 WRDA 90 Study Authority 1991 Feasibility Report and EIS Objectives: Determine Federal Participation in Level II Backfilling Alternatives: Weirs Plugging Level I Backfilling Level II Backfilling Modified Level II Backfilling Recommendation: Modified Level II Backfilling	1990 Governor Endorsed Level II Backfilling	1990 Restoration Report Objective: Ecosystem Restoration Alternatives: Weirs Plugging Level I Backfilling Level II Backfilling Recommendation: Level II Backfilling

control structure, S-65E, being completed in mid-1964. Channel excavation of C-38 was completed in July 1971.

The completed Kissimmee project conforms closely to the plan outlined in the Chief's 1948 report. The major lakes of the Upper Basin, which are used as water conservation reservoirs, are connected by channels - in most cases channels that were originally excavated by Hamilton Disston in the 1880's but enlarged to varying degrees under the authorized project. Nine control structures regulate water levels and flows in the lake channel system. A 56-mile canal now connects Lake Kissimmee with Lake Okeechobee. This canal consists of C-38, some 48 miles long from Lake Kissimmee to S-65E on the northern end, and the previously constructed 8-mile long Government Cut, between S-65E and Lake Okeechobee, on the southern end. Six control structures (S-65, S-65A, S-65B, S-65C, S-65D, and S-65E) control canal water elevations and regulate flows. The structures also have locks which provide year-round daytime navigation through the Kissimmee Basin.

6.1.2 Origin of the Restoration Movement

While the Kissimmee River project had been requested and supported by the State of Florida, there was some opposition to the project even before construction began. Concerns centered on fear of environmental damage that the project, primarily channelization, might cause. Although initially poorly organized, a grassroots movement to restore the Kissimmee River developed during project construction. Early issues in the restoration movement centered around physical alterations caused by C-38 excavation and placement of excavated materials on the adjacent flood plain.

The interests that were to provide the drive and foundation for both progress and controversies over the Kissimmee River evolved through the early 1970's. Support for river restoration came from numerous individuals and groups, including national environmental advocate groups, which desired return of the river's ecological and aesthetic values, and saw refilling of C-38 as the means to achieve that return. Opposition to river restoration came primarily from agricultural interests, including dairy and beef cattle ranchers and farmers. Concern also was expressed by developers, homeowners and other property owners and boaters. These groups were concerned that restoration would create an unfair hardship on them. Residents of the Upper Basin were concerned that modifications to C-38 might threaten their level of flood control. Land owners and other users along C-38 were concerned about the loss of their uses of the flood plain due to re-flooding from restoration. Boaters were concerned about the loss of the enlarged waterway.

The first steps toward restoration of the Kissimmee River occurred in 1971. The U.S. Geological Survey released a report that concluded that Lake Okeechobee was experiencing accelerated eutrophication as a result of high nutrient loading. In September 1971, one hundred and fifty experts from the fields of science, government, agriculture and conservation participated in the Governor's Conference on Water Management in South Florida. While the conference also focused on water quality problems, it requested that, *"action should be taken to restore fish resources and wildlife habitats,"* in the Kissimmee Valley.

In 1972, the Central and Southern Florida Flood Control District (now the SFWMD), conducted the first public hearing concerning possible environmental damage resulting from Kissimmee River channelization. Major public concerns were water quality and potential increased rates of eutrophication of Lake Okeechobee, and the loss of environmental values within the lower Kissimmee River Basin, specifically wetlands reduction. The Flood Control District's resulting recommendations included, among others, creation of an interdisciplinary team to help determine if additional restoration was necessary.

6.1.3 The Kissimmee River Coordinating Council

Throughout the mid-1970's, many debates occurred over the environmental effects of the Kissimmee River project, and what could and should be done about them. As discussed above, the earliest impetus to restore the river focused on possible effects on water quality entering Lake Okeechobee. It was believed that C-38 had acted as a conduit, speeding pollution from the urbanizing Upper Basin into Lake Okeechobee.

In 1976, after several years of public debate, the Florida Legislature passed the *"Kissimmee River Restoration Act"* in response to public concerns. The Act created the Coordinating Council on the Restoration of the Kissimmee River and Taylor Creek-Nubbin Slough Basin (known as the Kissimmee River Coordinating Council, or KRCC). The KRCC was charged with broad responsibilities to solve many of the region's water resources problems, including development of measures *"to minimize and ultimately remove threats to the agricultural industry, the wildlife, and the people of central and southern Florida posed by land use and water management practices"*. The KRCC was specifically directed to:

* Restore the natural seasonal water level fluctuations in the lakes of the Kissimmee River and in its natural flood plains and marshlands.

* Recreate conditions favorable to increases in production of wetland vegetation, native aquatic life, and wetland wildlife.

* Utilize the natural and free energies of the river system to the greatest extent possible.

Between 1976 and 1983, the State of Florida, through the KRCC, funded a variety of studies designed to evaluate different Kissimmee River restoration approaches. These studies improved understanding of hydrologic, biological, and water quality issues in the basin. As a result, many early hypotheses about basin conditions were validated or discarded. Especially important were clarifications of water quality issues (most Lake Okeechobee water quality problems were not originating in the Upper Basin; see Problems and Opportunities, Section 5), and establishment of restoration of lost environmental values through habitat restoration as a primary goal.

As early as April 1977, the KRCC's First Annual Report to the Florida Legislature recommended several specific projects to analyze the most effective way to deal with basin water quality problems; and presented two restoration alternatives, one calling for partial backfilling of C-38, and the other calling for creation of wetlands along the canal.

6.2 KISSIMMEE RIVER PLANNING STUDIES

In response to the growing concern about the effects of the Kissimmee River Flood Control Project, three major planning studies were undertaken by the Corps or the SFWMD since 1978. Each study built on the previous, and each had a different purpose, which led to different, yet compatible, results.

6.2.1 First Federal Feasibility Study (1978-1985)

The primary objectives of this study were restoration of the values of the Kissimmee River and its wetlands, and improvement of water quality. These led to a focus on measures and plans to meet these relatively narrow concerns; addressing the questions of how wetland vegetation could be restored, and how water quality (particularly nutrient levels, at that time) could be improved. Although several plans were formulated for these objectives, the study did not recommend Federal participation in solutions to these concerns because of the policies in effect at that time.

6.2.2 SFWMD Restoration Study (1984-1990)

This study adopted a broader, single objective: to restore the ecological integrity of the Kissimmee River. Whereas the previous Corps feasibility study

had focused on component parts of the environment - primarily wetlands and water quality - and how to improve each part individually, the SFWMD focused on restoration of the entire natural system, including its component parts and the interactions among them - the ecosystem. The ecosystem approach also included consideration of wetlands and water quality, as well as all of the many other elements that comprise the natural environment. However, the ecosystem approach recognized that numerous individual components collectively comprise the ecosystem and operate synergistically, making it difficult to define the relative importance of individual parts, as well as to define and address the requirements of each individual part. Furthermore, while requirements of many components are compatible, others would be in conflict, and meeting the needs of one would harm the other. Therefore, the ecosystem approach looked at ways to holistically recreate more natural physical and hydrologic characteristics that would, in turn, support and provide conditions which would allow the Kissimmee River plant and animal communities to again flourish.

By providing proper land and water conditions, the entire spectrum of the living environment will return naturally and maintain itself as it had done before C-38 was constructed. The ecosystem approach would lead to plans that would indeed restore wetlands vegetation, and reduce nutrient levels for water quality improvement, as the Corps' feasibility study plans were designed to do. But plans designed to meet a broad ecosystem objective also would restore the full natural range of components, including fish and wildlife resources. While component quantity or quality resulting from the ecosystem approach may not appear to be as great as that resulting from a more focused component-based approach traditionally used by the Corps, the ecosystem approach would provide the natural balance among all components that would ensure long-term resilience. That resilience would allow all components, interactions and processes to withstand natural extremes of temperature, drought, flood, disease, and others disturbances.

This different objective led the SFWMD to consider alternatives somewhat different from those considered by the Corps. For example, the Corps' Combined Wetlands Plan (to meet the wetland restoration objective), and the Best Management Practices Plan (to meet the water quality improvement objective) would not address the broader needs embraced by the SFWMD ecosystem restoration objective. However, several of the alternatives developed by the Corps, including the Partial Backfill Plan and the earlier rejected weir and plugging ideas, were reassessed by the SFWMD as ecosystem restoration alternatives.

Following additional extensive analyses, the SFWMD concluded that the Level II Backfilling Plan was the best approach to restore the integrity of the Kissimmee River ecosystem.

6.2.3 Second Federal Feasibility Study (1990-Present)

The Congressional authority for the Corps' second feasibility study of the Kissimmee River directed that the study be based on implementing the SFWMD's Level II Backfilling Plan. Therefore, there was no need to develop new planning objectives or alternative plans.

While the SFWMD followed the common planning process in conducting its restoration study, its work addressed that agency's decision making needs and was not intended to address the full range of Federal requirements that are normally imposed on Corps water resources planning. Therefore, the second Corps feasibility study required several additional analyses to establish the extent of Federal participation in the Level II Backfilling Plan. These analyses were:

* Modification of the individual design, construction, real estate and operational components of the Level II Backfilling Plan to improve engineering, reduce project costs, and increase environmental outputs to arrive at the best possible project.

* An evaluation of the final alternatives included in the SFWMD's 1990 Restoration Report, including the Level II Backfilling Plan, generally in accordance with traditionally required Federal evaluation procedures to affirm that, under Federal guidelines, the Level II Backfilling Plan would be selected for implementation.

* Current Federal policy recognizes "fish and wildlife restoration", rather than broader "ecosystem restoration", as a basis for the extent of Federal participation in a water resources project. Therefore, the extent of fish and wildlife outputs that would result from restoring the ecological integrity of the Kissimmee River was identified.

* An incremental cost analysis was conducted to determine that the restoration project is properly sized so that it is the most cost effective way to produce desired environmental outputs.

* The resulting Modified Level II Backfilling Plan also was evaluated in accordance with traditional procedures.

The following three sections describe these three phases of the Kissimmee River plan formulation process in more detail.

SECTION 7

FORMULATION OF ALTERNATIVE PLANS: FIRST FEDERAL FEASIBILITY STUDY

This section summarizes the plan formulation process and results of the Corps' first feasibility study of restoring the Kissimmee River. The study was started in response to Congressional authority in 1978.

7.1 AUTHORITY

On April 25, 1978, the U.S. House of Representatives' Committee on Public Works and Transportation and the Senate's Committee on Environment and Public Works passed identical resolutions requesting the Corps to investigate the completed Kissimmee River project,

> *"...With a view to determining whether any modification of the recommendations contained therein and of the system of works constructed pursuant thereto, is advisable at this time, with respect to the questions of the quality of water entering the Kissimmee River and Taylor Creek-Nubbin Slough and Lake Okeechobee, flood control, recreation, navigation, loss of fish and wildlife resources, other current and foreseeable environmental problems, and loss of environmental amenities in those areas. Potential modification alternatives, if any, shall include, but not be limited to consideration of restoration of all or parts of the Kissimmee River below Lake Kissimmee and of the Taylor Creek-Nubbin Slough Basin".*

These resolutions established the initial Federal interest in "restoration of all or parts of the Kissimmee River", and provided the authority for the first major Corps review of the flood control project.

7.2 PLANNING OBJECTIVES

The Corps study following from these resolutions began in November 1978, and evolved from extensive involvement by numerous concerned and interested public agencies, groups and individuals. Initially, a Survey Review Assistance Committee was formed to help develop and review the study effort. The Committee included representatives of environmental organizations, local hunting clubs, agricultural and cattle interests, dairies and sugar cane growers, waterway users, and various public agencies. In addition, a Special Review Committee was developed for close coordination with interested State agencies,

including: the SFWMD; the Departments of Natural Resources, Environmental Regulation, and Agriculture; and the Game and Fresh Water Fish Commission. The KRCC led the State's coordination during the Corps' study. Nine public meetings were held throughout the central and southern part of the state in March 1979 to identify public concerns related to the basin's water resources.

As a result of the study's extensive public involvement efforts, and the findings and conclusions of numerous previous studies and reports, a list of public concerns about the Kissimmee River Basin was developed. These concerns were:

* Loss of naturally fluctuating water levels.
* Loss of large areas of wetlands.
* Deterioration of water quality in Lake Okeechobee and its tributaries.
* Changes in land use resulting in increased drainage.
* Loss of the natural meandering and braided river.
* Lower groundwater levels and degraded groundwater quality.
* Potential need for increased flood protection.
* Potential reduction in frost protection.
* Potential increases in mosquito populations.
* Reduced recreational navigation opportunities.

These concerns were subsequently evaluated and restated as the study's planning objectives, and provided the basis for identifying management measures that could help to achieve their intents. Some public concerns, such as frost protection, were impact evaluation criteria rather than bases for planning objectives, and were therefore included in later evaluation activities. The resulting planning objectives focusing on restoring lost environmental values of the Kissimmee River were:

* Restore wetland areas.
* Improve water quality.
* Restore river meanders and oxbows.
* Improve groundwater recharge.
* Maintain flood protection.
* Restore fluctuating water levels.
* Provide surface water supply.
* Maintain navigation.
* Meet recreational demands.

7.3 EARLY ALTERNATIVE PLANS

Initial plan formulation included identification and evaluation of management measures that would meet these objectives. This was

accomplished by the Corps with considerable input from the public representatives on the Survey Review Assistance Committee. In addition, at this early phase, a study constraint, to avoid adverse effects on the existing project's flood control, water supply and navigation purposes that were served in the Upper Basin above S-65, was established. The range of technical and institutional measures, both structural and nonstructural, that were initially considered are listed in Table 7.

Each measure was compared against the planning objectives to identify whether it would address the objectives positively or negatively, maintain current conditions, or not address the objectives at all. This analysis provided the basis for dropping several measures from further consideration, and adding various other measures together into combinations of alternative plans. These plans, which included both structural and nonstructural measures, ranged from a plan of minimum action (minimum maintenance of the existing project) to almost complete backfilling of C-38. The alternative plans developed at this time were:

No Action - Operate and maintain the existing flood control and navigation systems in the Kissimmee River and the Taylor Creek-Nubbin Slough Basins.

Lake Regulation Schedule Modification - Increase flood storage capability in the Upper Basin by modifying the lake regulation schedules.

Additional Lake Control Structure - Install a control structure in C-37 above Lake Kissimmee to enable Lakes Cypress, Hatchineha, and Kissimmee to be regulated at different levels.

Complete Backfilling - Fill C-38 and remove attendant structures and earthworks.

Partial Backfilling - Fill the middle half of C-38 and remove attendant facilities, and install flow-through elements in Pool A and upper Pool B.

Plugging - Place various types of plugs in C-38 to divert in-channel flows from the canal to remaining portions of original river channel.

Flow-Through Marshes - Construct controlled wetlands adjacent to C-38 and immediately below S-65A, B, C and D.

Pool Stage Manipulation - Modify S-65A, B, C, D and E to accommodate higher upstream stages, and implement a fluctuating regulation schedule to increase wetlands.

TABLE 7
MANAGEMENT MEASURES IDENTIFIED TO MEET PLANNING OBJECTIVES

WETLAND RESTORATION	WATER QUALITY	FLOOD PROTECTION	FISH AND WILDLIFE	NAVIGATION AND RECREATION
Backfilling C-38 (in part or all)	Fencing cattle away from tributaries	Floodproofing	Creation of a game refuge	Creation of Parks
Plugging (including weirs)	Locating mineral and supplemental feeders away from tributaries	Restricting development in flood prone areas or zoning	Wildlife Management	Maintenance dredging
Flow through marsh	Providing cattle shade areas	Flood plain evacuation	Fish hatcheries	
Pool stage manipulation	Pasture rotation	Construction of levees	Fish berms	
Tributary impoundment	Dragging pastures to break up manure	Education	Firebreaks	
Manmade or recreated wetlands	Regulation of point sources	Flood forecasting/ warning		
Groins, wingwalls, deflectors	Temporary storage of runoff in pastures and field ditches	Flood insurance		
Pumping water to wetlands or oxbows	Terracing	Project modification		
	Replacing customary box ditches with vegetated swales or V-ditches			
	Routing runoff into existing natural wetlands			
	Filter strips			
	Timing and placement of fertilizers			
	Waste Utilization			
	Regulation of groundwater withdrawal			
	Structural diversions			

Impounded Wetlands - Implement nineteen separate elements, including flow-through marshes, tributary impoundments, and pool stage manipulation.

Enhance Existing System - Remove or reshape some excavated material mounds along C-38.

Paradise Run - Restore the Paradise Run wetlands, in the lower western part of the basin, by routing water into the area from C-41A, or by discharge from Pool E.

Best Management Practices - Use various measures on agricultural lands, such as fencing and on-site detention, to improve water quality and restore wetlands.

Minimum Maintenance - Return the basin to pre-project conditions through lack of maintenance, except for structures needed to protect against unsafe or hazardous conditions.

Dual Watercourses - Create and restore a riverine system along all of the east side and about half of the west side of C-38.

This first set of plans was evaluated to arrive at six general alternatives that were included in the *Kissimmee River, Florida, Reconnaissance Report for Stage 1:* No Action, Complete Backfilling, Partial Backfilling, Plugging, Impounded Wetlands, and Pool Stage Manipulation. The report was distributed for public review in September 1979. This review process raised a host of issues, concerns and questions, and illustrated the growing public commitment to filling C-38 as a means to restore the Kissimmee River. Following this review, the Corps worked with the KRCC to assess the advantages and disadvantages of identified alternatives, and narrow down the number of options being considered. To aid in this process, the Corps used the spacial analysis methodology (SAM), which was a computerized data management system for analyzing flood, economic and environmental effects of different plans. Use of SAM, however, slowed study progress due to the massive amount of data that needed to be collected for SAM analyses.

During the course of the Corps study, the State continued to be independently active in addressing Kissimmee River related issues. In 1983, after years of public debate regarding sovereign versus private ownership of the Kissimmee River flood plain, most of the early concerns of flood plain landowners were resolved by the State's Save Our Rivers (SOR) program. This program was used to acquire lands from owners along C-38, providing them with financial compensation in exchange for a clear State real estate interest in flood plain lands needed for river restoration.

Public interest intensified in 1983 when the Kissimmee River was linked with the Governor's *"Save Our Everglades"* plans. This basin-wide connection translated into increased efforts for the Corps to accelerate its study process, with the expectation that plans for restoration could commence. Such expectations were reinforced by national and local media claims that south Florida's drought problems at that time could be blamed on channelization of the Kissimmee River and could be corrected by river restoration.

In this climate of increased expectations, the Corps and the KRCC met with interested agencies and groups in mid- to late 1982 to further narrow the range of alternatives under consideration. These meetings reinforced the environmental and developmental positions on what action should be taken. For example, the Florida Wildlife Federation and the Izaak Walton League pressed for restoration, while the Kissimmee and Osceola Counties Chambers of Commerce expressed concern about possible changes in recreational and other land uses that could occur with any restoration plan. Based on views expressed at the meetings and analyses accomplished to that time, it was determined that most of the plans lacked feasibility, local support, or both; while some plans appeared to be feasible ways to accomplish study objectives and deserved further investigation. Therefore, the following plans were advanced for additional consideration:

*Partial Backfilling.
*Flow-Through Marshes.
*Pool Stage Manipulation.
*Impounded Wetlands.
*Paradise Run.
*Best Management Practices.

These alternatives were presented to the public in another round of meetings in late 1982, during which the public's growing impatience with the Corps' modeling effort became increasingly obvious. Acting in response to the sunset provision in its authorizing legislation, and in order to expedite completion of the Corps study and reduce the time required for a decision on restoration, the KRCC requested the Corps to narrow its evaluation focus to two plans for the lower Kissimmee River: filling C-38 ("dechannelization") and maintenance of the canal ("non-dechannelization"). The dechannelization plan was essentially the Corps' partial backfilling plan. The non-dechannelization plan would keep C-38 intact, and represented a combined wetlands alternative which combined the Corps' four wetlands plans: flow-through marshes, pool stage manipulation, impounded wetlands, and Paradise Run.

These two plans were analyzed and presented at a series of public meetings in mid-August 1983, where the KRCC heard views on such issues as

flood control, Federal involvement, water quality, water management, cost estimates, and private land takings. Again, various interested parties aligned themselves with one or the other plan, with ranchers and farmers - cautioning that "haste makes waste" opposing environmental interests, who clamored for "protection of the Kissimmee's waters". During these meetings, the Corps' preliminary findings on the flood control roles of the Lake Kissimmee outlet channel and the central reach of C-38 were released, and concerns of Upper Basin residents apparently were alleviated when it was revealed that the existing level of flood protection would not change in the Upper Basin.

The popularity of the dechannelization restoration plan was buoyed significantly by then Governor Graham's announcement of his six-step plan to *"Save Our Everglades"*, which included Kissimmee River restoration as one of its steps. Subsequently, the KRCC endorsed the dechannelization backfilling plan on August 19, 1983. The KRCC believed that there was enough information to proceed with this option; citing environmental benefits and lack of evidence of increased future flooding in the Upper Basin, it urged the State to consider restoration without Federal participation, if necessary. The KRCC assigned specific restoration-related tasks to the SFWMD and the other State agencies.

In November 1983, the Governor issued Executive Order 83-178 and created the Kissimmee River - Lake Okeechobee - Everglades Coordinating Council (KOECC) as a successor to the KRCC to formalize the State's restoration decision and its relationship to the Save Our Everglades campaign. The KOECC's objectives for the "Kissimmee River-Lake Okeechobee-Everglades ecosystems" were: *"avoid further destruction or degradation of these natural systems; reestablish the ecological functions of these natural systems in areas where these functions have been damaged; improve the overall management of water, fish and wildlife, and recreation; and successfully restore and preserve these unique areas"*. The KOECC, which included the SFWMD and six other State agencies, was charged with, among other things, overseeing restoration of the Kissimmee River.

As an outcome of these events, the SFWMD proposed a "demonstration project" as an experiment to assess the feasibility of the partial backfill concept. The SFWMD applied for Corps and State permits for the project in early 1984. After a series of public meetings, which again heard the positions of agricultural and developmental interests (ranchers, dairy farmers, landowners, recreational boaters, fishermen, and a number of county officials) in opposition to environmental interests, the SFWMD agreed that it would not begin channel backfilling until the project's Phase I (installation of three notched weirs in Pool B) was completed and evaluated. Phase I project construction was initiated in 1984 and completed in 1985. Project effects were monitored through 1989.

In 1985, Governor Graham adopted the Kissimmee River Restoration Strategy (sometimes called the Seven Point Plan), which provided direction to State agencies through the Demonstration Project period. It directed the SFWMD's commitment to monitoring and evaluation of the Demonstration Project, expedited land acquisition, physical modeling of dechannelization, and clarification of navigational provisions. The Strategy became the basis for subsequent restoration efforts by the SFWMD following completion of the Corps' study.

7.4 FINAL ARRAY OF ALTERNATIVE PLANS

With this activity at the State and local level as an integral background, the Corps completed its formulation and evaluation of a final array of alternatives. In addition to the KRCC's dechannelization and non-dechannelization alternatives, and the SFWMD's Demonstration Project, the Corps retained for final analysis three other alternatives that appeared to be cost effective and would not disrupt flood control capabilities in the Upper Basin: pool stage manipulation, Paradise Run, and best management practices. The final array of alternatives considered in the first Corps feasibility study were:

* The "Without Project" Condition ("No Action").
* Partial Backfilling ("Dechannelization").
* Combined Wetlands ("Non-dechannelization"), consisting of:
    - Flow-Through Marshes,
    - Pool Stage Manipulation,
    - Impounded Wetlands, and
    - Paradise Run.
* Demonstration Project.
* Pool Stage Manipulation.
* Paradise Run.
* Best Management Practices.

These alternatives are briefly described as follows:

7.4.1 The "Without Project" Condition (No Action)

The "without project" condition, as defined in the Corps' first feasibility study, included conditions expected through 2035, with continued operation of the basins' original project works without structural modifications.

7.4.2 Partial Backfilling (Dechannelization)

This plan, shown in Figure 10, would restore much of the flood plain to its natural appearance and hydrologic functioning while maintaining acceptable levels of flood control. In Pool A, S-65A would be retained; a combination flow-through marsh and tributary impoundment area (Blanket Bay Slough) would be created; and various minor structural modifications would be constructed. Similar modifications, including flow-through marshes, would be constructed in the upper reach of Pool B. About 20.5 miles of C-38 would be backfilled throughout Pools B, C, D, except for several designated areas, to a point in Pool E, 3.6 miles above S-65E. Dredged material from disposal areas would be used for backfill. S-65B, S-65C, and S-65D and their corresponding tieback levees would be removed. A section of C-38 in Pool E would remain intact for water delivery into Lake Okeechobee. Some sections of the former river channel which had been destroyed also would be restored. Certain existing dikes within the flood plain, including those within the Boney Marsh area, would be breached or removed to provide unimpeded surface flow within the reach and maximize marsh acreage.

7.4.3 Combined Wetlands (Non-Dechannelization)

This plan, shown in Figure 11 would be a combination of several components which would retain C-38 as an operable flood control mechanism while structurally creating wetlands. It would include twenty-four individual elements: twelve flow-through marshes, five tributary impoundments, five pool stage manipulation areas, and two riverine segments in the Paradise Run area. Each of these elements would be separable components in that each would have independent water management capabilities.

7.4.4 Demonstration Project

The Demonstration Project proposed by SFWMD is shown in Figure 12, and was designed as a field experiment to assess the feasibility of the partial backfilling concept and the value of flow-through marshes and pool stage fluctuation. Phase I of the project would consist of constructing three sheet pile weirs in Pool B to divert flows into original river oxbows, and structural modifications to create marsh areas in the Pool B flood plain. These changes, together with a revised schedule for pool stage manipulation, would recreate marshlands along Pool B.

7.4.5 Pool Stage Manipulation

This alternative would entail minor modifications of S-65A, S-65B, S-65C, S-65D and S-65E to provide seasonal water fluctuations and re-flooding of some

drained wetlands through all five pools of C-38. Figure 13 shows the areal extent of pool changes under this plan, and Figure 14 the annual fluctuation schedule. The plan would raise the annual water surface in each pool by two feet above the present controlled elevations by mid-October, and draw levels down to one foot below the present controlled elevations by mid-May. This would simulate a more natural, seasonal change in water levels, compared to the unnatural, static operation schedule.

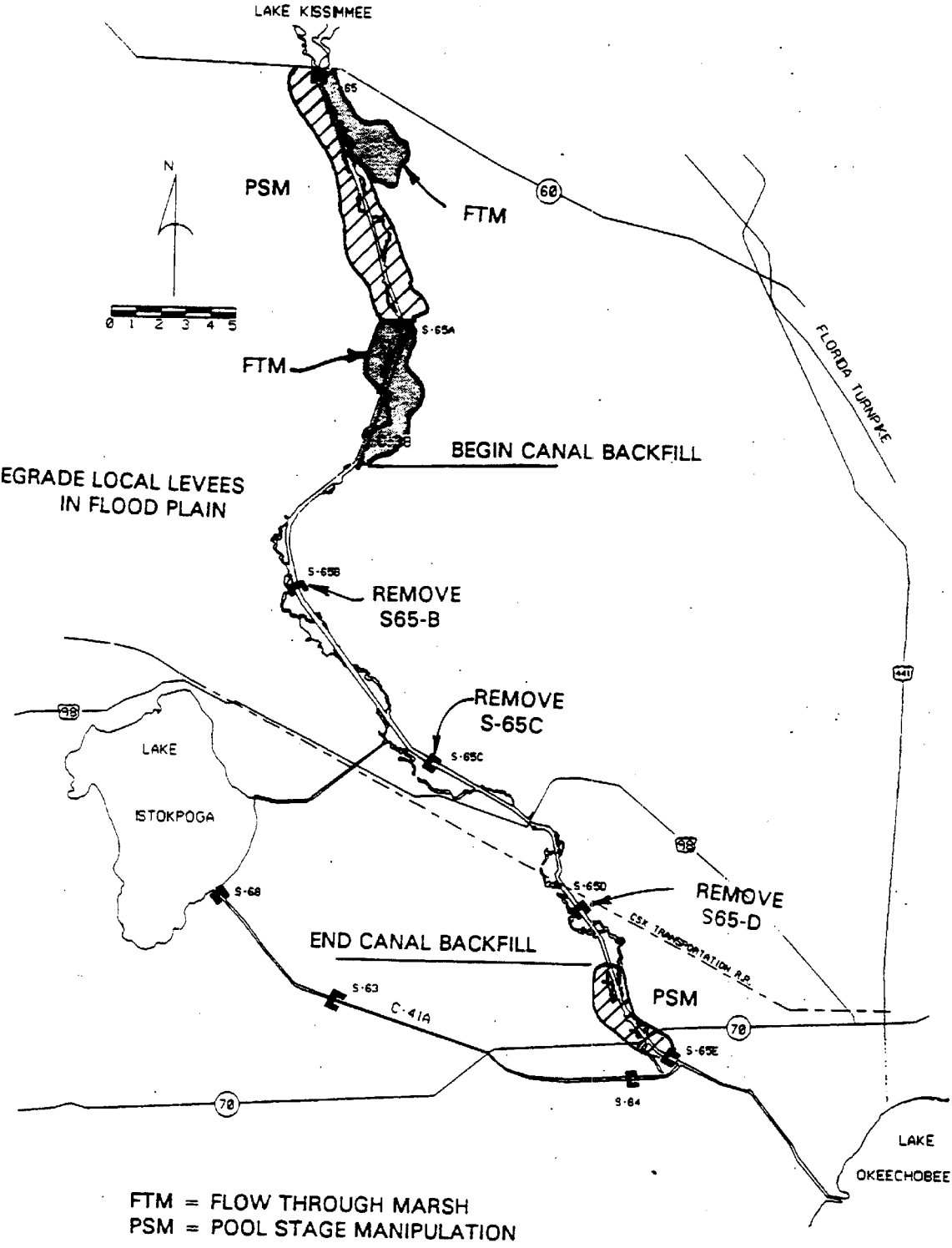
7.4.6 Paradise Run

This alternative, shown in Figure 15, would attempt to restore the southern most portion of the Kissimmee River flood plain downstream of C-41A and west of C-38. This area, known as Paradise Run, is about 8.5 miles long and is now primarily improved pasture used for cattle grazing. This plan would create additional wetlands through construction of several structural modifications (culverts, canal, weir, levee, plugs), which would permit two to three feet of fluctuation of water levels, as well as increased hydroperiods, in the Paradise Run marshland.

7.4.7 Best Management Practices

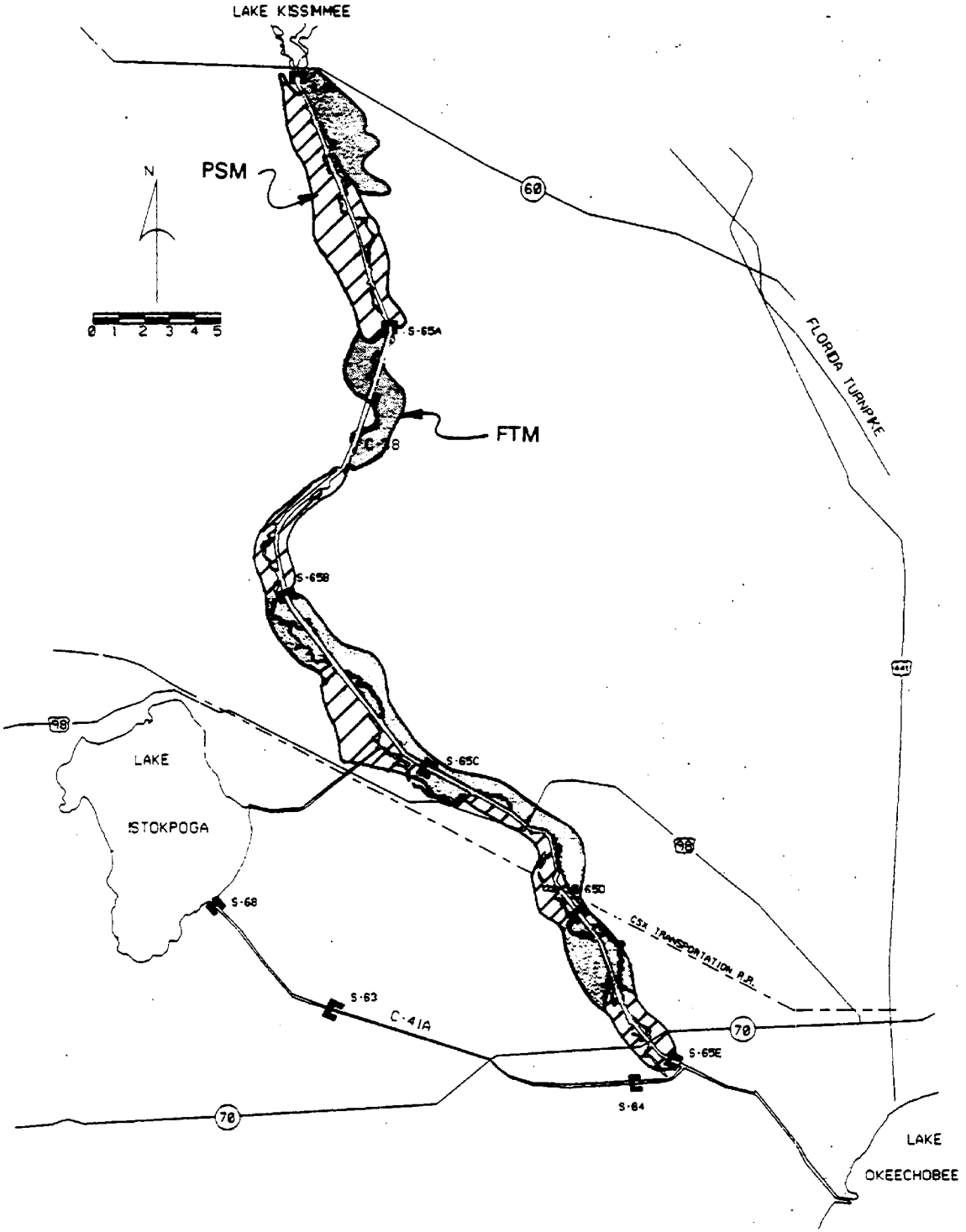
Best management practices refers to a combination of livestock and agricultural management practices that have been shown to be effective and practicable means to prevent or reduce non-point source water pollution. The objectives of this alternative would be to: keep livestock as far away from drainage ways as practical; disperse wastes for soil-plant uptake; practice proper fertilization and water management; enhance vegetation and infiltration conditions; and impound runoff for nutrient attenuation. Practices would be selected based on their cost effectiveness, and would be periodically subject to review and change. At the time of the first Corps study, the most cost effective practices for the lower Kissimmee River and Taylor Creek-Nubbin Slough Basins were fencing of beef cattle and dairy cows on intensively managed pastures away from streams and wetlands near streams, and impoundment of dairy barn holding-lot runoff.

This final array of alternatives underwent an extensive evaluation and tradeoff analysis, drawing on results of numerous studies and public input. Detailed impact assessments and evaluations of hydrologic, financial, environmental, recreational navigation, social and institutional effects were conducted and presented in the feasibility report. Table 8 summarizes the results of this final evaluation. Final public review occurred through circulation of a draft report in November 1984.



PARTIAL BACKFILLING

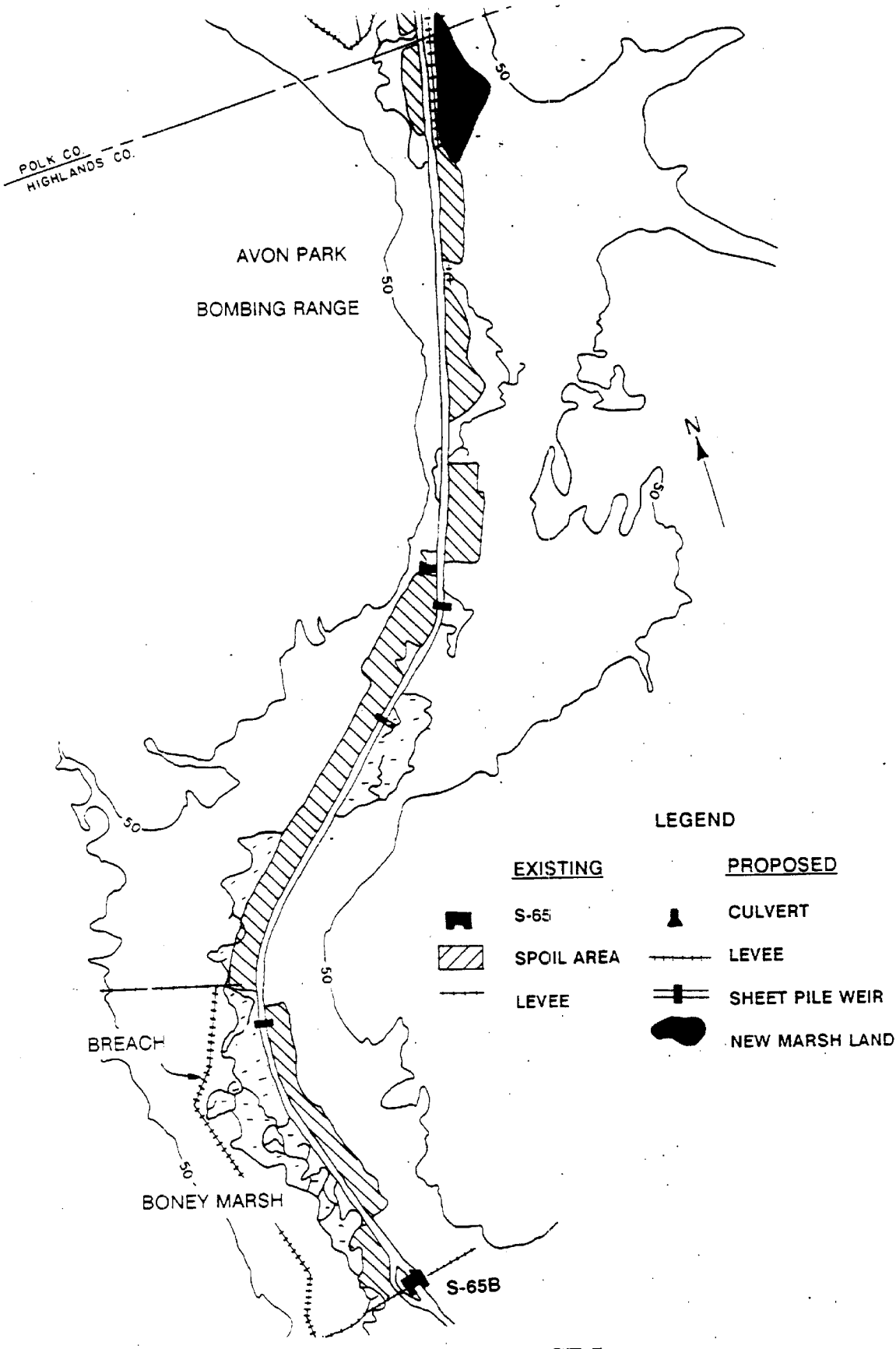
FIGURE 10



FTM = FLOW THROUGH MARSH
PSM = POOL STAGE MANIPULATION

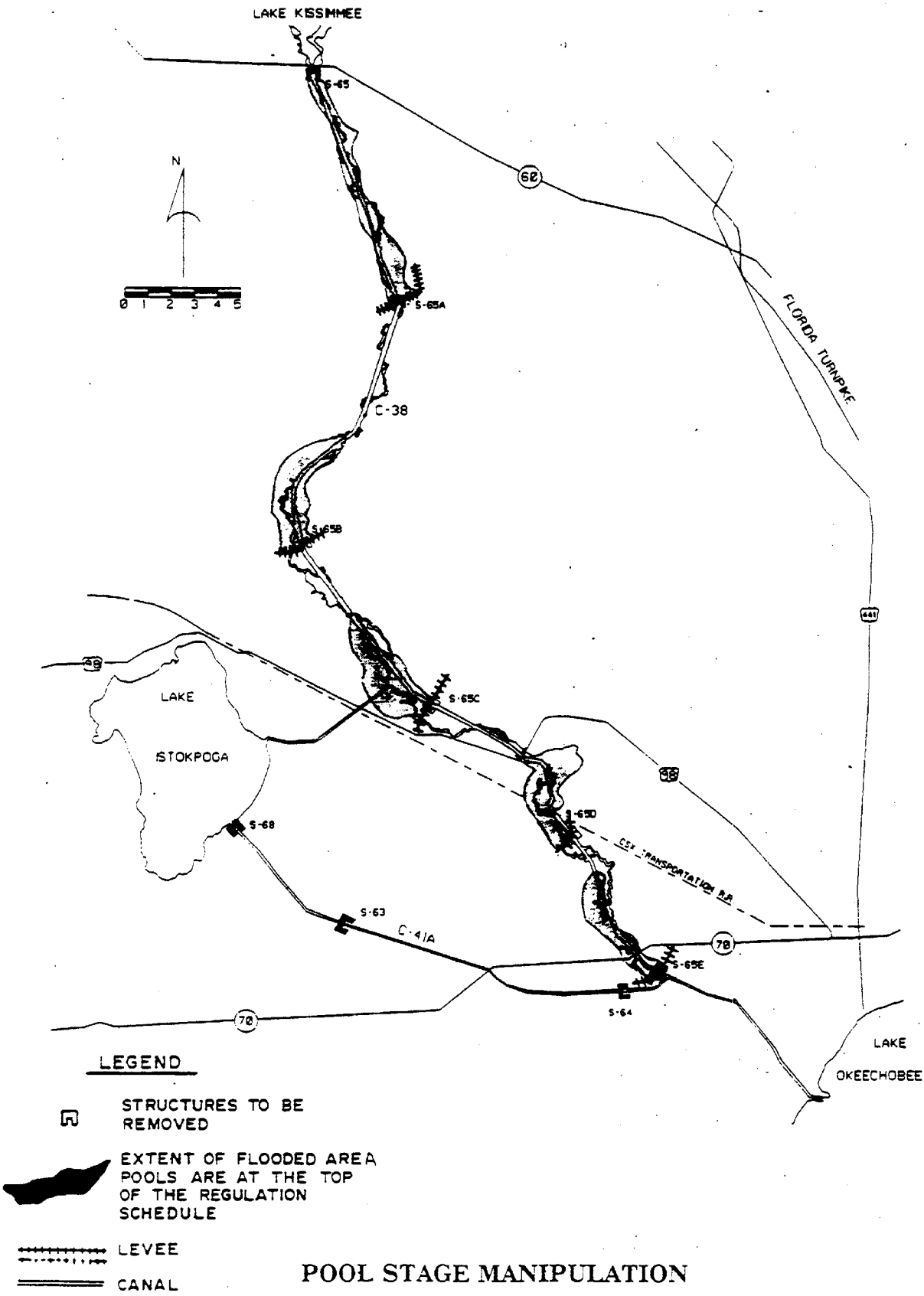
COMBINED WETLANDS

FIGURE 11



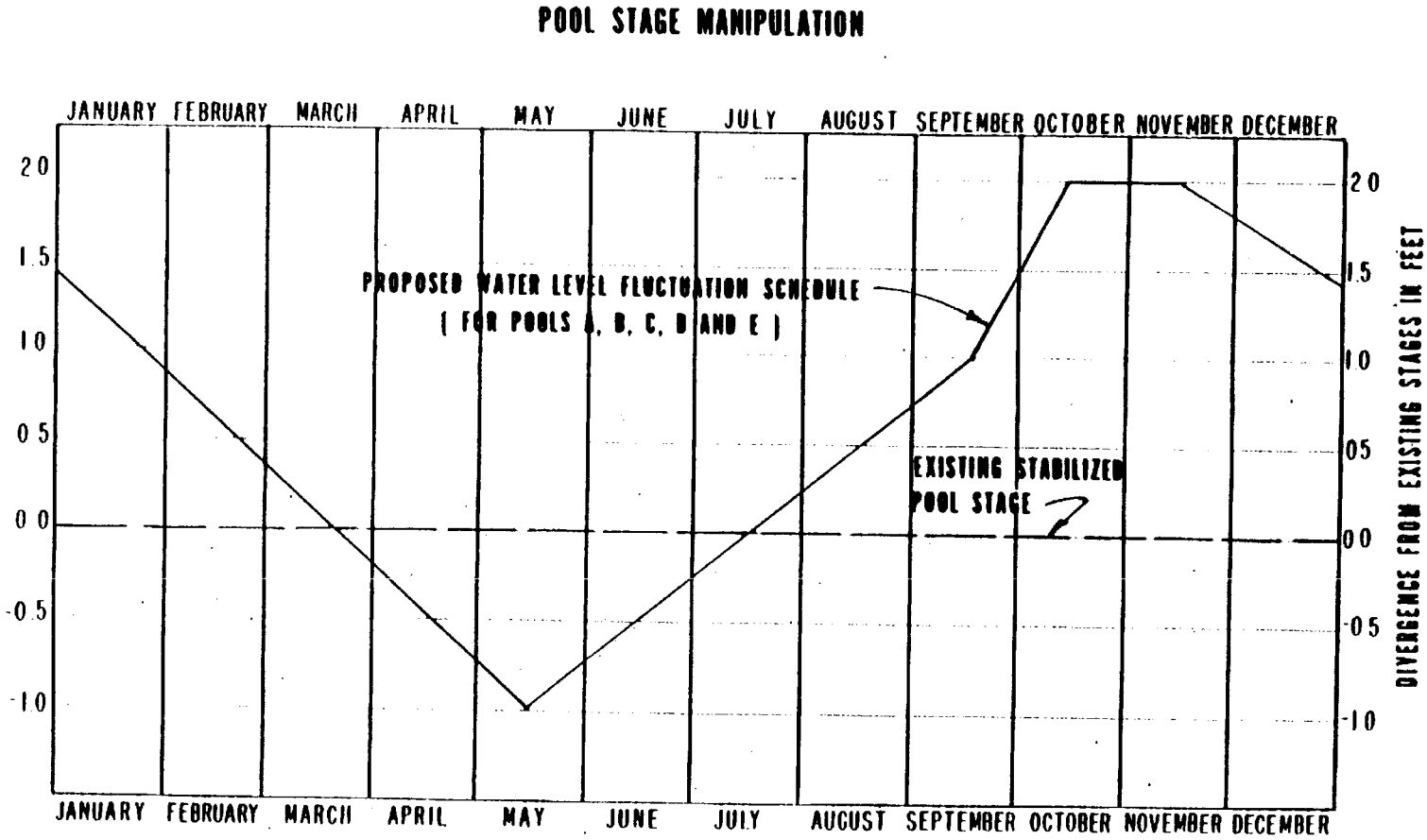
DEMONSTRATION PROJECT PHASE I

FIGURE 12



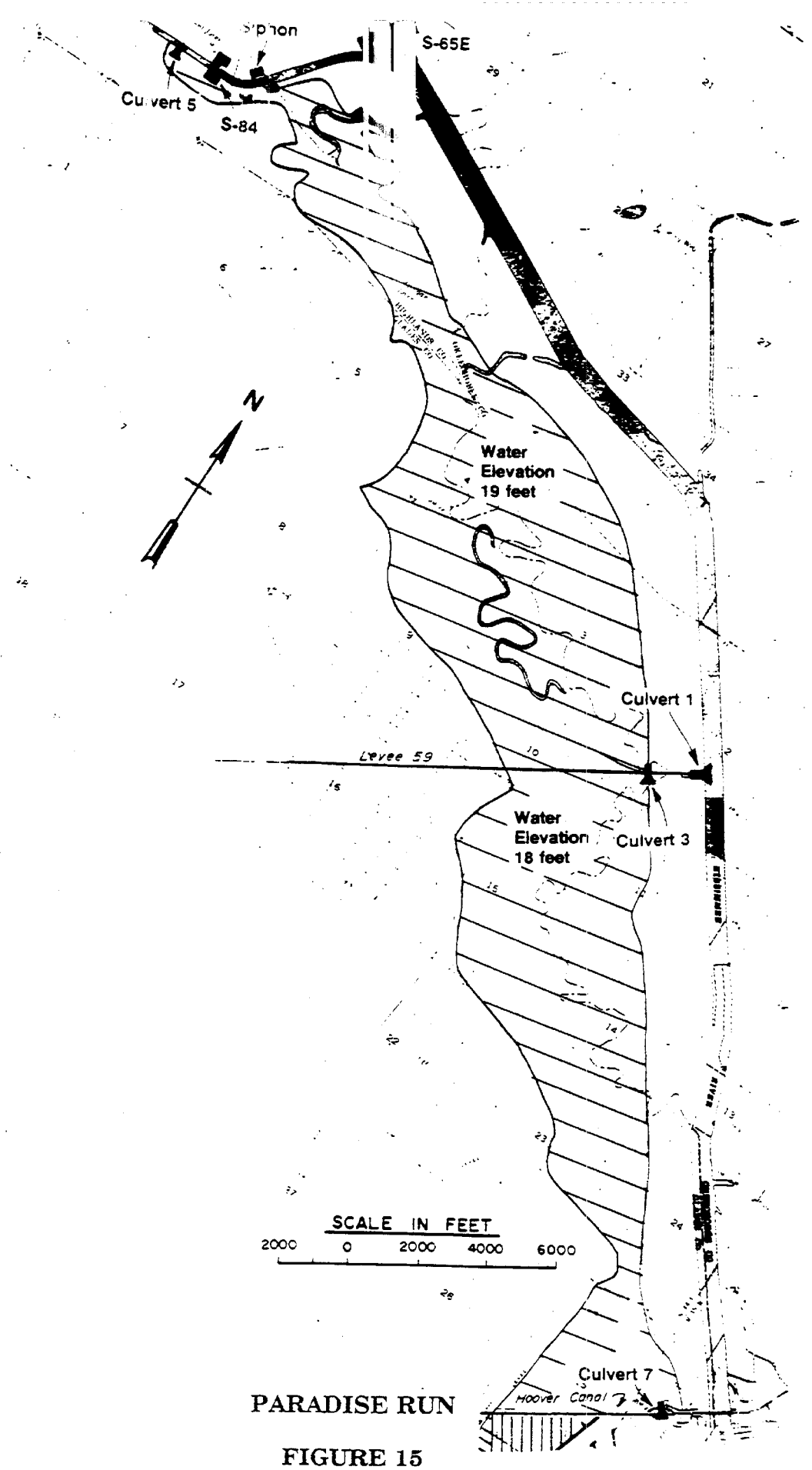
POOL STAGE MANIPULATION

FIGURE 13



POOL STAGE MAINPULATION SCHEDULE

FIGURE 14



PARADISE RUN

FIGURE 15

TABLE 8
CORPS 1985 PLANS: EVALUATION OF FINAL ARRAY OF ALTERNATIVES

EFFECTS	"WITHOUT PROJECT" CONDITION (NO ACTION)	PARTIAL BACKFILLING	COMBINED WETLANDS	DEMONSTRATION PROJECT	POOL STAGE MANIPULATION	PARADISE RUN	BEST MANAGEMENT PRACTICES
WATER QUALITY	Could degrade in future	Some improvement	Some improvement	Some improvement in river oxbows	Little or no change	Improves local water quality	Most beneficial impact for water quality improvement
WETLANDS	Total of 18,000 acres of wetlands in Lower Basin	Total of 37,400 acres of wetlands with Upper Basin flows	Total of 36,500 acres of wetlands expected	6,200 acres of wetlands expected from 4,800 acres in Pool B	Total of 29,300 acres of wetlands expected	3,400 acres of wetlands expected in Paradise Run from 1,200 acres	Minimal resource improvement
FLOOD DAMAGE REDUCTION	Flood protection retained	Flood protection reduced	Flood protection retained	Flood protection reduced	Flood protection retained	Not applicable	Not applicable
NAVIGATION	Navigational capability retained	Navigational capability reduced	Navigational capability retained	Navigational capability reduced	Navigational capability retained	Not applicable	Not applicable
TOTAL PROJECT COST ($ MILLION, JULY 1991 PRICE LEVELS)	$0	$102.8 to $131.6*	$40.7	$12.3	$7.2	$2.5	$1.6

* - Does not include necessary land

7.5 FINDINGS AND RECOMMENDATION

As a result of the extensive studies that had been undertaken, the Corps presented findings in five key areas. These findings provided the framework for subsequent formulation and evaluation of restoration measures within the lower Kissimmee River Basin by the SFWMD:

7.5.1 Environmental Resources

The most significant concern of this study was the loss of environmental amenities, specifically the wetland ecosystem, attributed to the channelization of the Kissimmee River. Backfill of the canal within the Lower Kissimmee River Basin would be the most viable method of restoring wetland values. Although more costly than the other alternatives, the partial backfill plan provided the highest fish and wildlife benefits. However, because of the significantly altered hydroperiod, backfill alone would not result in significant marsh restoration in the Lower Basin. Therefore, as a supplement to backfilling, modified release schedules for the Upper Basin would be required to more closely approximate the natural flow conditions needed for wetlands restoration. Modified schedules could affect fish and wildlife in the Upper Basin lakes, navigation between the lakes, and provision of flood control.

7.5.2 Water Quality

The Kissimmee River project created opportunities for intensified land use activities, and the resulting land use changes had the most significant effect of any source to date on water quality in the basin. Although the volume of water from C-38 contributes a significant load of material to the lake, it is similar in load to rainfall, and ortho- and total phosphorous concentrations are among the lowest of any lake inflow source. Implementation of best management practices would be expected to significantly improve the water quality of all tributaries draining into Lake Okeechobee. The partial backfill and combined wetlands alternatives would improve Kissimmee River water quality; however, these plans would not significantly affect the ambient phosphorous concentration in Lake Okeechobee.

7.5.3 Water Conservation and Drainage

Water deliveries from Lake Kissimmee into C-38 have declined about 39 percent in recent years. However, the overall volume of water delivered to Lake Okeechobee from the Lower Kissimmee River Basin through C-38 was found to be relatively the same as that experienced under pre-project conditions. The timing of water deliveries has changed, however, due to water management practices for flood control and water conservation. While the

plans considered in the first Corps study could change the timing of water delivery from the Kissimmee River Basin to Lake Okeechobee, they would not significantly affect the volume of water discharged to Lake Okeechobee, nor the volumes discharged into water conservation areas that supply the Everglades.

7.5.4 Flood Control

Modifications that would negate the Lake Kissimmee discharge "get away" capacity or conveyance afforded by C-38 in Pool A could create the potential for flood damage around Lakes Kissimmee, Hatchineha, and Cypress. In order to prevent reduced flood protection, adequate outlet capacity from the Upper Basin should be retained by leaving a portion of C-38 intact or providing additional structural capacity. Partial backfilling of the central portion of C-38 would not be expected to affect flood protection in the Upper Basin. However, induced flooding in the Lower Basin would require an easement on, or acquisition of, affected lands.

7.5.5 Recreation and Navigation

Expanded usage by small, non-powered boats, such as canoes, jon-boats, and flat bottom prams, would be expected on a restored river. Larger powerboats, however, could experience reduced use due to changed river conditions. Restoration of a natural river system under the partial backfill plan may cause shifting channels and sediment transport, which, if associated with large discharge or flood events, would likely necessitate dredging to maintain the authorized 3-foot navigation capability. Based on projected use demands, the greatest potential for recreational development would be in providing public access and additional recreational facilities for boating, hunting and camping.

7.5.6 Conclusion and Recommendation

Based on the final analyses, all of the investigations conducted during the study, Federal policies and guidelines current at that time, and the publicly expressed concerns and issues, the Jacksonville District Engineer determined that there was no basis for Federal implementation of modifications to the Corps' Kissimmee River flood control project. This determination was based on the Federal requirement to recommend the plan with the greatest net economic benefit, consistent with protecting the nation's environment; commonly called the National Economic Development, or NED, Plan. None of the plans considered would result in a net economic benefit, where annual dollar benefits would exceed annual dollar costs, when analyzed in accordance with the required economic evaluation procedures. Furthermore, at that time, environmental restoration was not yet defined as one of the Corps' high priority outputs for the water resources development program.

Although it was concluded that there was no Federal interest in project modifications by the Corps, the District Engineer noted that, short of restoring a riverine system, the following measures would achieve the study's planning objectives:

* **Pool Stage Manipulation** - Offers substantial increases in wetland associated environmental values by providing a fluctuation of water levels, and retains the flood control capability of the existing project. The existing water conservation and water management capability would be maintained.

* **Paradise Run** - Restores wetland values to the former riverine system in the lower Kissimmee River Basin.

* **Best Management Practices** - Offer the greatest potential for water quality improvement within both the lower Kissimmee River Basin and the Taylor Creek-Nubbin Slough Basin.

The District Engineer's recommendation for no Federal action was subsequently supported through the Corps' review and approval process, including the Division Engineer (October 1985), the Board of Engineers for Rivers and Harbors (June 1986), and the Chief of Engineers (July 1987). The Chief's Report is currently under review in the Office of the Assistant Secretary of the Army (Civil Works).

SECTION 8

FORMULATION OF ALTERNATIVE PLANS: SOUTH FLORIDA WATER MANAGEMENT DISTRICT RESTORATION STUDY

In response to the Governor's Executive Order 83-178 and the Seven Point Plan, the SFWMD undertook a series of activities designed to test and evaluate the State's preferred alternative of backfilling C-38. The SFWMD work drew from data and findings of the first Corps' feasibility study, and was the next step in developing a recommended plan for restoration of the Kissimmee River. The principal study efforts and milestones during this period were:

* **Demonstration Project (1984-1989),**

* **Model Study (1986-1989),**

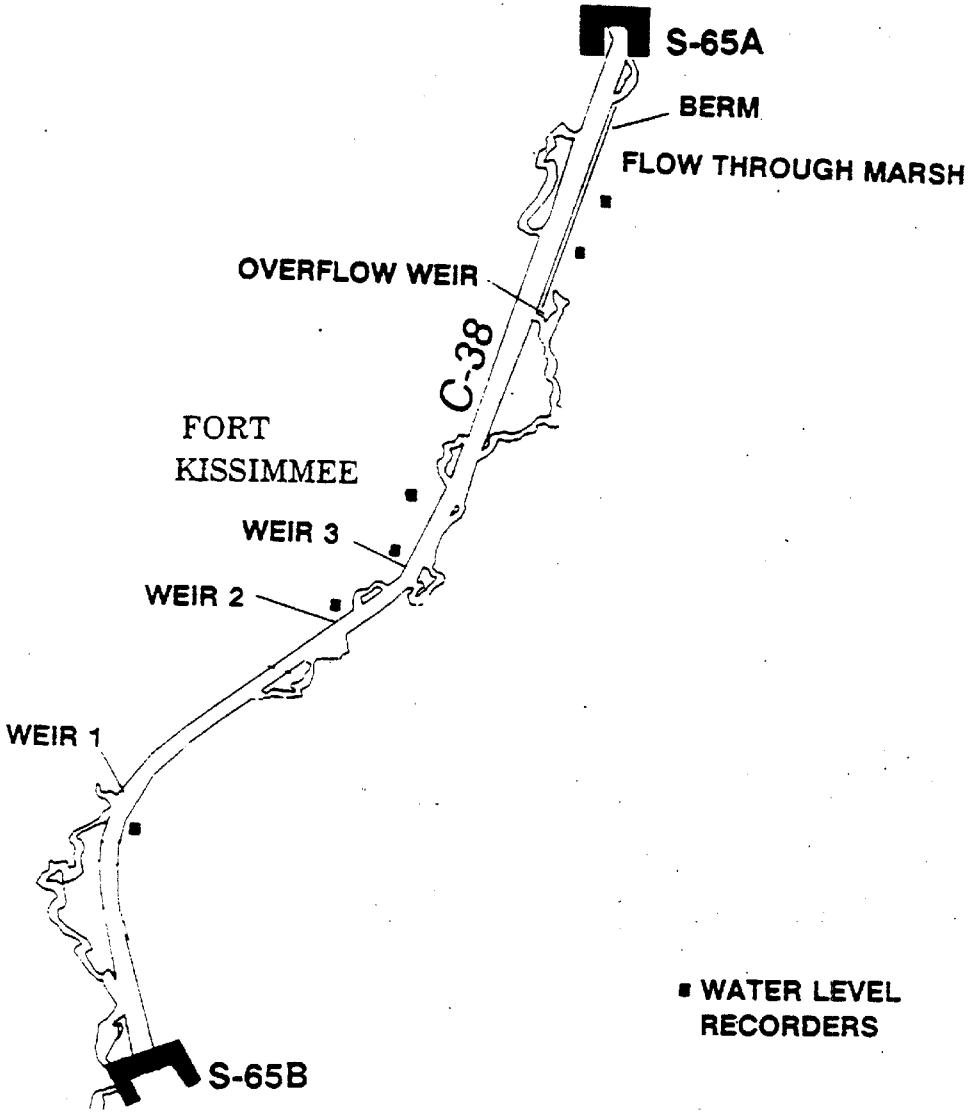
* **Kissimmee River Restoration Symposium (1988),**

* **Restoration Report (1990).**

8.1 DEMONSTRATION PROJECT

The SFWMD Kissimmee River Demonstration Project was designed and implemented as a field experiment to assess the feasibility of the partial backfill concept and provide greater insight into methodologies and consequences of restoration of the Kissimmee River.

This initial restoration effort, costing approximately $1.4 million, was referred to as the Phase I Demonstration Project. The project's Phase II, which would have consisted of installing four earth plugs in Pool B, was never undertaken. The Phase I project, shown in Figure 16, included construction of three steel sheet pile weirs, or dams, in Pool B. Each weir included center notches to allow navigation through the pool. Weir placement was designed to divert water into selected original river meanders and flood plain. This diversion technique was used in conjunction with manipulation of the Pool B water surface elevations in an effort to reproduce the natural water level fluctuations on the flood plain.



SFWMD's KISSIMMEE RIVER RESTORATION
PHASE I DEMONSTRATION PROJECT

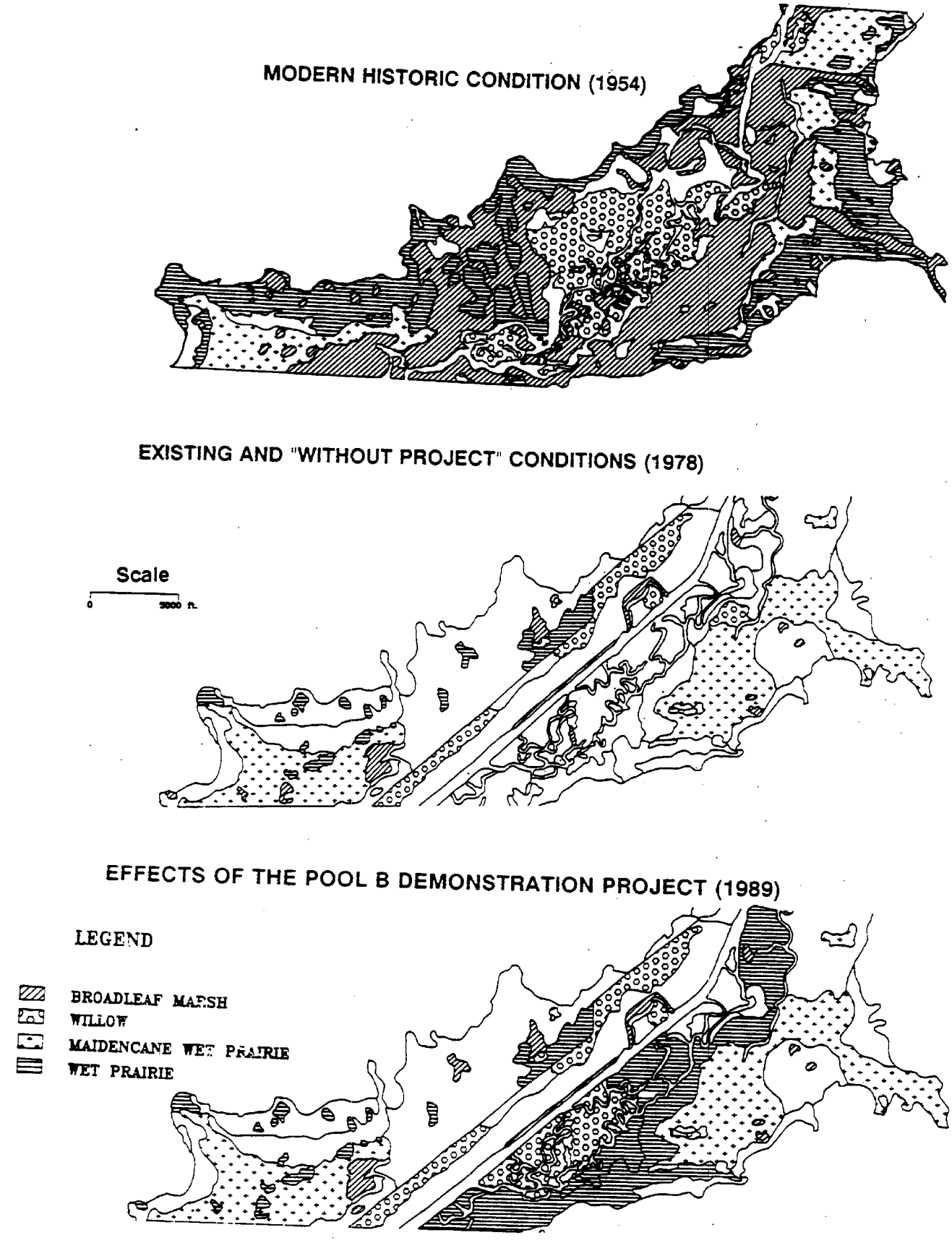
FIGURE 16

The Demonstration Project also included construction of a two-barrel slide gate structure in the tieback levee east of S-65A. This culvert was designed to pass flows into the upper reaches of Pool B and thereby create a flow-through marsh. An 8,000 foot berm was constructed along the east bank of C-38 to prevent surface flows over flood plain lands from returning to C-38.

Following completion of construction, discharge tests were conducted in January 1987 and February 1988 to simulate conditions that likely would occur in a 10-year flood event. These high-discharge tests showed that restoration of the Kissimmee would be compatible with flood protection. In addition, the SFWMD, Florida Game and Freshwater Fish Commission, and Florida Department of Environmental Regulation, monitored and evaluated environmental effects of the Demonstration Project through 1989. Monitoring results are contained in *Environmental Responses to the Kissimmee River Demonstration Project* (SFWMD Technical Publication 91-02, March 1991), the *Proceedings of the Kissimmee River Restoration Symposium* (SFWMD, December 1990), and *Kissimmee River Restoration Project: Post-Construction Monitoring* (Florida Department of Environmental Regulation, April 1989). These reports provide the following conclusions concerning restoration of the Kissimmee River and its environmental resources.

Plant community responses during the Demonstration Project showed that restoration of wetland communities on the Kissimmee River flood plain is feasible. Monitoring data indicate that plant community composition on both drained and impounded flood plain responded to changes in hydrologic factors, including water depths, inundation frequencies, and temporal inundation patterns. In general, hydrologic changes produced by the Demonstration Project led to expanded distributions of hydrophytic species and decreased frequencies of mesophytic and xerophytic species. Broadleaf marsh, wetland shrub and wet prairie, the three dominant plant communities on the natural flood plain, redeveloped on some portions of the Pool B flood plain. In fact, the willow community that was reestablished adjacent to the remnant river in the mid-section of the pool, and the broadleaf marsh that redeveloped in the northern section of the pool, are the same plant communities that occurred in these areas on the pre-channelization flood plain (Figures 17-20). These results indicate that the wetland plant species of the Kissimmee River flood plain have the reproductive potential, including a viable seed bank, to rapidly colonize and expand their distribution into habitats with favorable hydrology. Wetland plant communities were reestablished most successfully on sections of the channelized flood plain where hydroperiods comparable to pre-channelization records were restored.

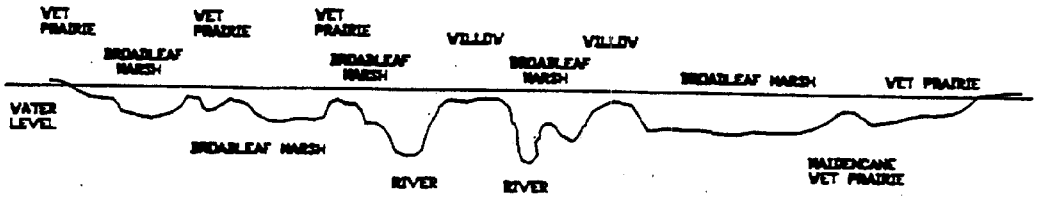
The Demonstration Project also provided evidence of the feasibility of restoring the full complement of wetland functions or values, including



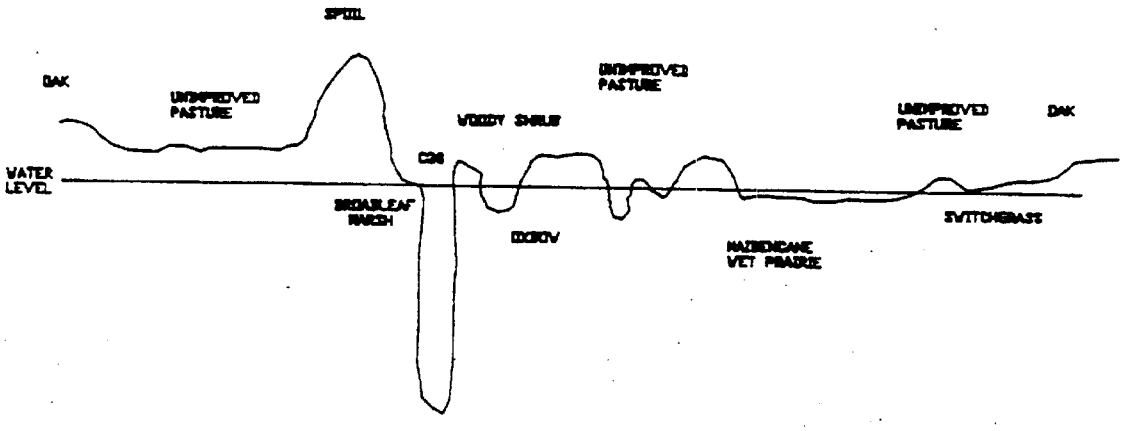
KISSIMMEE RIVER ECOSYSTEM
CENTRAL SECTION OF POOL B MAPS

FIGURE 17

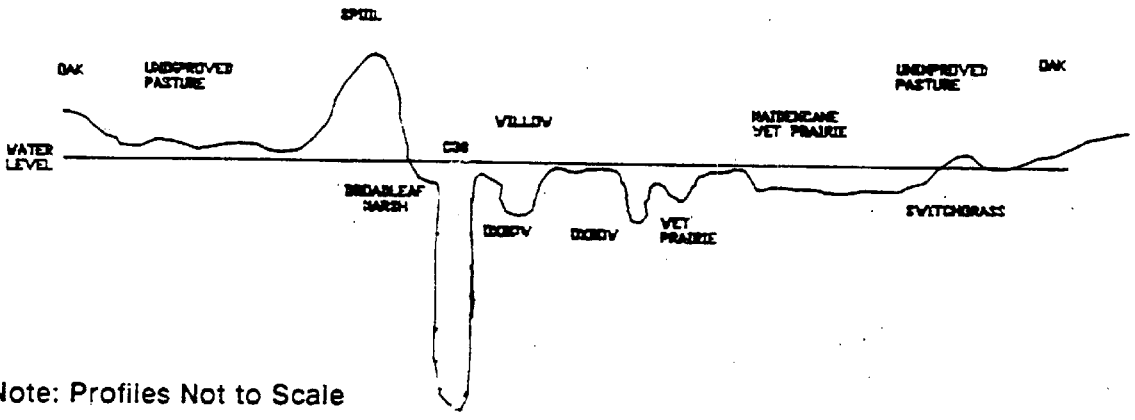
MODERN HISTORIC CONDITION (1954)



EXISTING AND "WITHOUT PROJECT" CONDITIONS (1978)



EFFECTS OF THE POOL B DEMONSTRATION PROJECT (1989)

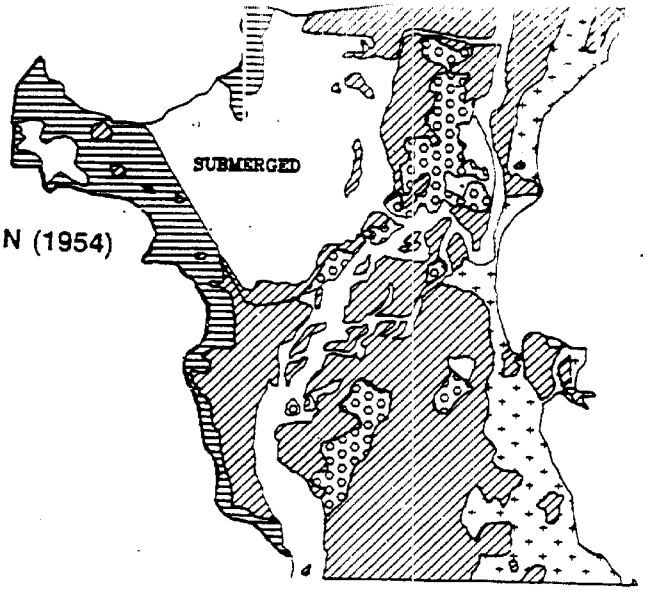


Note: Profiles Not to Scale

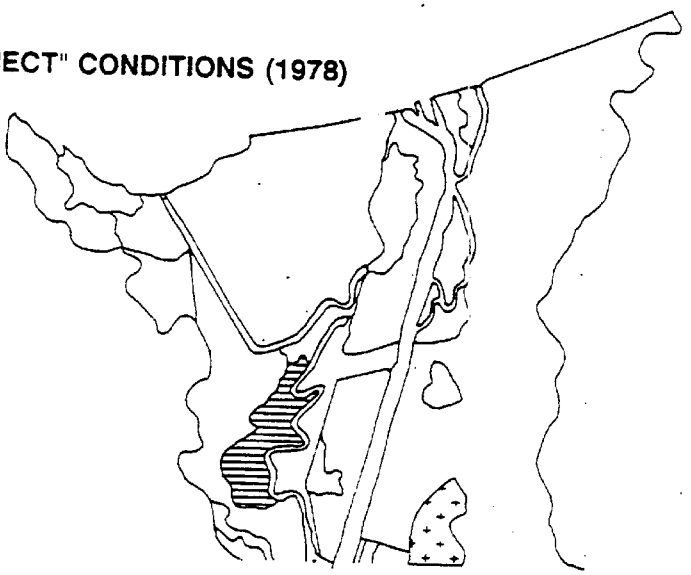
KISSIMMEE RIVER ECOSYSTEM
CENTRAL SECTION OF POOL B PROFILES

FIGURE 18

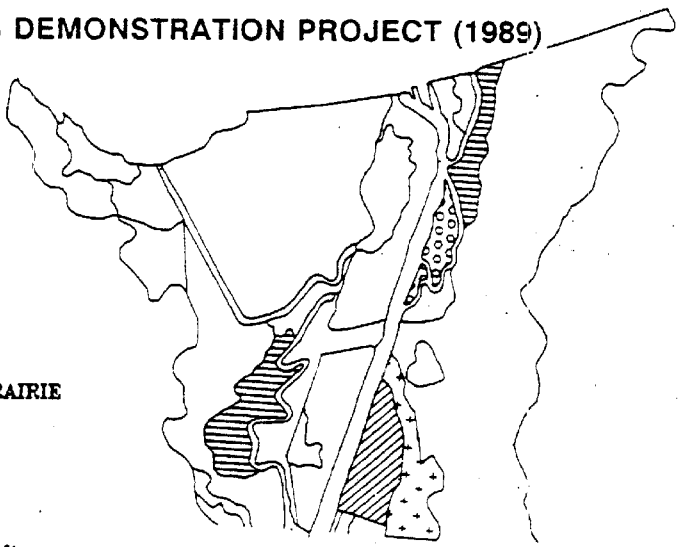
MODERN HISTORIC CONDITION (1954)



EXISTING AND "WITHOUT PROJECT" CONDITIONS (1978)



EFFECTS OF THE POOL B DEMONSTRATION PROJECT (1989)



LEGEND

- BROADLEAF MARSH
- WILLOW
- MAIDENCANE WET PRAIRIE
- WET PRAIRIE

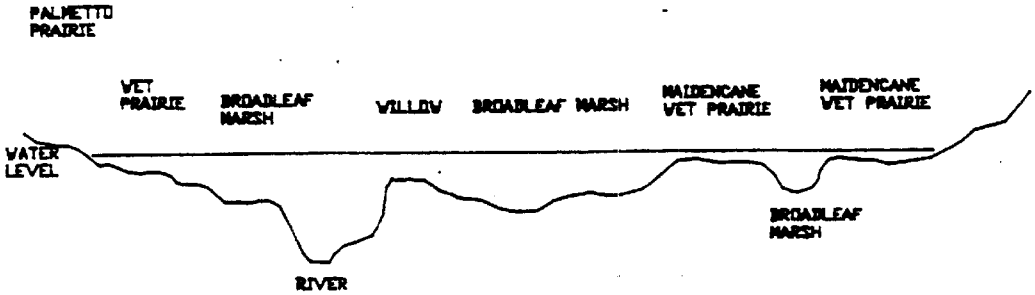
Scale

0 2000 ft.

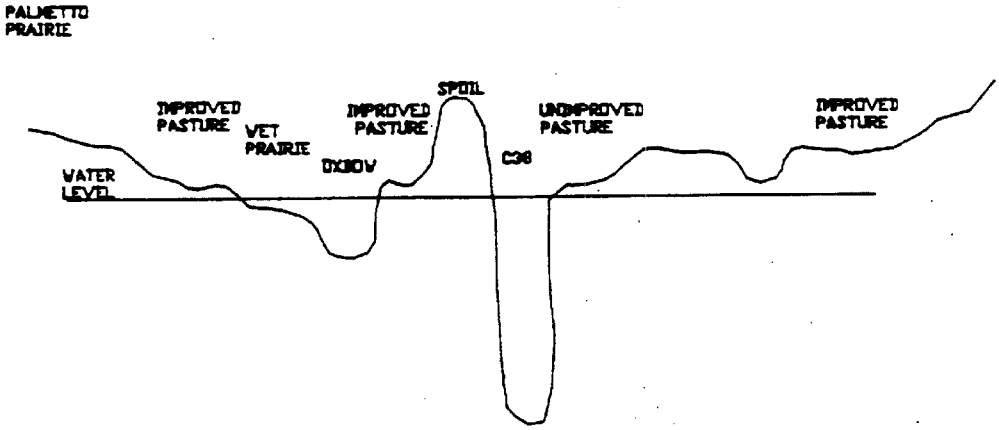
KISSIMMEE RIVER ECOSYSTEM
NORTHERN SECTION OF POOL B MAPS

FIGURE 19

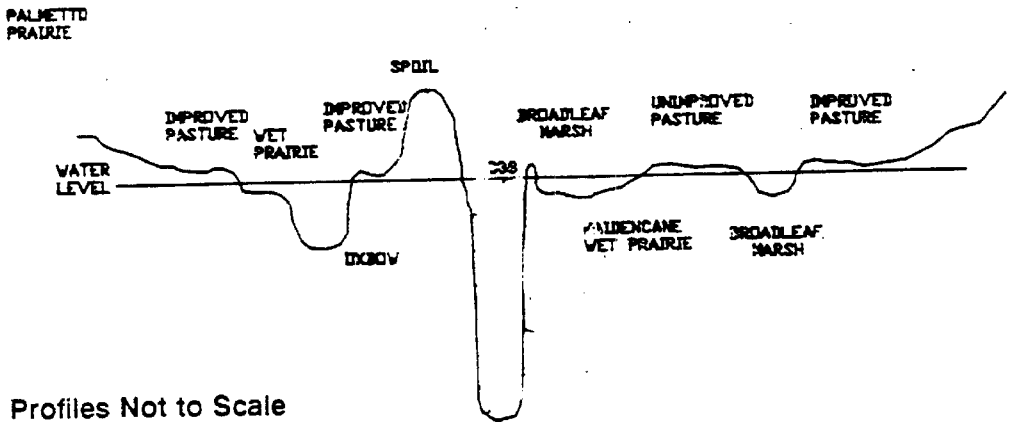
MODERN HISTORIC CONDITION (1954)



EXISTING AND "WITHOUT PROJECT" CONDITIONS (1978)



EFFECTS OF THE POOL B DEMONSTRATION PROJECT (1989)



Note: Profiles Not to Scale

KISSIMMEE RIVER ECOSYSTEM
NORTHERN SECTION OF POOL B PROFILE

FIGURE 20

waterfowl and wading bird utilization. Species richness, diversity and density of wading birds increased dramatically, and waterfowl diversity and density were higher on the Pool B flood plain than any other section of the C-38 system (Toland, 1991). Both waterfowl and wading bird utilization were highest in flood plain wetlands where the Demonstration Project led to reestablishment of natural (pre-channelization) hydrologic characteristics.

Several integral components of the flood plain food web also showed positive responses to reestablished hydrologic characteristics. Elevated water stages led to higher densities of small forage fish in broadleaf marsh and indicated that increased water depths is required to restore the productivity of this component of the food web. Invertebrate sampling showed that colonization of re-inundated flood plain was rapid; representative invertebrate community structure typically was attained after about 40 days of inundation. Highest densities of invertebrates were found in re-flooded areas that were hydraulically connected to other aquatic habitats, such as an adjacent marsh or the river channel. In fact, monitoring data indicated that invertebrate densities were higher in flood plain wetlands with overbank flow from the river, than in habitats without flow.

Other monitoring data showed that the Demonstration Project began to reestablish processes that could enhance river water quality, particularly during high flow periods. Grab samples taken from the river channel during a high discharge event revealed suspended solids concentrations as high as 41 mg/l, with associated total phosphorus levels of 0.131 mg/l, while samples taken at a location where water was draining back into the river from the flood plain had suspended solids concentrations < 1.0 mg/l and total phosphorus levels of 0.042 mg/l. Following this event, thick deposits of organic sediment were found on portions of the flood plain that received overbank flow.

Results of Demonstration Project monitoring indicate that restoration of ecological integrity of the river channel also is possible. Reintroduction of flow and associated fluvial processes enhanced diversity and quality of degraded river habitat by restoring natural substrate characteristics and channel morphology. A predominantly sand substrate was restored through gradual flushing and covering of organic deposits, without any detectable impacts on water quality. The diversion of flow also improved the quality of river habitat by leading to a more uniform vertical (surface to bottom) distribution of dissolved oxygen, particularly during high discharge periods.

Effects of reintroduced flow on river habitat diversity and quality were reflected by biological responses. The Florida Game and Fresh Water Fish Commission found that density and biomass of game fish species were higher in river runs with reintroduced flow than in river channels without flow

(Wullschleger et al., 1990). Monitoring data also indicated that game fish recruitment and production increased in response to a prolonged period of elevated water stages that occurred during the Demonstration Project. Other studies showed that reintroduced flow led to reestablishment of benthic invertebrate species composition with at least rudimentary characteristics of a natural river invertebrate community, including a full complement of trophic guilds. Both density and diversity of benthic invertebrates, particularly in littoral habitats, were enhanced by reintroduced flow.

Although the Demonstration Project clearly evoked many positive environmental responses, it did not restore the Kissimmee River channel or flood plain. Because altered physical characteristics, particularly hydrologic parameters, were not adequately reestablished, most structural and functional aspects of ecosystem integrity were affected temporarily and only partially restored. Inundation frequencies on approximately 70% of the Pool B flood plain, for example, remained considerably lower than provided by pre-channelization hydroperiods. As a result, "weedy" mesophytic and xerophytic species persisted, and the spatial mosaic of wetland plant communities began to reestablish on only a small portion of the flood plain.

The functional values of the flood plain also remained incomplete. Inadequate inundation patterns and rapid stage recession rates limited wading bird and waterfowl utilization and prevented establishment of a full complement of aquatic invertebrate trophic guilds. There also was no evidence of utilization of flood plain wetlands by large, river channel fish species. Water levels did not get deep enough, or were not deep long enough, to accommodate immigration of riverine fish species which historically used the Kissimmee marshes as spawning, nursery and feeding habitat. Fish utilization of the Pool B flood plain marshes also may have been limited by chronic low dissolved oxygen levels. Prior to channelization, fish immigration onto the flood plain probably was tied to, perhaps stimulated by, annual wet season flooding, which flushed deoxygenated water out of the marsh much like wet season pulses of water rejuvenate the Sudd swamps of the African Nile (Howell et al., 1988). Simple manipulations of water levels in the stagnant Pool B impoundment did not reproduce the ecological functionality of flood pulses over what was once a continuous flood plain landscape.

Similar conclusions are derived from river channel monitoring studies, which pointed out several significant flaws with using weirs as a potential restoration tool. During high flows, weir-caused flow diversions, combined with the drainage capacity of the canal, produced a steep water surface gradient, and as a result, unnaturally high velocities in adjacent river runs. Modelling studies conducted during the Demonstration Project (see next section) showed that a more extensive weir/canal system would result in erosive velocities which

would be 2-3 times higher than historic records of average pre-channelization maximum velocities. Use of weirs to divert C-38 discharges also did not lead to required improvements in dissolved oxygen regimes in adjacent river runs. Either discharges were not high enough, and the length of discontinuous river channel through which flow was diverted was not long enough, to allow physical processes to aerate the extremely low dissolved oxygen water that was diverted from the canal during summer and fall months.

Meaningful restoration of river biological communities was precluded by these negative effects of Demonstration Project weirs on physical and chemical characteristics. For example, any observed progress toward restoration of natural river channel fish and benthic invertebrate communities was reversed repeatedly by low dissolved oxygen conditions which consistently reappeared during the summer and fall months. Recovery of fish communities also was impacted by two major fish kills that resulted when dissolved oxygen was depleted further by rapid drainage of water off the flood plain. Modeling studies showed that rapid stage recession rates are a basic environmental flaw of the weir/canal system. Also, although direct negative impacts of high velocities were not detected, natural Kissimmee River fish and invertebrate species are not adapted to survive in high flow velocities. The reproductive habits of most Kissimmee River game fish species, for example, make their eggs or young highly susceptible to being washed out of nests by high flow velocities.

Current inflow regimes from the headwater lakes also limited restoration in river channels adjacent to weirs. Typical pre-channelization base flow discharges were generated only half as frequently during the Demonstration Project, and extended no-flow periods exacerbated the low dissolved oxygen problem during summer and fall months. The Upper Basin regulation schedule also resulted in a seasonal juxtaposition of high and low flow periods, which disrupted or interfered with spawning by fish species. Highest discharges occurred between January and April, the peak reproductive period of most Kissimmee River game fish species.

In summary, the Demonstration Project clearly showed that restoration of the ecological integrity of the Kissimmee River ecosystem can be accomplished, but only if certain physical, chemical and hydrologic characteristics are reestablished in the river and flood plain. The studies established that a successful restoration plan must include measures that will restore the following characteristics of the pre-channelization system which were altered by the flood control project: inundation frequencies, spatial and temporal patterns of inundation, stage recession rates, and water depths on the flood plain, river channel velocities, dissolved oxygen regimes, and temporal discharge characteristics and variability, hydraulic connectivity between the river and flood plain, and the continuity of river and flood plain habitat.

8.2 MODEL STUDY

Kissimmee River sedimentation and river mechanics questions were addressed by a three-year physical and mathematical modeling study by the University of California at Berkeley. The model drew from the Demonstration Project, and helped in developing and evaluating an array of alternative restoration plans. A major study finding was that soil backfill placed in C-38 can be stabilized to resist erosion by major flood flows. Other findings indicated that mass transport of sediment to Lake Okeechobee would not occur, and that remnant canal sections can severely limit restoration efforts by causing high velocities in original river channels, rapid recession of flood plain water levels, and inadequate flood plain inundation.

8.3 KISSIMMEE RIVER RESTORATION SYMPOSIUM

The State's Kissimmee River environmental restoration goals and objectives were formulated at the Kissimmee River Restoration Symposium conducted by the SFWMD in October 1988. Over 150 participants gathered in Orlando to consolidate knowledge developed since the early 1970's, with a focus on work conducted since 1983. The symposium emphasized that lost Kissimmee River values were dependent upon complex environmental attributes, including numerous physical, chemical and biological processes, dynamics of intricate food webs, and an array of river and flood plain habitat characteristics and interactions. The symposium's ecological review panel concurred with participating scientists that reestablishment of lost ecological values would be achieved only with a holistic, ecosystem restoration perspective.

As an outcome of the symposium, Kissimmee River restoration became focused on the ecosystem and its emergent properties, rather than individual or discrete biological components. Based upon these guidelines and the impacts of channelization on the form and functioning of the Kissimmee River ecosystem (i.e., habitat and hydrologic determinants of ecological integrity), the primary restoration objective became to reestablish pre-channelization physical form and hydrologic characteristics in as much of the river and flood plain ecosystem as possible.

8.4 RESTORATION REPORT

Insights gained through the Demonstration Project, model study and Restoration Symposium, as well as through numerous other investigations over the previous twenty years, culminated in the formulation, evaluation and

selection of a restoration plan by the SFWMD. These efforts were documented in the *Kissimmee River Restoration, Alternative Plan Evaluation and Preliminary Design Report* in June 1990, and are summarized in the following discussions of the SFWMD planning process.

8.4.1 Goal

As a result of the 1988 symposium, reestablishment of the ecological integrity of the Kissimmee River ecosystem became the primary restoration goal. The goal requires reestablishment of an ecosystem that is *"capable of supporting and maintaining a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitat of the region"* (Karr and Dudley, 1981).

To define how to achieve this goal, the SFWMD developed a plan formulation rationale based on the ecosystem, in contrast to the more traditional species and habitat-based rationale generally used by Federal agencies. The SFWMD reasoned that natural ecosystems, like the historic Kissimmee River, have a level of organization that transcends the optimal requirements of its individual species components. The historic Kissimmee River was not a biological utopia in which the optimal environmental requirements of wading birds, waterfowl, fish and other discrete components were constantly met. Even if it were desirable, it would not be possible to create such a utopia because optimal requirements of individual species, and even life history stages of the same species, are often conflicting. Therefore, it would be neither practical nor desirable to combine individual species requirements with the intention of providing optimal conditions for a maximum number of species or a select group of species. Such an approach would not be successful in restoring an ecosystem that resembles the historic Kissimmee River with its recognized complement of environmental values, because no criteria specifying individual species requirements, whether alone or in combination, would reestablish the complex food webs, habitat heterogeneity, and physical, chemical and biological processes and interactions that determined the biological attributes of the natural system.

Moreover, due to temporal variations in environmental conditions, like hydrology, and continuously occurring competitive shifts, species populations and community structure of the historic Kissimmee River were not stable. There were likely years, for example, when waterfowl utilization of the flood plain was extensive, but largemouth bass recruitment may have been below average. During other years, bass populations increased, while wading bird feeding opportunities may have been limited. However, the essential structural and functional characteristics of the ecosystem were stable. For example, while temporal hydrologic variability led to constant shifts in the size and distribution

of individual patches of the distinct wetland habitat types that once dominated the flood plain, conferred functional attributes, such as the integrity of the flood plain food web, remained intact and persisted through the most extreme droughts and floods. Because stability and resilience are emergent properties of ecosystems, and not characteristics of component species populations, these features cannot be restored by simply summing or optimizing the requirements of individual species.

8.4.2 Determinants of Ecological Integrity

Given this rationale for natural ecosystem restoration, the SFWMD assembled a study team of biologists, chemists, hydrologists and ecologists to develop criteria that would guide its planning, design and evaluation processes. The team included technical experts from the SFWMD, the Florida Game and Fresh Water Fish Commission, the Florida Department of Environmental Regulation, and the U.S. Fish and Wildlife Service. Initially, the team recognized that ecological integrity of riverine systems like the Kissimmee River is determined by five classes of variables (Karr et al., 1983):

* **Energy source** - Type, amount and particle size of allocthonous inputs, primary production, and seasonal pattern of available energy.

* **Water quality** - Temperature, turbidity, dissolved oxygen regimes, nutrients, organic and inorganic chemicals (natural and synthetic), heavy metals and toxic substances, pH.

* **Habitat quality** - Substrate type, water depth, current velocity, availability of refuges and reproductive, nursery and feeding habitats, habitat diversity.

* **Hydrologic (flow) regime** - Water volume, temporal variability of discharge.

* **Biotic interactions** - Competition, predation, disease, parasitism.

These variables are determinants which interact with each other and may show hierarchical relationships. For example, hydrologic regimes in the historic Kissimmee River had a major influence on the other four determinants. Although channelization degraded the river's ecosystem through effects on all five determinants, the most directly affected were hydrologic regimes and habitat quality. Effects on energy inputs, water quality and biological interactions occurred, but were primarily caused by altered hydrology. The physical elimination of 35 linear miles of river and 7,000 acres of flood plain wetlands by the excavation of C-38 and deposition of excavated material were

the most obvious effects on habitat quality. However, alteration of the hydrologic regimes significantly affected the integrity of the remaining river ecosystem.

8.4.3 Guidelines and Objective

The study team proposed that, because hydrologic processes created and maintained the historic ecosystem, restoration of that system's values could best be achieved by returning control of the system to these natural hydrologic processes. That is, given a chance, natural hydrologic processes will restore the complex ecosystem attributes, and ensure the return and preservation of the ecosystem's environmental values. This concept was verified by the Demonstration Project monitoring studies, which confirmed that biological integrity could be restored through reestablishment of appropriate hydrologic characteristics (Toth, 1991). However, restoration must involve reestablishment of ecosystem form as well as function. The integrity of the historic system, including its stability and resilience, would not be restored if key structural characteristics, such as availability of refuges, continuity of river and flood plain habitat, and interaction (connectivity) between the river channel and flood plain, were not reestablished.

In addition, the study team recognized that ecosystem restoration could be achieved only if the restored area is large enough to reestablish all structural and functional aspects of the historic system. At a minimum, the ecological integrity goal requires reestablishment of the mosaic of habitats which supported the fish and wildlife species and associated food webs that were present in the pre-channelization ecosystem. While population densities of some components, such as small macro-invertebrates like crayfish, can be restored in habitat patches of an acre or less, reestablishment of populations of other fauna, such as wading birds, requires restoration of multiple habitat types over a much larger area. The dominant fish and wildlife habitat types in the pre-channelization river and flood plain were open water associated with the river channel, willow and buttonbush wetland shrub communities, cypress and wetland hardwood forests, broadleaf marsh, maidencane and mixed species wet prairie, and switchgrass, as displayed in Table 1 (U.S. Fish and Wildlife Service, 1991). If the distribution and functionality of these habitats could be restored, then the best basis for establishing the minimum area required to reestablish the ecological integrity of the ecosystem is the area of pre-channelization ecosystem over which a complete complement of these major habitat patches were found.

Remnants of all of these habitats remain in the channelized river and flood plain, particularly in the lower portions of each pool, but do not possess the same structure and function, and consequently do not support the same

biological components, as they did historically. However, Demonstration Project studies indicated that reestablishment of hydrology will not only restore the functionality of remaining remnant habitats, but also will lead to reestablishment of the pre-channelization mosaic of habitats throughout the river and flood plain ecosystem, including drained and physically altered sections. Based upon these results, the study team analyzed the historic flood plain vegetation maps and determined that the minimum area needed to reproduce the habitat diversity that was present in the historic ecosystem, and hence reestablish the array of fish and wildlife species that were present in that system, encompassed approximately 25 square miles of river and flood plain. Although large patches of mixed species wet prairie, broadleaf marsh and river channel habitat were found over a smaller area, the somewhat restricted distributions of the other important habitat types, as shown in the Table 1, determined the required minimum area.

Based on these ecological guidelines and the determinants of ecological integrity, the study team concluded that the primary restoration objective was to reestablish pre-channelization hydrologic characteristics in as much of the river and flood plain ecosystem as possible, including the 35 miles of river channel and 7,000 acres of flood plain that were directly impacted by construction of C-38 and disposal of excavated material.

8.4.4 Restoration Criteria

This objective was further defined through five criteria that collectively measure hydrologic conditions that must be recreated in order to restore the river's pre-channelization ecological integrity. Evaluations of performance relative to these criteria could be used to compare alternative restoration plans. The development and use of hydrologic criteria for ecological evaluation was a pioneering effort in blending these two sciences.

Due to secondary drainage, Upper Basin regulation, possible climatic change, and constraints within which restoration may be possible, complete restoration of historic hydrology would not be feasible. However, pre-channelization records upon which the criteria were based indicate discharge regimes regularly caused flooding beyond the flood plain. This "excess" water may not be needed for Kissimmee River restoration because restoration efforts and criteria focus on hydrologic characteristics within the flood plain boundary. The hydrologic criteria developed by the study team and subsequently used by the SFWMD to determine the most effective restoration plan were:

* **Continuous flow with duration and variability characteristics comparable to pre-channelization records** - The most important features of this criterion are: (a) reestablishment of continuous flow from July-October, (b) highest

annual discharges in September - November and lowest flows in March - May, and (c) a wide-range of stochastic discharge variability. These features should maintain favorable dissolved oxygen regimes during summer and fall months, provide non-disruptive flows for fish species during their spring reproductive period, and restore temporal and spatial aspects of river channel habitat heterogeneity. Table 9 illustrates the relationships between the discharge characteristics criterion and the determinants of ecological integrity.

*** Average flow velocities between 0.8 - 1.8 feet per second when flows are contained within channel banks** - These velocities complement discharge criteria by protecting river biota from excessive flows which could interfere with important biological functions such as feeding and reproduction, and provide flows that will lead to maximum habitat availability. The relationships of the criterion velocities, slower water and faster water to ecological determinants are shown in Table 10.

*** A stage-discharge relationship that results in overbank flow along most of the flood plain when discharges exceed 1,400 - 2,000 cubic feet per second** - This criterion reinforces velocity criteria and will reestablish important physical, chemical and biological interactions between the river and flood plain. Overbank and non-overbank flow effects on ecological determinants are depicted in Table 11.

*** Stage recession rates on the flood plain that typically do not exceed 1 foot per month** - A slow stage recession is required to restore the diversity and functional utility of flood plain wetlands, foster sustained river-to-flood plain and flood plain-to-river interactions, and maintain river water quality. Slow drainage is particularly important during biologically significant time periods, such as wading bird nesting months. Rapid recession rates, such as rates that drain most of the flood plain in less than a week, led to fish kills during monitoring of the Demonstration Project in Pool B, and thus are not conducive to ecosystem restoration. Table 12 shows relationships among ecological determinants and recession conditions.

*** Stage hydrographs that result in flood plain inundation frequencies comparable to pre-channelization hydroperiods, including seasonal and long-term variability characteristics** - Ecologically, the most important features of stage criteria are water level fluctuations that lead to seasonal wet-dry cycles along the periphery of the flood plain, while the remainder (approximately 75 percent) of the flood plain is exposed to only intermittent drying periods that vary in timing, duration and spatial extent. Hydroperiod effects on ecological determinants are illustrated in Table 13.

Interdependencies among the restoration criteria and the determinants of ecological integrity are shown in Table 14, which illustrates the complex linkages that must be restored as a complete system to achieve successful restoration. For some biological components, some criteria and guidelines may be more important than others. For example, appropriate flood plain hydroperiods and slow stage recession rates are more important to wading birds than velocities in the river channel. For other groups, some criteria are critical, while others may be limiting. High river channel velocities could be devastating to benthic invertebrate communities that form the base of river food webs, but benthic invertebrates also depend on stage recession rates to provide slow and continuous inputs of organic matter as fuel for their productivity.

However, for many biological components, such as game fish species, each of the criteria and guidelines are of comparable importance, and failure to achieve all will preclude their restoration. For example, if the velocity, overbank flow, recession rate and hydroperiod criteria are met, but the current Upper Basin regulation schedule is maintained, high spring flows will interfere with game fish spawning. If the natural seasonal patterns of inflows are reestablished, but high velocities are generated in the river channel, other important life history functions of fish species will be affected. Kissimmee River fish fauna, for example, are not adapted for feeding in rapid currents. Game fish populations also will remain limited if flow characteristics are restored but production of potential food resources on the flood plain is reduced by inadequate inundation, or becomes inaccessible to river fish because the connectivity between the river and flood plain is restricted by lack of overbank flow, or blocked by berms or levees. Therefore, for game fish, as well as many other species, piecemeal restoration in which some restoration criteria are achieved in one segment of the system and others are met in another portion, would be of little or no value.

Moreover, because all biological components of the river and flood plain ecosystem are interrelated in a complex food and energy web, the effects of failure to meet one or more restoration criteria will reverberate throughout the system. In fact, such failure could prevent the development of the key interrelationships among biological components that form the basis of the intrinsic buffering capacity of natural ecosystems, confer resilience and facilitate persistence of a high diversity of species. Therefore, to reestablish the ecological integrity of the Kissimmee River ecosystem, and thereby restore the broad complement of fish and wildlife species that the ecosystem once supported, requires that all restoration criteria are met simultaneously.

TABLE 9

RELATIONSHIPS BETWEEN DISCHARGE CHARACTERISTICS
RESTORATION CRITERION AND DETERMINANTS OF ECOLOGICAL INTEGRITY

Determinants of Ecological Integrity	Restoration Criterion Continuous Flow, Historic Seasonal Flow Patterns and Variability	Prolonged No Flow Periods	Reversed Seasonal Patterns	Reduced Discharge Variability
FOOD (ENERGY) BASE	Increased productivity, diversity and incorporation of flood plain, riparian, and river sources and inputs	Decreased flood plain and riparian inputs, increased algal inputs	Decreased incorporation of flood plain and riparian inputs	Decreased diversity of flood plain and riparian inputs
WATER QUALITY	Increased dissolved oxygen in river and flood plain, decreased nutrient concentrations in river	Decreased dissolved oxygen in river	Decreased dissolved oxygen in river during critical time of year	Increased nutrient concentrations in river
HABITAT QUALITY	Increased wetlands, flood plain and river habitat diversity and quality	Decreased river habitat diversity and quality	Decreased river habitat quality	Decreased wetlands, flood plain and river habitat diversity
BIOTIC INTERACTIONS	Increased species diversity and community complexity	Decreased species diversity and community complexity	Decreased fish species diversity	Decreased species diversity and community complexity
ECOSYSTEM PROPERTIES	Increased resilience, biological communities adapted to withstand perturbations	Decreased resilience, localized population extinctions common in river	Decreased resilience of fish communities	Decreased resilience, biological communities susceptible to perturbations

TABLE 10

RELATIONSHIP BETWEEN FLOW VELOCITY RESTORATION CRITERION AND DETERMINANTS OF ECOLOGICAL INTEGRITY

Determinants of Ecological Integrity	Slow Water flow velocities less than 0.8 ft/sec	Restoration Criterion flow velocities between 0.8 - 1.8 ft/sec	Fast Water flow velocities greater than 1.8 ft/sec
FOOD (ENERGY) BASE	Reduced processing & incorporation of riparian, flood plain & littoral inputs into food web; increased exotic & algal inputs	Efficient processing & incorporation of flood plain, riparian & littoral inputs into food web	Reduced processing & incorporation of flood plain, riparian & littoral inputs
WATER QUALITY	Depressed DO with stratified distribution; nutrient inputs processed & incorporated by exotics, algae & native plant communities; increased turbidity during algal blooms	Increased DO with uniform distribution; nutrient inputs processed & incorporated primarily by native littoral plant communities; natural levels of turbidity	Increased DO with uniform distribution; nutrient inputs transported downstream: increased turbidity from erosion
HABITAT QUALITY	Increased coverage by exotics; reduced coverage by native plants; reduced habitat diversity & refuge availability; flocculent organic substrate	Native littoral wetland communities; diverse habitats & abundant refuges; predominantly sand substrate	Reduced littoral wetlands; reduced habitat diversity and refuge availability; predominantly shifting sand substrate
BIOTIC INTERACTION	Reduced species diversity & number of guilds in trophic structure	High species diversity; full complement of guilds in trophic structure	Reduced species diversity & number of guilds in trophic structure
ECOSYSTEM PROPERTIES	Simple communities with low resilience	Complex communities with high resilience	Simple communities with low resilience

TABLE 11

RELATIONSHIP BETWEEN OVERBANK FLOW RESTORATION CRITERION AND DETERMINANTS OF ECOLOGICAL INTEGRITY

Determinants of Ecological Integrity	Restoration Criterion overbank flow along most of flood plain when discharges exceed 1,400 - 2,000 cfs	No Overbank Flow
FOOD (ENERGY) BASE	Increased productivity & diversity of flood plain sources & inputs; river, flood plain & riparian contributions incorporated into river food web	Limited productivity & diversity of flood plain sources & inputs; some contributions to river food web lost
WATER QUALITY	Increased DO in flood plain wetlands; decreased nutrients and turbidity in river channel flow	Low DO in flood plain wetlands; elevated nutrients and turbidity in river channel flow
HABITAT QUALITY	Increased wetlands, diversity of wetland functions, refuge availability, & river and flood plain habitat diversity; river channel habitat favorable for diverse biological communities	Limited wetlands & diversity of wetland functions; decreased refuge availability & river and flood plain habitat diversity; river channel habitat favorable for only limited species
BIOTIC INTERACTIONS	Increased species diversity and complexity of trophic structure	Low species diversity; incomplete complement of trophic guilds
ECOSYSTEM PROPERTIES	Increased resilience; decreased probability of populations extinctions	Decreased resilience; high probability of at least localized extinctions in river channel

TABLE 12

RELATIONSHIP BETWEEN STAGE RECESSION RATES RESTORATION CRITERION AND DETERMINANTS OF ECOLOGICAL INTEGRITY

Determinants of Ecological Integrity	Restoration Criterion Stage Recession Rate of 1 Foot or Less Per Month	Fast Recession Stage Recession Rate Greater Than 1 Foot Per Month
FOOD (ENERGY) BASE	Diverse river, flood plain and riparian inputs efficiently processed and transferred to all components of food web	Diversity of flood plain inputs reduced; transfer of available food resources to some food web components eliminated
WATER QUALITY	Efficient filtration of nutrient and suspended solids from river discharge & tributary inflows; inflows from flood plain to river oxygenated, with low oxygen demand	Large percentage of nutrient & suspended solid loads transported downstream; inflows from flood plain to river deoxygenated, with high oxygen demand
HABITAT QUALITY	High wetland acreage, diversity & functionality	Decreased wetland acreage, diversity & functionality
BIOTIC INTERACTIONS	High species diversity including complete river and flood plain food web	Reduced species diversity in river and flood plain; incomplete food web
ECOSYSTEM PROPERTIES	River and flood plain biological communities buffered from hydrologic and water quality perturbations	Reduced resilience due to repetitive hydrologic and water quality perturbations

TABLE 13

RELATIONSHIP BETWEEN FLOOD PLAIN INUNDATION FREQUENCIES RESTORATION CRITERION AND DETERMINANTS OF ECOLOGICAL INTEGRITY

Determinants of Ecological Integrity	Hydroperiod Too Short	Restoration Criterion *Prolonged inundation of inner 75% of floodplain *Seasonal wet-dry cycles along peripheral 25% of floodplain *Wide range of seasonal and inter-annual variability	Hydroperiod Lacking Normal Spatial or Temporal Variability
FOOD (ENERGY) BASE	Diversity & area over which inputs occur reduced; potential inputs incompletely processed and not incorporated in river or flood plain food webs	Maintenance of diverse inputs over entire flood plain; efficient processing and incorporation of all inputs into river and flood plain food webs	Diversity of inputs reduced; potential inputs not incorporated into river or flood plain food webs
WATER QUALITY	Incomplete uptake & storage of nutrients in river discharge & tributary flows	Efficient uptake and long-term storage of nutrients from river discharges and tributary inflows	Efficient uptake and storage of nutrients
HABITAT QUALITY	Decreased habitat diversity, wetland acreage & functionality, & availability of refuges	High habitat diversity and wetland functionality over entire flood plain; flood plain habitats available as refuges for diverse biological components	Decreased habitat diversity, wetland functionality and availability of refuges
BIOTIC INTERACTIONS	Decreased species diversity with incomplete complement of trophic guilds & interactions	High species diversity with full complement of trophic guilds and interactions	Decreased species diversity; generally complete complement of trophic guilds but reduced interactions
ECOSYSTEM PROPERTIES	Reduced resilience; species subject to local extinctions; importance of biotic interactions reduced	High resilience; species highly buffered against perturbations; population and community dynamics determined by complex biotic and abiotic interactions	Reduced resilience; population and community dynamics determined by simple biotic and abiotic relation-ships; species susceptible to perturbations

TABLE 14

RELATIONSHIPS BETWEEN SFWMD RESTORATION CRITERION AND DETERMINANTS OF ECOLOGICAL INTEGRITY

DETERMINANTS OF ECOLOGICAL INTEGRITY	CONTINUOUS AND VARIABLE FLOW	FLOW VELOCITY	OVERBANK FLOW	STAGE RECESSION RATE	HYDROPERIODS
FOOD (ENERGY) BASE					
River to flood plain contribution	Critical	Some affect	Critical	Important	Important
Riparian vegetation to river contribution	Important	Critical	Important	Critical	Critical
Flood plain to river contribution	Important	Critical	Important	Critical	Critical
In-stream primary production	Critical	Critical	Important	Some affect	Some affect
WATER QUALITY					
Dissolved oxygen	Critical	Critical	Important	Critical	Some affect
Nutrients	Important	Important	Critical	Critical	Important
Turbidity	Important	Critical	Critical	Critical	Some affect
HABITAT QUALITY					
HEP habitat units	Critical	Critical	Important	Critical	Critical
Wetlands	Important	Some affect	Critical	Critical	Critical
Overland flood plain flow	Critical	No affect	Critical	Critical	Critical
Winter water	Important	No affect	Important	Critical	Critical
Refuge availability	Important	Critical	Critical	Critical	Critical
Riverine habitat diversity	Critical	Critical	Critical	Important	Important
Substrate	Critical	Critical	Important	Important	Some affect
Velocity	Critical	Critical	Critical	Some affect	Some affect
BIOTIC INTERACTIONS					
Species diversity	Critical	Critical	Important	Critical	Critical
Trophic Structure	Critical	Critical	Critical	Critical	Critical
ECOSYSTEM PROPERTIES					
Resilience	Critical	Critical	Critical	Critical	Critical
Population/ community dynamics	Critical	Important	Important	Important	Critical

8.4.5 Constraints

While the goal of the SFWMD was ecosystem restoration, two planning constraints also were considered in plan formulation: retention of flood control capabilities and maintenance of navigation. Significant changes to either of these authorized purposes of the Corps' Kissimmee River project would require Congressional approval.

All restoration plans were required to maintain flood protection provided by the existing flood control project. Any modification to C-38 and its structures would reduce flood conveyance capacity, and therefore would require implementation of additional measures to satisfy this constraint. Two factors were considered in relation to this constraint.

First, flood plain to be acquired for ecosystem restoration can also be used for flood conveyance. This would result in substitution of nonstructural flood control for the existing structural control provided by C-38 and its structures, and would be consistent with the authorized project flood control purpose. Some alternative plans may not induce flooding beyond the restoration acquisition boundary, while other plans could produce this effect. In these plans, additional flooding rights, such as flowage easements, would be necessary.

Second, as determined during the previous Corps study, it is necessary to maintain adequate discharge capacity from the Upper Basin. Different alternative plans may produce different backwater effects on the outlet of the Upper Basin. Alternative plans need to provide adequate outlet channel capacity from the Upper Basin by leaving a portion of the canal intact or providing additional structural capacity at the Upper Basin outlet.

With regard to navigation, the existing project permits all-year navigation regardless of water level conditions, but travel is limited to daylight hours due to the lock operators' schedule. Under different restoration options, navigation might be limited by water levels but would not be limited to specific daylight hours.

8.5 ALTERNATIVE PLANS

Results of the Demonstration Project were used to formulate an array of alternative restoration plans. The primary concept of these plans was to block, or "de-channelize", C-38 and redirect flow through bends of the original river and over the river flood plain. Opportunities to restore bends adjacent to Pool A were limited because dechannelization in that area would interfere with

maintenance of the Upper Basin outlet capacity for flood control. Similarly, dechannelization in the lower end of Pool E would not be possible due to the need to preserve flood water collection capacity at the downstream end of C-38.

Remaining old river bends total about 68 of the original 103 miles. Abandoned river bends vary in length, size and degree to which they are separated from C-38. Some river bends would not be suitable for flow restoration due to erosion, stability and other hydraulic concerns. Generally, SFWMD targeted ten major river bends, between the middle reaches of Pools B and E, for formulation of restoration opportunities. Methods considered for redirecting flows were essentially the same as those that had been considered in the earlier Corps' study: weirs, plugs, and backfilling. The degree of restoration of natural river flow and flood plain inundation that could be achieved would vary significantly among these methods.

In developing alternatives, several project features were needed regardless of the plan and were therefore common among all plans. These common features were:

* Retaining C-38 through Pool A and part of Pool B, as well as possibly providing additional outlet capacity at S-65, to maintain adequate discharge capacity for the Upper Basin.

* Constructing a bypass spillway at S-65 to provide flows that reproduce pre-project flow characteristics from Lake Kissimmee. The manual control spillway would have a crest length of 300 feet. A downstream channel with a scour protected stilling basin would provide flows into C-38.

* Degrading the tieback levee at S-65A to an elevation of approximately 48 feet. At this elevation, flood waters would overtop the levee and continue downstream as sheetflow. This would provide more conveyance at this location, which would help offset the loss in flood conveyance caused by high tailwater conditions at S-65A. Erosion protection would be placed on the modified levee.

* Maintaining a short stretch of C-38 under two bridges that cross the canal in Pool D: the U.S. 98 highway bridge and the CSX Transportation Railroad bridge. Openings would be included in these structures' causeways to improve flow past them.

* Modifying S-65E to allow higher headwater stages, which would induce backwater effects on the outlet of the lower end of the restored river channel. All plans kept C-38 intact from S-65E to approximately one mile upstream of State Road 70. This section of C-38 would provide the necessary collection

capacity to control flood waters from the restored flood plain and return it to channelized flow for discharge into Lake Okeechobee.

Using information developed during the first Corps study and the Demonstration Project, and analytical capabilities of the study's hydraulic model, the SFWMD developed four alternative restoration plans: weirs, plugging, limited backfilling of C-38 (called Level I Backfilling), and more extensive backfilling (called Level II Backfilling).

8.5.1 Weir Plan

As a result of the Phase I Demonstration Project, the SFWMD determined that weirs warranted further evaluation. Therefore, the Weir Plan was developed based on using structures similar to those used in the Phase I Demonstration Project. As in that project, weirs would be placed across the canal adjacent to abandoned river bends.

The Weir Plan would include ten fixed weirs, as shown on Figure 21 with heights set at optimum elevations to divert flow into adjacent river bends. Erosion protection would be provided at the ends of each weir. The primary difference between weirs included in this plan and those built for the Demonstration Project would be that no navigation notch would be included in the plan weirs. Notches were eliminated because during low flows of less than 1,000 cubic feet per second, which currently occur more than 50 percent of the time (Obeysekera and Loftin, 1990), the navigation notches allowed virtually all flow to pass through the canal and bypass adjacent river bends (Loftin et al., 1990). Another difference from the Demonstration Project was based on model tests which indicated that a single weir would be more efficient if placed near the downstream canal-river bend junction. Therefore, weirs would be placed just upstream of where river bends return flow back to C-38. Figure 21 also shows a conceptual river reach for the Weir Plan. Pool stages would be fluctuated in accordance with the schedules shown in Figure 14.

As a result of canal alignment and the placement of dredged material, several original river channel segments are discontinuous and are connected only by the canal. In these places, the original river channel alignment coincided with canal alignment or material placement, and the original river channel was physically eliminated. At these locations, the canal would remain intact as a link between river bends.

Each S-65 spillway and boat lock structure would remain intact. The tieback levees at each of these locations also would remain intact, but would be partially degraded at S-65A, S-65B, S-65C and S-65D to allow overflow during flood events. Degraded tieback levees would continue to provide grade control

along the waterway. The canal would remain intact upstream and downstream of each boat lock in order to maintain navigation between pools.

At S-65B, S-65C, and S-65D, the old river channel parallels the canal alignment. Small culverts (also called auxiliary structures) are located where the original river channel passes across the tieback levee alignment. These structures would be enlarged to provide a flow capacity commensurate with the bank-full capacity of the old river channel at their respective points along the river.

Of ten weir designs considered, two types were found most suited for the project: fixed weir and gated weir. The crest of a fixed weir would be set at a specific level such that minimum flows would be diverted through the old river channel, and flood flows would overtop the crest. The crest of a gated weir could be set higher so that minimum flow diversion could be greater. During extreme floods, the gates would be opened to provide flood conveyance. Although more costly, a gated weir would provide greater operational flexibility.

8.5.2 Plugging Plan

The Plugging Plan is very similar to the Weir Plan. The primary difference is that the canal would be blocked with material originally dredged during construction of the flood control project instead of steel or concrete. Ten plugs would be built in the same locations as the ten weirs as shown on Figure 22, which also shows a conceptual depiction of the Plugging Plan within a river reach.

A minimum length plug would have a 50 foot longitudinal crest and a 450 foot base. The crest and downstream face of the plug would be protected from scour by riprap (Shen et al., 1990). Other features of the plan would be virtually the same as the Weir Plan. The design and operational flexibility of this plan would be more limited than the Weir Plan because the crest elevation of the plug and hydraulic conveyance across the top of the plug would be less controllable than that of a weir. Pool stage fluctuation upstream of each water control structure also would be a component of the Plugging Plan; see Figure 14.

8.5.3 Level I Backfilling Plan

The Level I Backfilling Plan would include backfilling ten segments of C-38, retaining S-65B, S-65C, and S-65D, partially degrading tieback levees, and constructing auxiliary structure improvements. Figure 23 shows the locations of backfilled canal sections and partial backfilling for a conceptual river reach. Features of the Weir and Plugging Plans, including pool stage fluctuation (see

Figure 14), would be incorporated in this plan, except that instead of simply blocking the canal at key locations adjacent to abandoned river bends, the entire segment of canal adjacent to nine river bends would be filled. As in the previous two plans, segments of the canal would remain intact to provide linkages between abandoned river bends, and to and from the boat locks at S-65 structures.

8.5.4 Level II Backfilling Plan

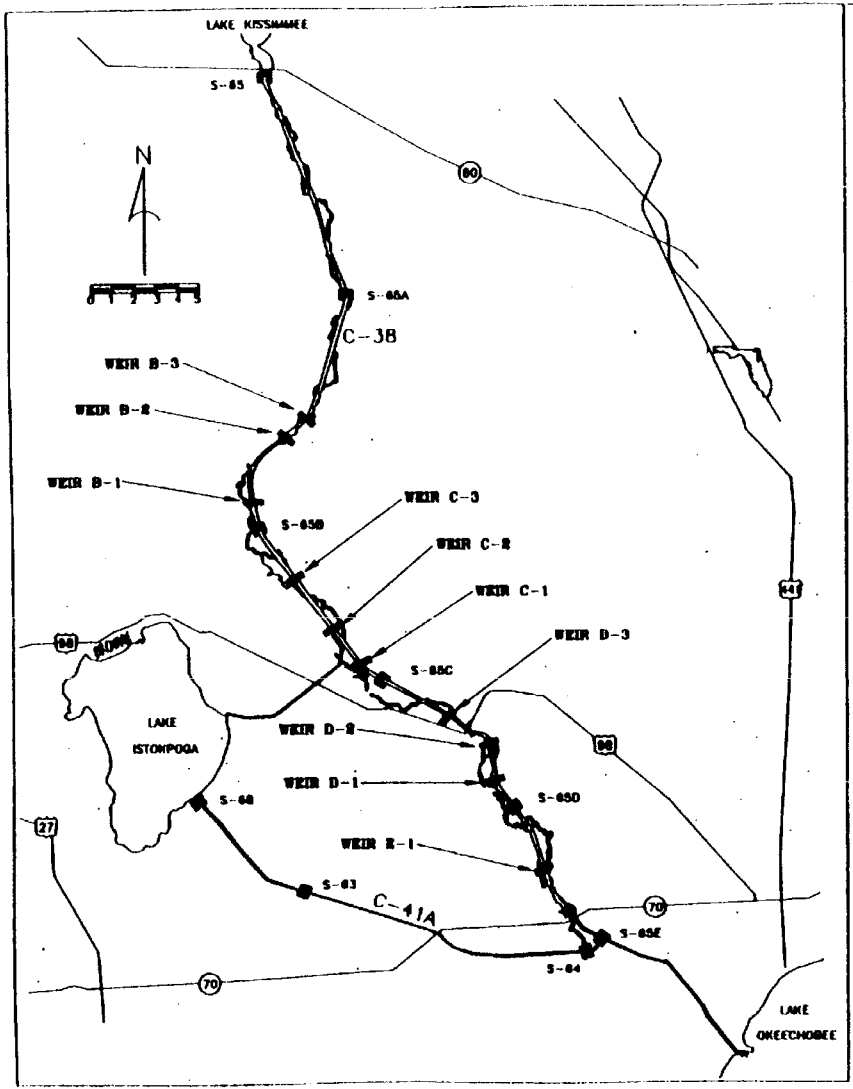
In the Level II Backfilling Plan, the links between river bends and canal links to the boat locks also would be filled as shown conceptually in Figure 24. The result would be one continuous backfilled section from the middle reaches of Pool B to middle reaches of Pool E as shown in Figure 24. The linear extent of this filled section would be approximately 25 to 30 miles, most of the central reach of the river.

The spillways, boat locks, auxiliary structures and tieback levees at S-65B, S-65C, and S-65D would be demolished. Structural debris would be removed, and the remaining sites would be graded to natural ground levels.

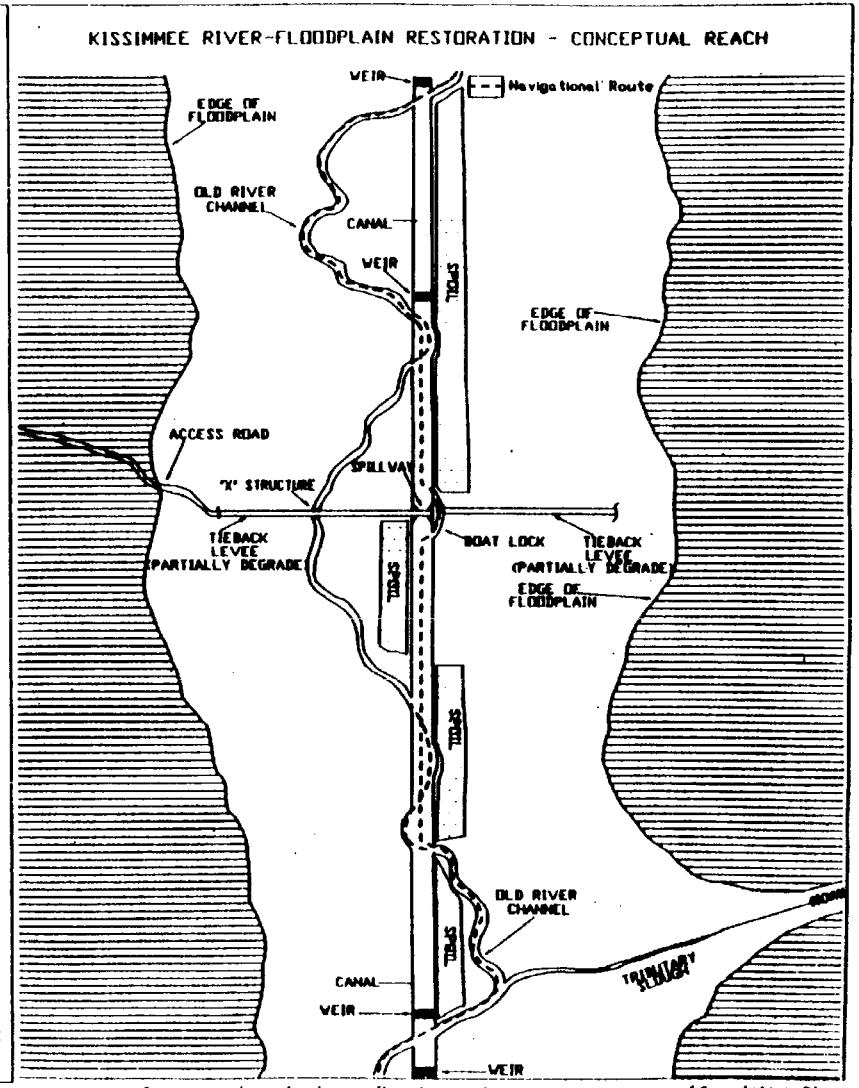
Where the original river channel had been eliminated by excavation of the canal or by the placement of material removed during project construction, a new channel would be excavated. The channel would be dug through the existing flood plain to reproduce the original river meanders and associated gradient, and cross-section. These newly created river sections would provide links between restored river sections. The new channel would be excavated by floating dredge prior to canal backfilling.

8.6 EVALUATION OF ALTERNATIVE PLANS

The SFWMD used numerous physical and mathematical models to extensively evaluate, refine, and reevaluate the hydrologic and hydraulic performance of the four alternatives. Based on these analyses, effects on ecosystem restoration, flood control and navigation were determined. Project costs also were estimated. The following is a summary of the evaluation of these plans, which is given in more detail in the SFWMD *Restoration Report*.



Locations of weirs for the Fixed Weir Plan



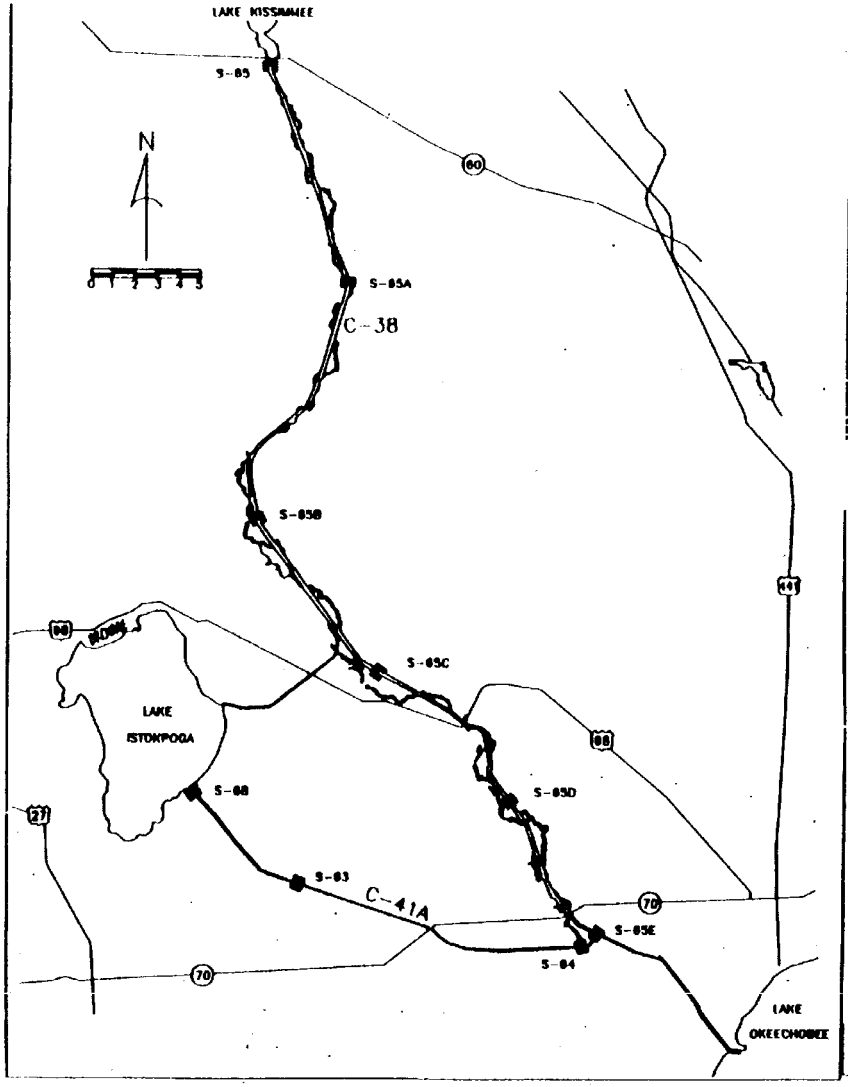
Conceptual reach of river/floodplain showing components of Fixed Weir Pl

WEIR PLAN LOCATION AND CONCEPTUAL REACH

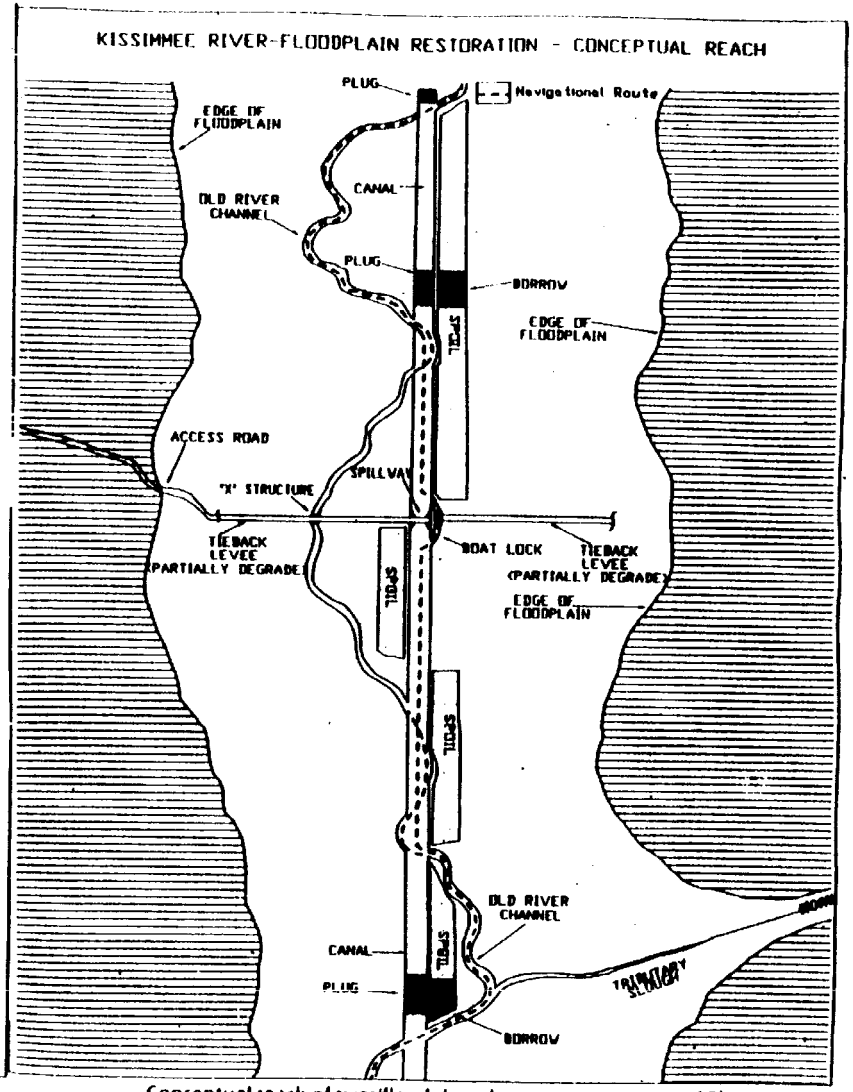
FIGURE 21

PLUGGING PLAN LOCATION AND CONCEPTUAL REACH

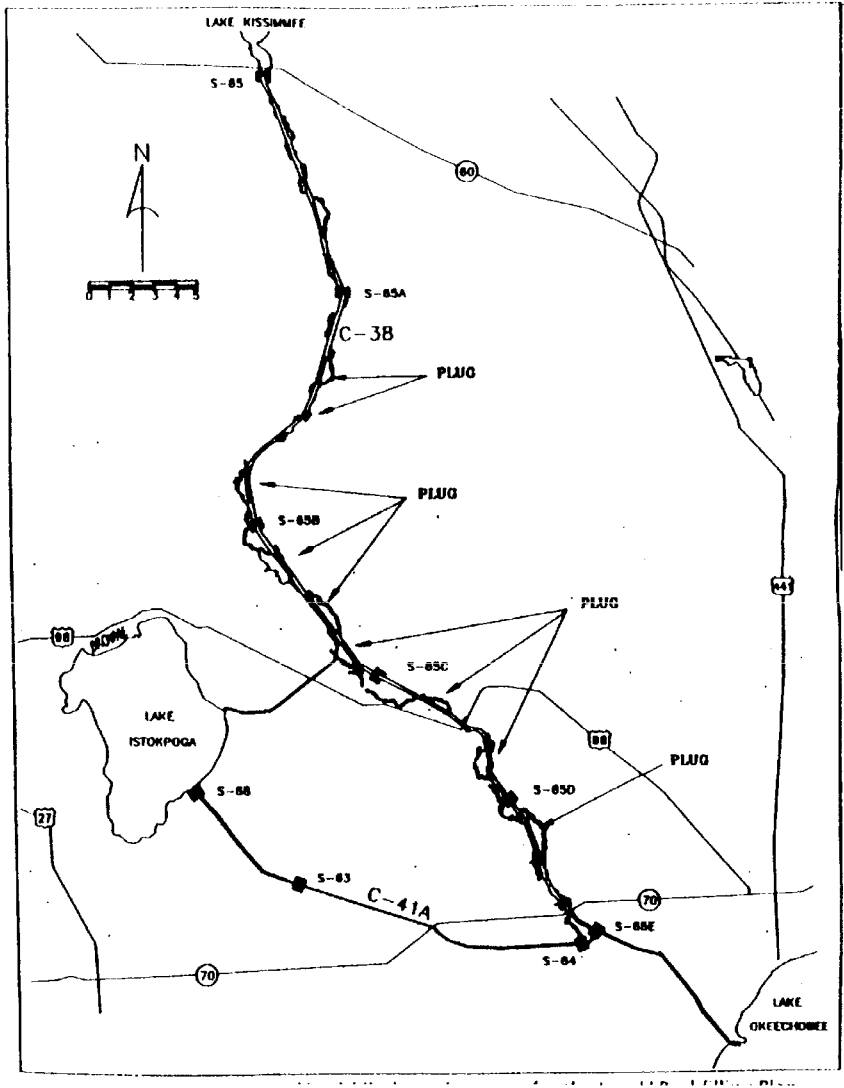
FIGURE 22

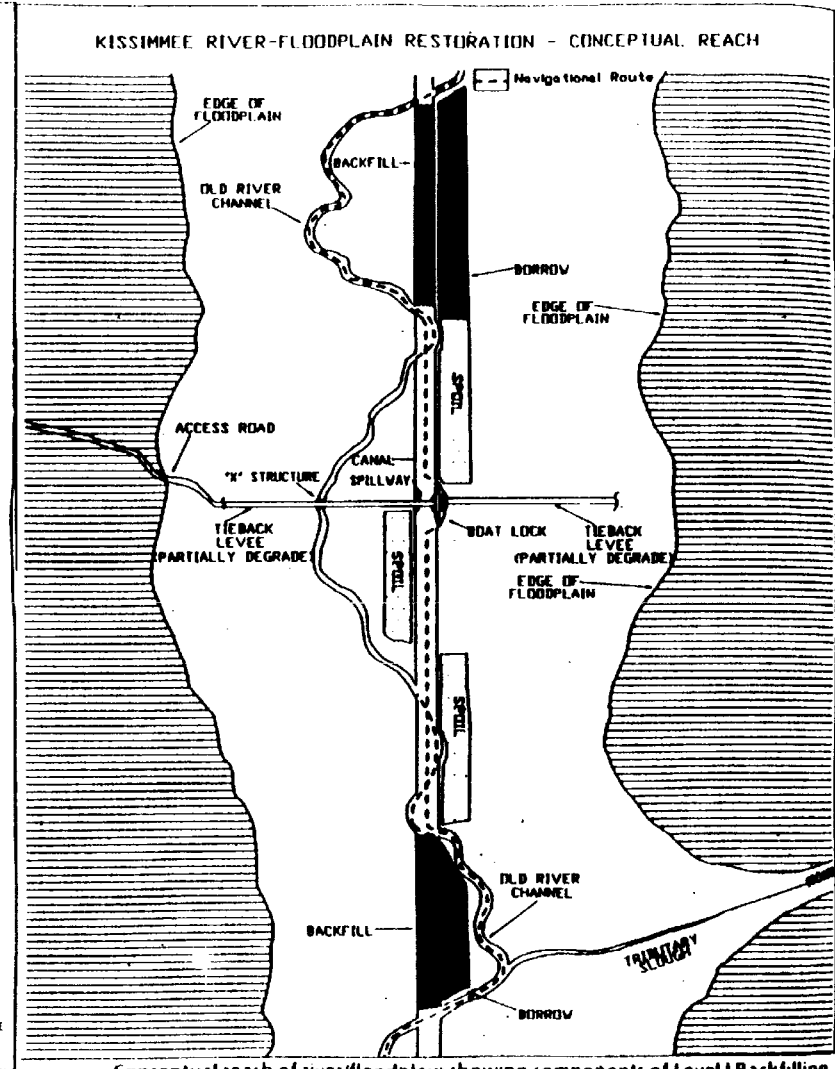


Locations of plugs for the Plugging Plan.



Conceptual reach of river/floodplain showing components of Plugging Plan



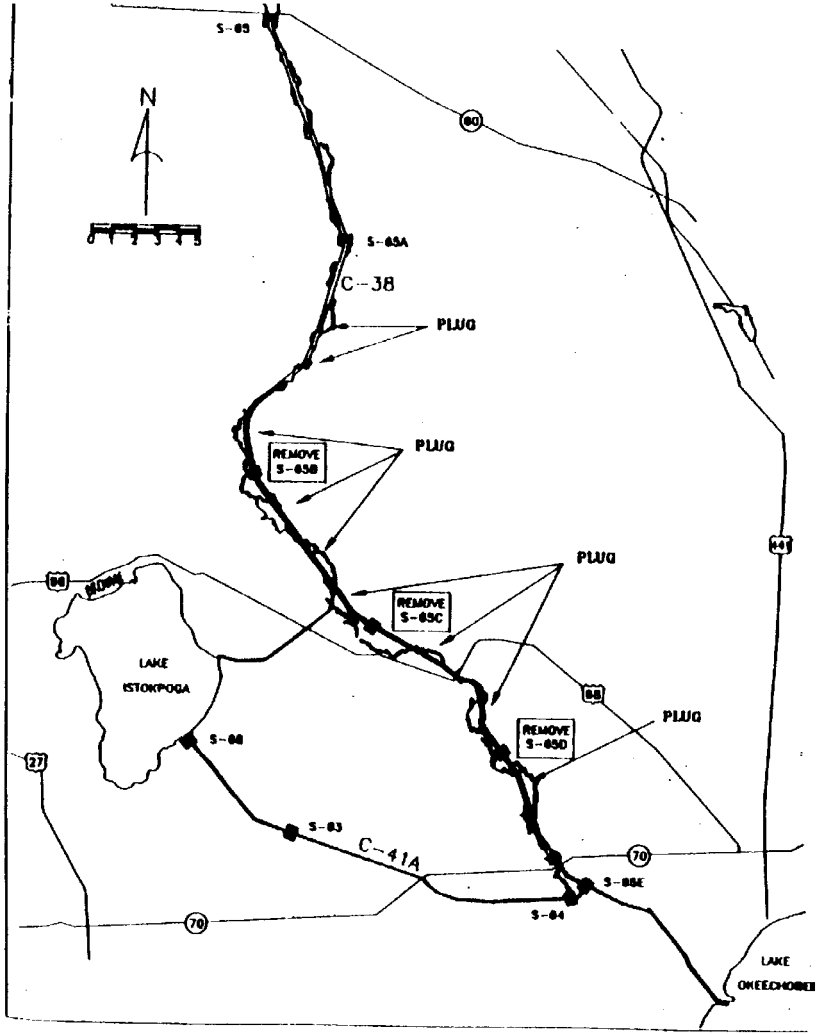


Conceptual reach of river/floodplain showing components of Level I Backfilling Plan

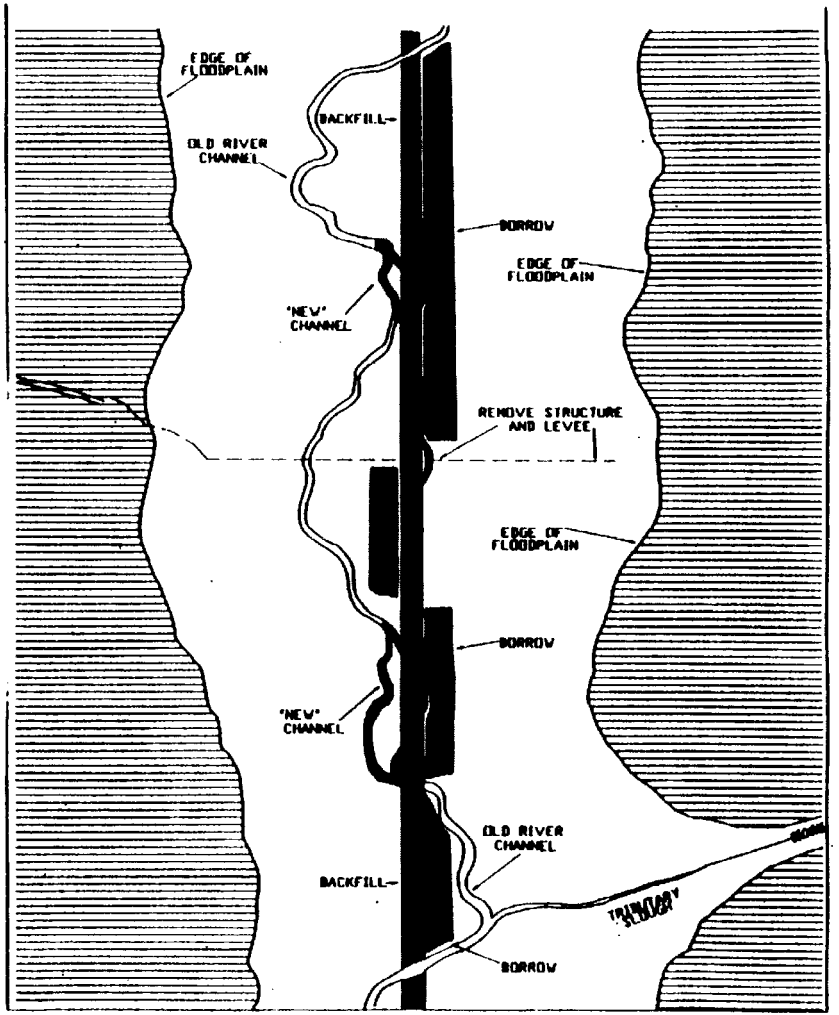
LEVEL I BACKFILLING PLAN LOCATION AND CONCEPTUAL REACH

FIGURE 23

LEVEL II BACKFILLING PLAN LOCATION AND CONCEPTUAL REACH



Locations of backfilled canal sections for the Level II Backfilling Plan.



Conceptual reach of river/floodplain showing components of Level II Backfilling Plan

FIGURE 24

8.6.1 Weir Plan

Fixed crest weirs would restore flow through approximately 36 miles of disjunct river channel (with implementation of the Headwaters Revitalization component). This flow diversion, however, would result in flow velocities higher than those that existed in the historic condition. Modelling results indicate scour holes would develop downstream from the weirs, and would require bed protection. Weir induced flow diversion would flood 43,700 acres under standard project flood discharge conditions.

Stage recession rates were determined to be excessive to accomplish the restoration objective, particularly within the upper half of each pool. Recession rates would vary with location and pool stages. Simulated rates were evaluated at a mid-Pool B location adjacent to Fort Kissimmee using the October 1979 extreme discharge event, when regulatory flood control releases from Lake Kissimmee approached 8,000 cubic feet per second, and subsequently were lowered to about 2,000 cubic feet per second. Under the Weir Plan during this event, the peripheral 20 percent of the flood plain at Fort Kissimmee, between elevations 43 feet and 45 feet, would have drained in one day, but the remainder of the flood plain would have drained slowly. Slow recession on 80 percent of the flood plain at this location would be due to high pool stages maintained by downstream control during this event. If the Weir Plan were implemented, complex water management schemes, based upon available water supplies in the Upper Basin and projected forecasts of future inflows, could be developed to moderate recession rates in the lower 50 percent of each pool. However, rates in the upper 50 percent of each pool would remain largely uncontrollable.

Like recession rates, flood plain inundation characteristics in the lower 50 percent of each pool would be determined by pool stage fluctuations. To evaluate flood plain inundation in the upper 50 percent of each pool, inundation frequencies were simulated for the flood plain adjacent to Fort Kissimmee, where 58 percent of the flood plain is higher than the high stage of the fluctuation schedule. Based upon simulated inflows from 1970 - 1987, 44-54 percent of the flood plain adjacent to Fort Kissimmee would be inundated 50 percent of the time at the end of the wet season (September - November), but no more than 62 percent of the flood plain would be inundated greater than 10 percent of the time. Moreover, 90 percent of the time, at least 56 percent of the flood plain, including all peripheral habitat, would be dry throughout the year.

Although restored flow would reestablish hydrodynamic processes which could lead to improved channel morphology and habitat diversity in 36 disjunct miles of river, high velocities generated by this plan would provide unstable

river habitat. This instability, along with direct effects of high velocities, would prevent reestablishment of natural biological communities. Most Kissimmee River fish and invertebrate species, for example, are not adapted for living in high flow velocities. Game fish species will migrate away from areas with velocities greater than two feet per second (Florida Game and Freshwater Fish Commission, 1957) and have reproductive habits that make eggs and young susceptible to high flows.

Due to the influence of canal segments that would remain upstream and downstream of river channels with restored flow, dissolved oxygen regimes probably would not improve in these short sections of river adjacent to weirs, particularly during summer months. Water quality monitoring during the Demonstration Project showed that dissolved oxygen levels in river runs adjacent to weirs would be determined primarily by dissolved oxygen concentrations of diverted water from remaining segments of C-38. Diversion of C-38 discharges did not lead to consistent improvements in summer dissolved oxygen concentrations in river runs adjacent to weirs because discharges generally were not high enough, or the length of river through which flow was diverted was not long enough, to allow physical processes to aerate water that was diverted from the canal. Monitoring data indicate that dissolved oxygen concentrations in these canal sections, and thus, in river runs adjacent to weirs, would be extremely low (less than 3.0 milligrams per liter) during summer months (Rutter et al., 1989).

Although overbank flows would restore some of the important historic river-flood plain interactions, particularly in the lower portion of each pool, rapid stage recession rates following discharge events would prevent full development of river-flood plain interactions, and preclude reestablishment of functional flood plain wetlands in the upper 50 percent of each pool. With recession rates comparable to the simulated 1979 discharge event, peripheral flood plain habitats would have little, if any, functional ecological value, particularly for wading birds and waterfowl. At the upper end of each pool, recession rates would drain the entire flood plain in a day or two, and could lead to frequent and extensive fish kills in both the canal and river. By shifting competitive pressures in favor of tolerant species such as gar and bowfin, frequent fish kills could lead to a long-term decline or degradation of game fish resources.

Pool stage fluctuation could rejuvenate existing wetlands in the lower half of each pool, but inundation frequencies generated by the Weir Plan would be inadequate to restore the diversity and functional values of flood plain habitats in the upper 50 percent of each pool. Only about 3000 acres of new wetlands would be reestablished by this plan.

More details on environmental consequences of failure of the Weir Plan to meet the flow velocity, stage recession rate and flood plain inundation frequency criteria are summarized in Tables 10, 12 and 13. The key conclusion that can be drawn from these tables, hydrologic modelling, and results of Demonstration Project monitoring studies is that the Weir Plan will not restore the ecological integrity of the Kissimmee River ecosystem. It will reestablish only some of the lost wetland values on approximately 17,000 acres of flood plain, and will not lead to restoration of fish and wildlife resources in the river channel. In fact, effects of high river channel velocities and rapid stage recession rates would be expected to lead to further degradation of the river's fisheries resources.

Navigation would be through C-38 and the original river course; the locks would be maintained for travel between pools. Navigation would not be limited by low flow conditions and therefore would be available continuously, but inter-pool navigation would be limited to the locks' daylight hours of operation.

Total first cost of the Weir Plan would be $100.4 million at 1990 price levels ($103.1 million at July 1991 price levels).

A gated Weir Plan would provide increased flexibility during flood events. However, proper operation would be critical to the performance of the entire system during major floods. Flood damage reduction associated with the existing project would be retained with implementation of the fixed or gated Weir Plan. Other effects of a gated Weir Plan would be similar to those of the fixed Weir Plan. First costs for the gated weir would be $137.8 million at 1990 price levels ($144.0 million at July 1991 price levels). Because of higher financial costs and relatively little gain over use of a fixed crest weir, a gated Weir Plan was not considered further.

8.6.2 Plugging Plan

Hydrologic effects of the Plugging Plan would be essentially the same as those of the Weir Plan. Flows would be diverted into the old river oxbows, although velocities would exceed those found in historic river channels. The design and operational flexibility of this plan would be more limited than the Weir Plan because the crest elevation of the plug and the hydraulic conveyance over the top of the plug would be less controllable than that of a weir. The ecological, flood damage reduction, and navigation effects also would be essentially the same as those of the Weir Plan.

The first cost of the Plugging Plan would be $145 million at 1990 price levels ($151.5 million at July 1991 price levels).

8.6.3 Level I Backfilling Plan

As in the Weir Plan, the Level I Backfilling Plan would result in erosive river channel velocities greater than three feet per second during high discharge periods (Shen et al., 1990). When discharges range from 700 - 2,400 cubic feet per second, model results indicated that 40 percent of the river channel with restored flow would have average velocities greater than 1.8 feet per second, and only 23 percent of the river channel adjacent to backfilled canal would have velocities comparable to the historic river (between 0.8 - 1.8 feet per second). Sixty-three percent of the flood plain adjacent to backfilled canal would have overbank flow when discharges exceed 1,400 cubic feet per second (Shen et al., 1990).

Simulated recession rates for the Level I Backfilling Plan indicated that the peripheral 21 percent of the flood plain at Fort Kissimmee would have drained over a period of 35 days following the October 1979 discharge event. However, this slow recession rate followed an initial 2 1/2 foot decline which rapidly drained inundated areas outside the flood plain. Because this event occurred at the high point of the pool stage fluctuation schedule, slow recession on the flood plain was facilitated by maintenance of a downstream pool stage that kept 42 percent of the flood plain inundated following the event. If this discharge event would have occurred in, for example, July when the downstream pool stage was 2 feet lower, the initial rate of recession would have drained a larger proportion, if not all, of the flood plain rapidly. Because flood plain elevations at the upper end of each pool exceed the maximum stage of the fluctuation schedule, recession rates at these locations typically would drain the entire flood plain within a few days after a discharge event.

Pool stage fluctuation would inundate most of the lower half of each pool, but substantial flood plain inundation would occur in the upper 50 percent of pools only during October and November. During these months, pool stage fluctuation would inundate 42 percent of the flood plain adjacent to Fort Kissimmee 90 percent of the time. However, from this location to the upper end of the pool, no more than 63 percent of the flood plain would be inundated greater than 10 percent of the time, and at least 58 percent of the flood plain would be dry 90 percent of the time during any year.

The combination of backfill and headwaters restoration would restore flow through 36 disjunct miles of river channel. Restored flows would reestablish hydrodynamic processes which could lead to improved habitat diversity in river runs adjacent to backfilled canal. However, as with the Weir Plan, high velocities generated by this plan would provide unstable river channel habitat, would preclude reestablishment of natural biological communities, and could have adverse effects on river biota.

As with the Weir Plan, dissolved oxygen regimes in river runs with restored flow would be determined primarily by dissolved oxygen concentrations of diverted water from remaining segments of C-38. During summer months, dissolved oxygen levels in the river would be too low to reestablish biotic integrity.

Although reestablishment of the historic stage-discharge relationship and overbank flow would reestablish some of the important ecological interactions between the river and flood plain, rapid stage recession rates following discharge events would prevent full development of river-flood plain interactions, and preclude reestablishment of functional flood plain wetlands in the upper 50 percent of each pool. Rapid stage recession rates also could lead to repetitive fish kills, which would result in further degradation of the river's fishery resources. Rapid stage recession rates caused two fish kills during the Demonstration Project by depleting dissolved oxygen in both the river and canal.

Pool stage fluctuation would result in some rejuvenation of existing wetlands in the lower half of each pool, but inundation frequencies generated by the Level I Backfilling Plan would be inadequate to restore the diversity and functional values of flood plain habitats in the upper 50 percent of each pool. Only about 3000 acres of new wetlands would be reestablished by this plan.

More details on environmental consequences of failure of the Level I Backfilling Plan to meet the flow velocity, stage recession rate and flood plain inundation frequency criteria are summarized in Tables 10, 12 and 13. The key conclusion that can be drawn from these tables, hydrologic modelling, and results of Demonstration Project monitoring studies is that the Level I Backfilling Plan will not restore the ecological integrity of the Kissimmee River ecosystem. It will reestablish only some of the lost wetland values on approximately 17,000 acres of flood plain, and will not lead to restoration of fish and wildlife resources in the river channel. In fact, effects of high river channel velocities and rapid stage recession rates would be expected to lead to further degradation of the river's fisheries resources.

As with the other plans, this plan retains existing flood damage reduction afforded by existing project works. This plan also restores flows through former river oxbows and diverts navigation from portions of C-38 into these river bends. The 3-foot navigation project could be maintained in the river meanders with implementation of headwater restoration. Current lock usage would be continued. Navigation would be maintained through grade control by S-65B, S-65C, and S-65D.

The first cost of the Level I Backfilling Plan would be $241.9 million at 1990 price levels ($252.8 million at July 1991 price levels).

8.6.4 Level II Backfilling Plan

The Level II Backfilling Plan, in combination with Headwaters Revitalization, would provide flow and seasonal discharge characteristics in 56 continuous miles of river channel. Moreover, because Lower Basin tributary inflows would attenuate slowly in the Level II Backfilling Plan (in contrast to the other plans), Lake Kissimmee discharges would be augmented for prolonged periods by local inflows along the river. These supplemental inflows would be beneficial, particularly during periods when discharges from Lake Kissimmee are low, below 500 cubic feet per second.

Modelling studies (Shen et al., 1990) indicated that 48 percent of the river channel in the backfilled section would have average velocities between 0.8 and 1.8 feet per second when discharges range between 700 - 2,400 cubic feet per second, and 95 percent of the river would have average velocities less than 1.8 feet per second when discharges are less than 2,400 cubic feet per second; see Table 15. These studies also indicate that 64 percent of the flood plain in the backfilled section would have overbank flow when discharges exceed 1400 cubic feet per second (Shen et al., 1990), which is the estimated discharge when overbank flow historically occurred along most of the flood plain.

Simulated stage recession rates for the Level II Backfilling Plan were evaluated at the upper end of Pool C, as well as adjacent to Fort Kissimmee, upstream of the backfilled canal section. Stages simulating the October 1979 event indicate that, following inundation of the entire flood plain, the peripheral 16-21 percent of the flood plain at Fort Kissimmee and upper end of Pool C would have dried over a period of 34-37 days; see Figure 25.

Inundation frequencies, as shown in Table 16 were based upon Fort Kissimmee stage data derived from simulated Lake Kissimmee discharges and downstream tributary inflows from 1970 -1987. Because Upper Basin average annual inflows during these years were 40 percent lower than the historic period of record, generated inundation frequencies, should, at best, reflect flood plain inundation characteristics during drier years of the historic period of record. The data indicate that these reduced inflows would inundate 75 percent of the flood plain 55-72 percent of the time during wet season months; see Figure 26. In fact, 95 percent of the flood plain, including important peripheral flood plain habitat, would be inundated at least 20 percent of the time during February, and April through October.

TABLE 15

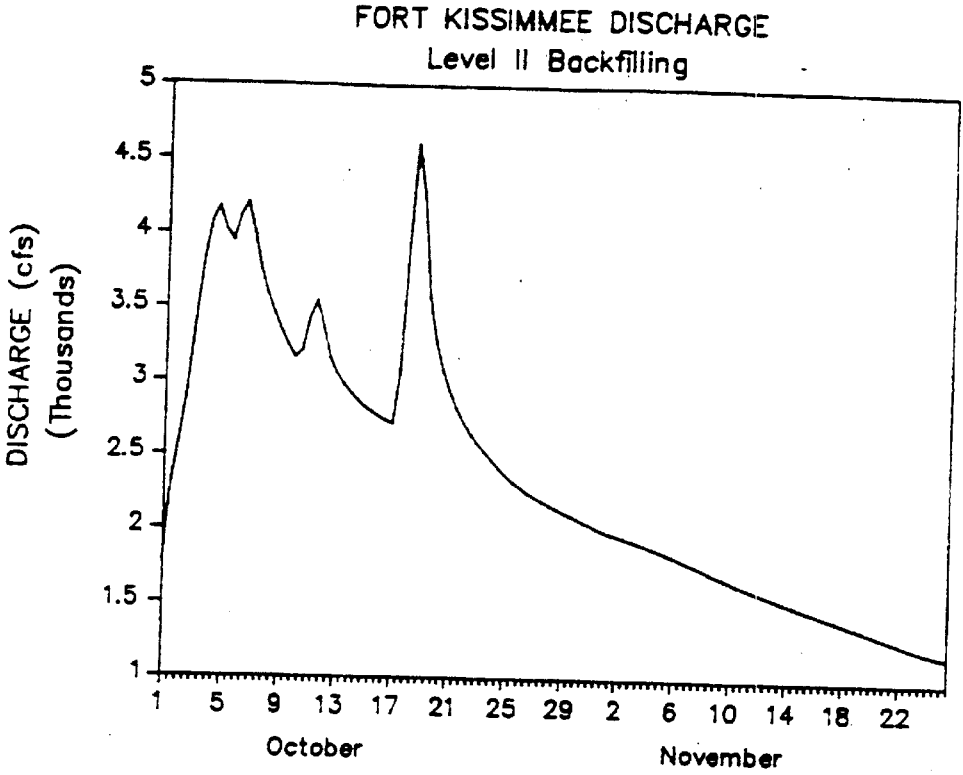
Simulated river channel velocities for alternative restoration plans (Shen et al., 1990). Data show average percentages of river channels with restored flow that would have given velocities when discharge ranges from 700-2400 cfs.

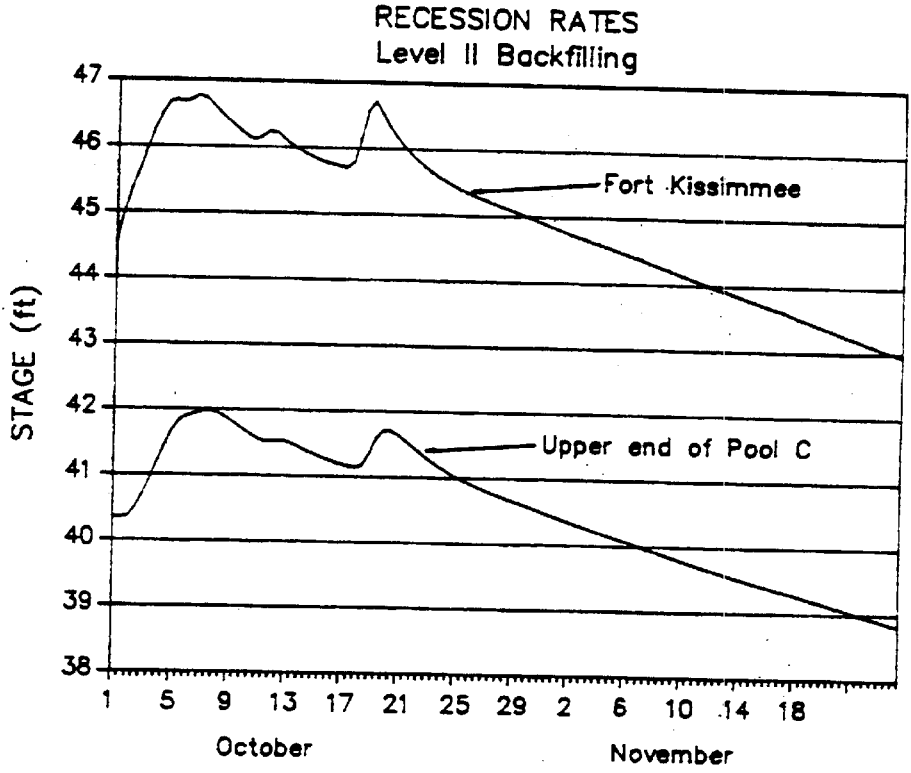
VELOCITY (FT/SEC)	ALTERNATIVE PLANS		
	FIXED WEIR	LEVEL I BACKFILLING	LEVEL II BACKFILLING
<0.8	15	37	47
0.8 - 1.8	43	23	48
>1.8	42	40	5

TABLE 16

Flood plain inundation frequencies for the Level II Backfilling Plan. Data show percentages of simulated period (1970-87) that given percentages of flood plain adjacent Fort Kissimmee would be inundated.

MONTH	AREA INUNDATED (PERCENT OF FLOOD PLAIN)					
	99	95	75	40	15	1
January	3	14	28	30	64	98
February	4	18	40	40	46	98
March	1	3	6	9	46	97
April	5	23	47	48	65	98
May	4	21	47	56	70	98
June	4	22	62	66	78	98
July	4	21	55	65	87	99
August	5	27	59	69	82	99
September	7	33	72	78	93	100
October	7	32	65	69	98	100
November	2	10	18	20	83	100
December	1	4	8	8	62	100

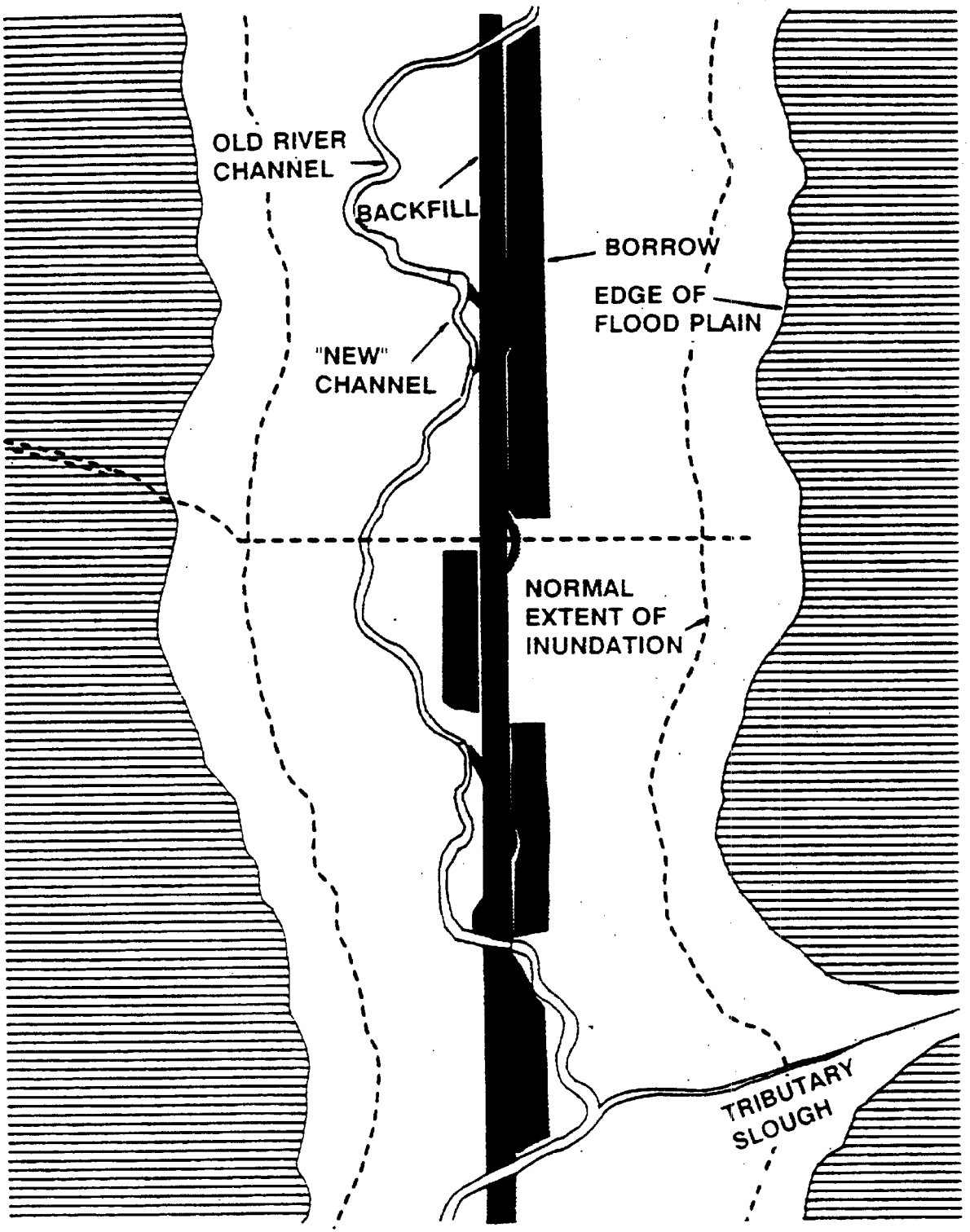




Stage recession rates for the Level II Backfilling Plan. Simulated discharges and stages at Fort Kissimmee and the upstream end of Pool C during October - November 1979.

STAGE RECESSION RATES
FOR THE LEVEL II BACKFILLING PLAN

FIGURE 25



FLOOD PLAIN INUNDATION
LEVEL II BACKFILLING PLAN

FIGURE 26

The combination of backfill and headwaters restoration would restore flow through 56 continuous miles of river, including 9 miles of river channel which were lost by excavation of C-38 and placement of dredged material. Through physical aeration and mixing, maintenance of continuous flows should provide favorable dissolved oxygen regimes through most of the river channel in the backfilled section of the system. Dissolved oxygen studies during the Demonstration Project indicate that impacts of diverted "canal water" on river dissolved oxygen regimes would dissipate in long sections of river with continuous flow supplemented by flood plain and tributary inflows. Although simulated Lake Kissimmee discharges did not replicate the wide range of historic discharge variability, Lower Basin tributary inflows and a return of normal rainfall inputs would be expected to reestablish spatial and temporal aspects of habitat heterogeneity in the river channel.

The Level II Backfilling Plan would provide river velocities that would improve river channel habitat, and be conducive to important biological functions like fish feeding and reproduction. Reestablishment of the historic stage-discharge relationship - overbank flow - would restore physical, chemical and biological interactions between the river and flood plain. Stage recession rates would be slow and would restore the functional values of peripheral flood plain habitat.

Even with 40 percent less inflow, simulated inundation characteristics for this plan appear to be adequate to reestablish the structural and functional characteristics of at least 24,000 acres of flood plain wetlands along a 25-mile long section of the valley. This includes 3,000 acres of flood plain which were destroyed by excavation of the canal and placement of dredged material. A return of historic climatic conditions would increase inundation frequencies throughout the flood plain, and lead to increased functional values and use of peripheral flood plain habitats.

In the Level II Backfilling Plan, the navigation route between the middle reaches of Pools B and E would revert to the original river channel, and in some locations, to newly excavated river channels connecting existing river channels. Except for natural grade control, there would be no control for approximately 56 miles of river channel. With removal of the locks, navigation would not be constrained by lock schedules and would be possible 24 hours a day. However, during extremely dry periods, the depth of clearance may be reduced due to low water conditions. Model results determined a threshold flow of 150 cubic feet per second would maintain the authorized 3 foot depth 91 percent of the time, except at four locations within pools C and D which provide natural grade control. Flows below 150 cubic feet per second would adversely impact river navigation, but would occur only during extremely dry years.

The first cost of the Level II Backfilling Plan would be $291.6 million at 1990 price levels ($304.7 million at July 1991 price levels).

For the final report, the SFWMD added several features to the Level II Backfilling Plan cost estimate: canal shallowing in the outlet channel (Pool A and upper Pool B), upland detention and backfilling channelized flood plain portions in the Lower Basin tributaries, and channel enlargement for the Lake Istokpoga Canal. These features increased the first cost of the Level II Backfilling Plan to $343.5 million at 1990 price levels ($359.0 million at July 1991 price levels).

8.7 FINDINGS AND RECOMMENDATIONS

The restoration report culminated in findings and a recommendation for action. All plans could maintain flood control and navigation if some combination of structural modifications, land acquisition and operational changes were incorporated. With regard to the five hydrologic restoration criteria which define the conditions necessary to restore ecosystem integrity, the SFWMD studies showed that all four plans performed similarly and generally acceptable in restoring discharge characteristics and overbank flows. However, only the Level II Backfilling Plan would restore acceptable flow velocities, stage recession rates and flood plain inundation frequencies. Table 17 summarizes the performance of the alternatives relative to the restoration criteria. Based on these levels of hydrological performance and Demonstration Project results, ecological restoration findings were:

* Ecological monitoring studies support the goal, objective, and criteria used in formulating and evaluating Kissimmee River restoration alternatives.

* Results from monitoring the Phase I Demonstration Project confirm that ecological integrity - the goal of Kissimmee River restoration - can be achieved only with a holistic approach which succeeds in restoring both the form and function of the historic ecosystem. This requires reestablishment of historic hydrologic characteristics on both the river and flood plain, including river channel and flood plain habitat that was destroyed.

* Integration of monitoring results with hydrologic modelling established that restoration of the Kissimmee River ecosystem can be accomplished only through backfilling a long, continuous reach of C-38.

* Evaluation of alternative plans led to the determination that adverse environmental effects would occur during certain flow conditions (as found in the field studies with notched weirs) unless much of the longitudinal length of

TABLE 17
CRITERIA-RELATED PERFORMANCE SUMMARY FOR ALTERNATIVE RESTORATION PLANS

CRITERIA	ALTERNATIVE PLANS		
	WEIRS AND PLUGGING PLAN	LEVEL I BACKFILLING	LEVEL II BACKFILLING
Discharge Characteristics	Continuous flow and seasonal patterns reestablished	Continuous flow and seasonal patterns reestablished	Continuous flow and seasonal patterns reestablished
Flow Velocities	Greater than pre-channelization maximum along 42% of river channel with restored flow	Greater than pre-channelization maximum along 40% of river channel with restored flow	Less than 1.8 ft/sec along 95% of river channel with restored flow
Overbank Flow Threshold	Overbank flow at pre-channelization threshold along 62% of the flood plain adjacent weirs	Overbank flow at pre-channelization threshold along 63% of the flood plain adjacent backfilled canal	Overbank flow at pre-channelization threshold along 64% of the flood plain adjacent backfilled canal
Stage Recession Rates	Potentially very rapid, particularly in upper 50% of each pool	Potentially very rapid, particularly in upper 50% of each pool	Slow, rarely greater than 1 ft/month
Flood plain Inundation Frequencies	Significantly less than pre-channelization on at least 50% of flood plain	Significantly less than pre-channelization on at least 50% of flood plain	Comparable to pre-channelization

the canal is de-channelized. Cyclical occurrences of rapid flood plain drainage would be particularly damaging because of the high biological oxygen demand (BOD) load from the flood plain entering the canal, which further depresses the canal's already low dissolved oxygen levels. Occurrences of depleted dissolved oxygen lead to repetitive fish kills. If a plan is built that performs in this manner, fish kills would lead to an accelerated decline of populations of desirable sport fish species.

* Because the Weir Plans (fixed and gated), Plugging Plan and Level I Backfilling Plan would result in excessive river velocities, rapid stage recession rates, and inadequate flood plain inundation, and likely would not improve dissolved oxygen regimes in river channels with restored flow, none of these alternatives would restore the ecological integrity of the river ecosystem.

* The Level II Backfilling Plan would establish historic hydrologic characteristics for 56 continuous miles of river channel and at least 24,000 acres of flood plain wetlands, restoring the ecological integrity of about 50 square miles of river ecosystem.

The SFWMD *Restoration Report* concludes and recommends:

> *"... The Level II Backfilling Plan should be adopted as the restoration approach for the Kissimmee River. A commitment to such an expensive and extraordinary project should be evaluated carefully. Unless a "no action" decision is made, the next restoration effort should be implementation of the Level II Backfilling Plan".*

In June and November 1989, the SFWMD conducted two rounds of public meetings in four cities. The first round was held to present alternative plans and the basis of evaluating them. Additionally, an opinion survey was conducted to solicit views on restoration. The second round of meetings was held to present results of alternative plan evaluations and preliminary designs. Two additional public meetings were held in the town of Kissimmee to explain the Headwaters Revitalization Project and associated land acquisition program. Public involvement also came at the SFWMD's Governing Board workshops in November 1989 and January 1990, during which the Restoration Report findings were presented to the Board and public. A video documentary, **Run, River Run**, was produced in 1989 to tell the story of restoration, and has been aired widely over the Public Broadcasting Stations' network since November 1989.

Final actions on restoration recommendations were taken by the State of Florida in early 1990. Governor Martinez made a strong endorsement for the Level II Backfilling Plan in February 1990, and the SFWMD Governing Board adopted the Level II Backfilling Plan in March 1990. In June 1990, the final SFWMD *Restoration Report* was published.

SECTION 9

FORMULATION OF ALTERNATIVE PLANS: SECOND FEDERAL FEASIBILITY STUDY

9.1 AUTHORITY

In November 1990, shortly after the completion of the SFWMD restoration study, Congress authorized a second Federal feasibility study in *Section 116(h) of the Water Resources Development Act of 1990* (see Section 1 for the full text of the authority). This section of the Act authorized the Secretary of the Army to conduct a feasibility study of the Kissimmee River flood control project to identify modifications necessary to provide a comprehensive plan for the river's environmental restoration. The authority states that the feasibility study,

> *"...shall be based on implementing the Level II Backfilling Plan specified in the Kissimmee River Restoration, Alternative Plan Evaluation and Preliminary Design Report, dated June 1990, published by the South Florida Water Management District".*

The urgency to quickly complete the study was expressed in the authority's requirement that the Secretary of the Army submit to Congress the final report of the Chief of Engineers on the results of this study by April 1, 1992.

9.2 STUDY PURPOSE AND CONSTRAINTS

In accordance with the authorization's narrowly defined direction, the purpose of this study was to determine the extent of Federal participation in the SFWMD's Level II Backfilling Plan for the Kissimmee River. This determination was based on guidance from the Corps Headquarters and consequent plan formulation analyses.

In February 1991, representatives from the Corps, the Office of the Assistant Secretary of the Army for Civil Works, and the SFWMD met in a Special Resolution Conference to discuss policy and procedural issues regarding the study. The plan formulation guidance resulting from that meeting was to analyze in detail the Level II Backfilling Plan and ways to improve the plan's cost effectiveness. In addition, alternatives from the SFWMD's June 1990 *Restoration Report*, and appropriate separable elements of the Level II Backfilling Plan, were to be evaluated in this feasibility report. The report

would document the differences among the alternatives using the criteria developed by the SFWMD to measure the effectiveness of the restoration plans and other measures, such as the habitat evaluation procedures (HEP) model. The result would be to allow decision makers to determine the justification for the various levels of restoration achieved by the different alternatives and the cost effectiveness of various elements of the Level II Backfilling Plan. It was agreed that any plan recommended by the Corps as a result of the study would achieve the same results as the Level II Backfilling Plan unless agreed to by the SFWMD. Although the Level II Backfilling Plan may be the only plan acceptable to the sponsor, Federal participation would be recommended only for that portion of the recommended plan which the Corps believed to be the most cost effective means of achieving an increment of restoration, and that the increment of restoration obtained was judged to be at least equal to its cost. This guidance was applied through a series of subsequent analyses.

First, the individual components of the Level II Backfilling Plan, as recommended by the SFWMD, were evaluated and modified to improve their effectiveness. Plan components, including design assumptions, structures, construction methods, and operational procedures, were reviewed to identify ways to improve the engineering design, reduce financial costs, or increase ecological outputs. This analysis led to a Modified Level II Backfilling Plan as the Corps Recommended Plan.

Second, the Modified Level II Backfilling Plan and the other alternatives considered by the SFWMD during its restoration study were evaluated in accordance with the traditionally required Federal evaluation procedures. These procedures are used routinely in any Corps planning investigation of potential Federal investment in a water resources development project. Federal evaluation procedures include the *"Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies" ("Principles and Guidelines", or P&G)*, as well as the *National Environmental Policy Act (NEPA)* and other Federal environmental review and coordination compliance procedures. One exception to normal evaluation requirements, as decided at the February 1991 conference, was that traditional economic benefit-cost analysis would not be required for this environmental restoration project.

Third, since justification of this restoration project will not be based on a traditional benefit/cost ratio, the extent of fish and wildlife objectives that would result from restoring the ecological integrity of the Kissimmee River were identified and alternative plans were compared.

Fourth, analyses of the Modified Level II Backfilling Plan were conducted to determine the extent of Federal participation in plan implementation:

* **Incremental Analysis** - An incremental (marginal) cost analysis was accomplished on the separable elements of the Modified Level II Backfilling Plan to clearly demonstrate that the most cost effective means to accomplish fish and wildlife resources restoration objectives was identified and that the most cost effective, incrementally justified features, were combined in developing the recommended plan.

* **Evaluation** - The modified plan was evaluated in accordance with the traditionally required Federal evaluation procedures similar to the previous evaluation of alternatives.

* **National Economic Development (NED) Plan** - The *"Principles and Guidelines"* require that,

> *"the alternative plan with the greatest economic benefit consistent with protecting the Nation's environment (called the national economic development plan, or the 'NED plan') is to be selected unless the Secretary of a department or head of an independent agency grants an exception when there is some overriding reason for selecting another plan, based upon other Federal, State, local and international concerns".*

At the February 1991 Special Resolution Conference, the participants agreed that since the Kissimmee River restoration project is an environmental restoration plan, development of an NED plan is not required, and there is no need to seek a waiver for selection of a plan other than the NED plan. Therefore, no analyses in support of an NED Plan were required or conducted for this feasibility study.

In conducting these analyses, the Corps generally accepted the SFWMD's restoration study procedures and results, including the planning objective (called the "goal" by the SFWMD) to reestablish the ecological integrity of the Kissimmee River ecosystem, and selection of the Level II Backfilling Plan. While the Corps feasibility study did not recreate the SFWMD study process, it did conduct sufficient analyses, as summarized above and described in the following sections of this report, to support conclusions and recommendations regarding Federal participation in the Level II Backfilling Plan.

9.3 MODIFICATIONS TO THE LEVEL II BACKFILLING PLAN

The Level II Backfilling Plan, as generally described in the previous chapter and described in detail in the SFWMD *Restoration Report*, was analyzed to ensure that its design, structural, construction, and operational components were the most effective means to accomplish the fish and wildlife planning

objectives. This was accomplished through a review of the plan's component parts to determine if more sound engineering, lesser cost, or more environmentally beneficial features or procedures could be incorporated into the plan. The following features were considered in this analysis and are shown on Figure 27.

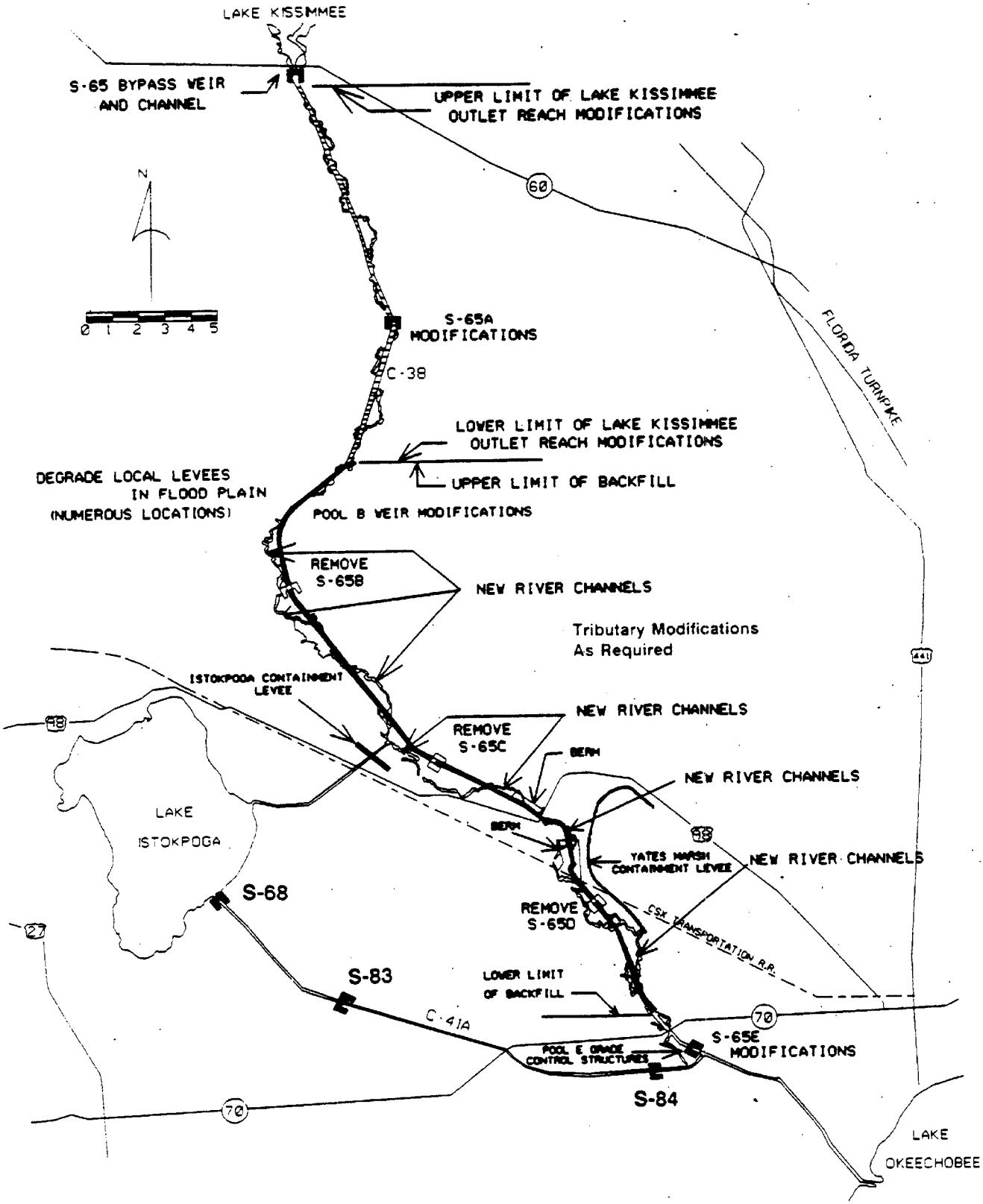
9.3.1 Dechannelization

Although, in theory, it would be technically and financially possible to implement any length of backfilling, SFWMD recognized that maintaining a level of flood control would limit the linear extent of backfilling. At locations where the conveyance of C-38 is either negated or reduced as a result of dechannelization, the non-structural approach of acquiring flooding rights, either through the purchase of fee title or flowage easement, would be used. Because of the constraint to maintain the existing level of flood protection, numerous actions must take place in conjunction with the dechannelization besides the backfilling action. These include: land interests; mitigation of tributaries impacted as a result increased flooding; a by-pass weir at S-65; modifications of the S-65A spillway and tieback levee; removal of the S-65 B, C, and D spillways, locks, tieback levees, and buildings; modifications to S-65E; and degrading locally constructed levees in the flood plain. Each of these components are described in the following paragraphs.

9.3.1.1 Backfilling

As determined during the Corps' 1985 report, an outlet channel is required to maintain existing flood protection in the Upper Basin. C-38 must also remain intact from S-65E to approximately 1 mile upstream of State Road 70. This section would provide the necessary collection capacity to control flood waters from the restored flood plain and return it to channelized flow for discharge into Lake Okeechobee. Therefore, the SFWMD proposed that one continuous backfill section from the middle reaches of Pool B to middle reaches of Pool E, extending 25-30 miles. The linear extent of this filled section would consist of four hardened plugs constructed at the downstream terminus of each backfilling segment. Because of this extensive filling, sections of river eliminated by C-38 construction would be recreated to provide the linkage between restored river reaches.

During this study, through hydrologic and hydraulic modeling the linear extent of backfill was refined to twenty-nine miles of C-38. This extent of backfilling allows the routine flood events to remain within the historic flood plain boundary, and therefore, prevents extensive flooding of residential properties.



COMPONENTS

FIGURE 27

Backfill will be taken from the piles of material adjacent to the canal that remain from the original channel excavation. Disturbed surfaces in the project area will be graded to maximize both the use of fill material adjacent to the canal and environmental outputs. Much of the backfilled reaches will be topped by a mound of fill material about 2.5 feet above grade to allow for settling of the fill. Settling would be complete in less than three years, and the resulting topography would approximate prechannelization conditions.

In selected areas, potholes and backwater areas will be created by filling the canal to slightly below the surrounding grade. One to two acre potholes would result by filling below surrounding grade to produce water depths of about three to five feet over various distances 150 to 300 feet in length and 300 feet in width; about two potholes could be spaced over each mile of backfill. In other areas, backwater sloughs, with water depths of about five to ten feet and about four to six acres in size (about 300 feet wide, and 600 to 900 feet in length), could be retained in areas about 400 to 500 yards from where the restored river crosses a backfilled reach.

In addition, if, along a given stretch of canal, the requirement for fill material should exceed the volume of material available in adjacent disposal mounds, material will be excavated from the adjacent flood plain, rather than trucking material from other pools or borrow sites outside the flood plain, to create potholes adjacent to the channel. The resulting adjacent borrow pits will vary in size and depth depending on the amount of materials needed, but depths will not exceed ten feet and side slopes will be gradual, avoiding vertical or steep slopes. This overall grading approach, involving the creation of potholes, backwater sloughs and borrow pits to take advantage of filling and borrow situations, will mimic the Kissimmee River flood plain's historical topographic contouring, providing natural, seasonally-drying habitat areas.

Where the original river channel was eliminated by the excavation of C-38 or the placement of excavated material, a new channel will be excavated to connect existing river remnants. The channel will be dug through the existing disposal areas in order to avoid construction impacts to undisturbed flood plain, where possible. Each segment will be constructed to approximate the original meandering pattern, gradient, and cross-section. This new channel will cross backfilled areas as near as possible to a right angle to maximize stability at their junction. Approximately 18 new river channel sections will be constructed with a total length of 11.6 miles and an average cross section of 1,230 square feet.

9.3.1.2 Land Interest

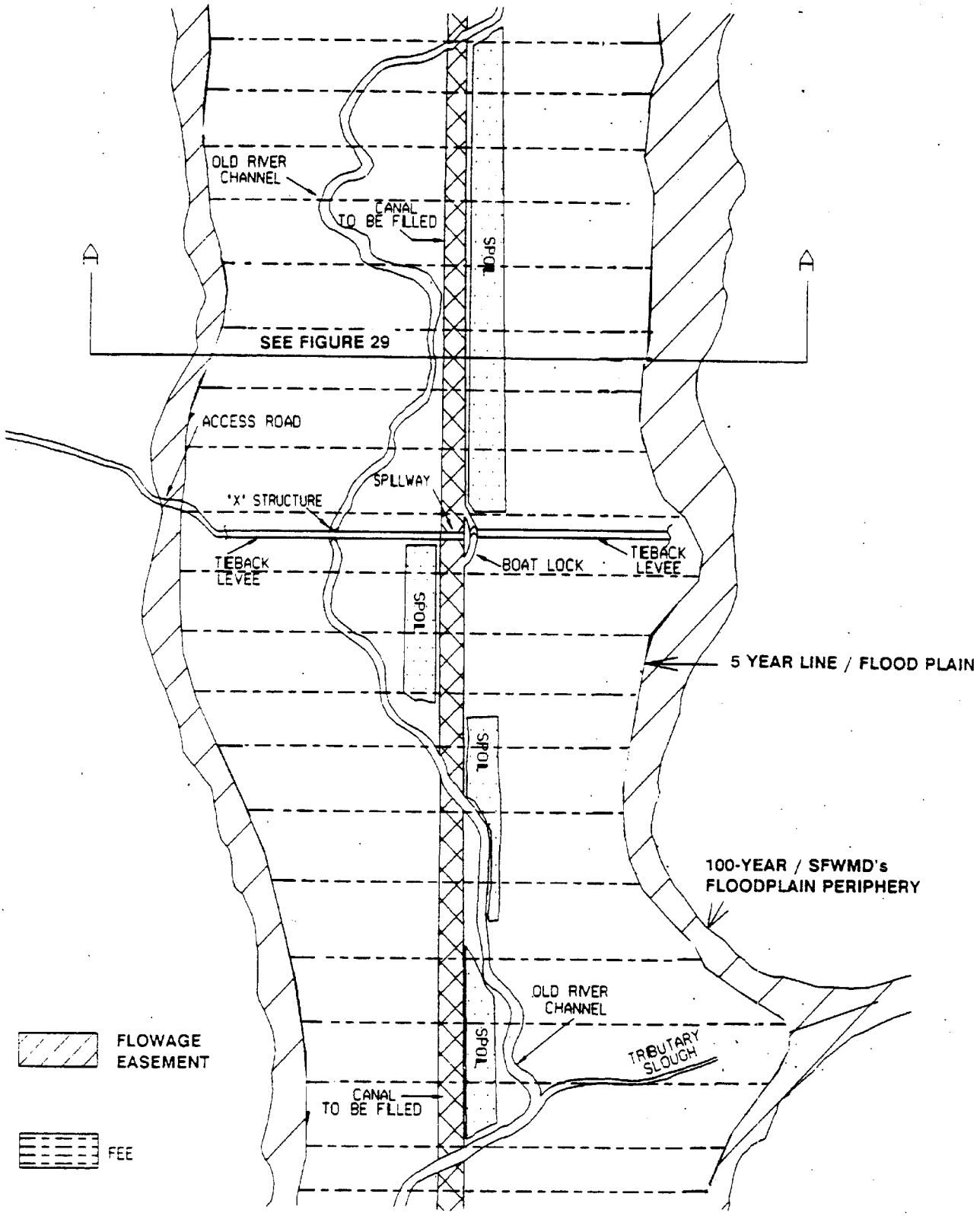
The SFWMD *Restoration Report* recommended two types of land acquisition for the Level II Backfilling Plan: 1) fee title interest in lands defined as "flood plain", and 2) limited flowage easement interest in lands defined as "flood plain periphery". Flood plain lands were those areas where flooding would be expected to be of sufficient frequency and duration that vegetative changes would occur and eventually evolve to closely match the species and patterns of the historic flood plain. The limits of the flood plain were derived from SFWMD's Technical Publication 80-7, *Plant Communities of the Kissimmee River Valley* (September 1980). Flood plain periphery lands were those areas where flooding would be expected to occur infrequently and for such short durations that no significant vegetative changes would be expected to occur.

The extent of land acquisition, which is conceptually shown in Figures 28 and 29, was estimated in SFWMD's *Restoration Report* to be 43,439 acres in the flood plain and 26,022 acres in the flood plain periphery, for a total of 69,461 acres. Of this total, SFWMD estimated that 53,815 acres were lands for which real estate interests would have to be secured, and 15,649 acres were known public lands where no additional interests and costs were assumed.

However, in determining the extent of lands needed to achieve the restoration objective, this study considered three factors: environmental restoration, flood control operations, and induced flooding.

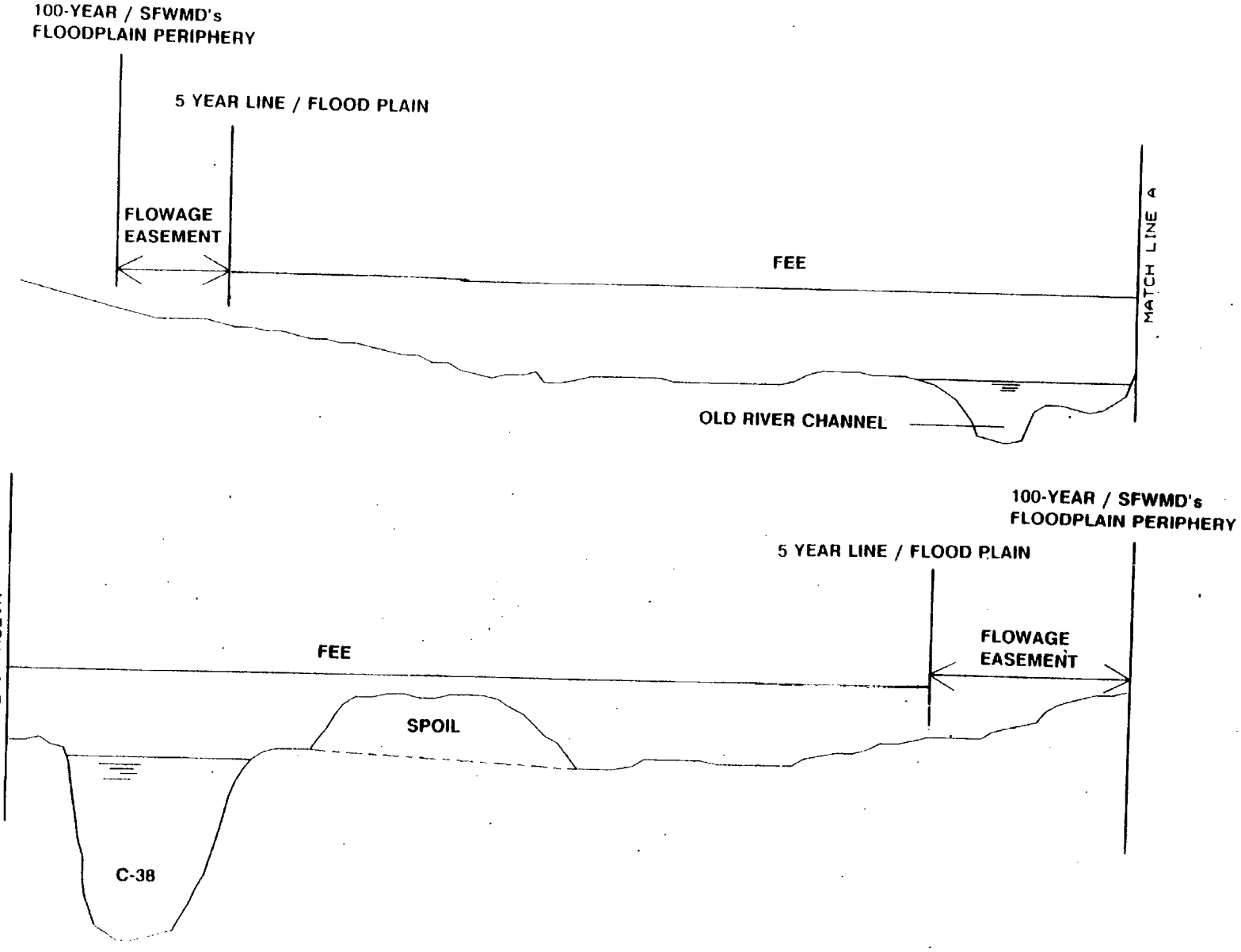
* **Environmental Restoration and Flood Control** - The project purpose is environmental restoration; lands needed to achieve this purpose should be fully available and unconstrained. Therefore, lands for restoration will be acquired in fee to ensure that the purpose can be met over the life of project. The limit of these lands has been defined as the vegetation line established by the SFWMD and is somewhat less than the 5-year flood plain. Consequently, acquiring fee to the 5-year flood line will, in addition to providing for environmental restoration, also maintain the current level of protection (thirty percent standard project flood) through non-structural flood control by ensuring a flood discharge flow-way capacity of 11,000 cfs from the upper chain of lakes.

* **Induced Flooding** - Elimination of the capacity of C-38 to carry flood flows of up to thirty percent of the standard project flood may result in induced flooding. Fringe areas that are currently not at a significant level of flood risk may experience an increase in frequency of inundation. Other areas closer to the river with a comparatively more frequent flood risk may experience flooding of somewhat greater depths for longer duration. There is an



KISSIMMEE RIVER FLOOD PLAIN RESTORATION
LAND ACQUISITION

FIGURE 28



PROFILE OF FIGURE 28

FIGURE 29

unresolved legal issue concerning the Government's right to restore flow within the historic flood plain without compensation to affected owners. Hydraulic and hydrologic data necessary to determine the limits of the historic flood plain are not available. Studies necessary to obtain this data would take about 18 months and approximately $500,000 in research and modeling costs, with an estimated reliability of less than fifty percent. The estimated value of the flowage easement over 9,143 acres between the 5-year and 100-year limits is $916,000. Because of the uncertainty of the induced effects and the costs associated with determining these damages, it was determined that the acquisition of a flowage easement up to substantially the 100-year flood plain would be more financially prudent than conducting the analyses required to justify the purchase. The 100-year limit was selected because: (1) there may be a significant induced effect up to the 100-year level, and (2) it is the limit used by the Federal Emergency Management Agency to regulate development outside the floodway.

Therefore, the interest in real estate was determined by the Corps to be acquisition in fee up to the 5-year flood for restoration and flood control, and acquisition in standard flowage easement between the 5-year flood plain and substantially the 100-year flood plain for assumed mitigation of induced flooding. Figure 28 and 29 shows the conceptual extent of these acquisition areas. Levee easements, channel easements (associated with the levees) and temporary construction easements will also be acquired. The differences between the amounts of land required are shown in Table 18.

TABLE 18
LAND ACQUISITION

	Total Acres	% of Total
5-year flood plain (Restoration & Flood control)	58,487	86
100-year flood plain (Induced flooding)	9,143	14
Misc. Easements	213	0
TOTAL	67,843	100

9.3.1.3 Tributary Modifications

There are approximately fifty tributaries in the Lower Basin. SFWMD recommended improvements or additional land interests in twenty-six small tributaries, four large tributaries, and Lake Istokpoga Canal; however, no detailed studies were conducted to assess the effects of the Level II Backfilling Plan on these tributaries. The Corps determined that, in most cases, backwater influences in the tributaries are such that interests in lands beyond the Kissimmee Valley flood plain are minimal. However, adverse impacts of Lower Basin tributary flooding will be mitigated through acquisition of appropriate real estate interests. However, in two flood plain areas where acquisition of real estate interests were recommended by the SFWMD, protection from induced backwater flood damages by levees was investigated as an alternative to acquisition. These areas are Yates Marsh/Chandler Slough, located east of C-38 in Pool D, just upstream of S-65D; and Lake Istokpoga, located west of C-38 in Pool C. In both cases, preliminary estimates were developed for the cost of required real estate and the cost of a levee that would structurally protect the affected property. These estimates are shown on Table 19.

TABLE 19

COMPARISON OF REAL ESTATE AND CONTAINMENT LEVEE COSTS

Affected Area	Real Estate	Levee
Yates Marsh/Chandler Slough	$ 1,488,000	$647,000
Lake Istokpoga	$44,750,000	$409,000

In view of these cost comparisons, levees were selected over acquisition of easements for these two areas. Modifications specific to each tributary will be identified during later preconstruction engineering and design studies to determine whether there is a more cost effective structural solution that is consistent with the restoration purpose of the project.

9.3.1.4 S-65 Bypass Weir and Channel

Analysis during the SFWMD study indicated that additional spillway capacity for S-65 may be needed for events less than the Standard Project

Flood. Therefore, they proposed a by-pass spillway as the primary spillway to discharge at a rate that closely approximates the pre-project stage-discharge rating for lake stages above the crest elevation of 51.0 feet.

During this study, analysis indicated that S-65 was barely able to meet the discharge requirements because of the higher tailwater caused by the backfilling. On the Lake Kissimmee flood hydrographs, S-65 was unable to meet the 11,000 cfs outlet capacity when the Lake Kissimmee started receding. Therefore, to maintain flood prevention in the Upper Basin it is likely that a weir will be required at times to meet the 11,000 cfs outlet capacity. The new structures will permit flows to be discharged at a rate that corresponds closely to the natural capacity of the historic outlet. The spillway will be a sheet pile weir, which will allow for insertion of needle boards. While the spillway will pass most discharges without manual operation, the flash boards will provide a tool to "fine tune" the system during project monitoring. The bypass channel will direct discharge to C-38 downstream from the existing S-65 structure.

9.3.1.5 S-65A Modifications

SFWMD proposed modifications to the S-65A tieback levee and spillway structure. Analysis showed that the structure will be required to operate with much higher headwater and tailwater stages. Therefore, gate extensions will be installed at S-65A, and the crest of the tie-back levee will be lowered to about elevation 49 feet to maintain the existing level flood protection. Six small overflow structures will be constructed along the tieback levee to augment discharge capacity of S-65A by allowing flood flows to discharge over the levee when stages exceed elevation 48 feet. The levee will remain at full height at the residence, spillway, and boat lock, forming an "island" during flood flows.

9.3.1.6 S-65B, C and D Removals

The SFWMD proposed that the tie-back levees, spillways and boat locks at S-65B, C and D be demolished such that all structures are removed to restore natural ground elevations; debris could be buried in C-38. Degradation of the tie-back levees to surrounding ground levels has been retained to allow for sufficient flood plain conveyance for flood events by reestablishing flows across the width of the flood plain. However, demolition of the other structures has been modified to include: (1) removal and proper off-site disposal of potential hazardous or toxic waste items, such as fuel storage tanks, (2) removal for off-site salvage of reusable items, such as engines and other mechanical devices, and (3) demolition of the structures to the existing ground levels forming an island during flood flows. Debris would be placed in the canal

and covered with backfill. The structures will be removed for public safety to eliminate an attractive nuisance.

9.3.1.7 S-65E Modifications

The SFWMD recommended gate extensions at S-65E to induce backwater influence upstream of the lower limit of backfilling, thereby controlling flood plain recession rates in the lower portion of the backfilled area, erosion of the backfill plug, and head cutting in the river channel outlet. Analyses during this study indicated that such gate extensions would necessitate substantial modifications to S-65E spillway and lock. A more cost effective design would be a grade control structure just upstream of S-65E, and stability measures at S-65E.

A weir and flood gates will be built just upstream of S-65E spillway and lock to minimize velocity stress on the downstream plug and reduce the stage difference across S-65E and prevent lock machinery from being flooded during high flows. The gates will ensure continued use of the lock under normal flow conditions, but will be closed when stages upstream of S-65E rise to elevation 23.0 feet. New tieback levees will be constructed to connect the weir into the existing tieback levee to the east and west, and the existing levee will be reinforced to accommodate higher upstream stages. The navigation channel will be rerouted with its confluence with C-38 upstream of the weir to permit navigation through the existing lock.

The new weir and flood gate will isolate a drainage basin located northeast of S-65E. This area currently drains to the upstream pool of S-65E through an existing channel. A new drainage system will be constructed to convey runoff from that area to the approach channel downstream of the S-65E lock.

Because of the possibility of increased water depths expected at S-65E, the structure will require installation of stability measures. The addition of stilling basin anchors will counteract the increased lateral and overturning forces from the increase in water depths upstream from S-65E.

9.3.1.8 Local Levee Modifications

The SFWMD proposed that the S-65B, C, and D tieback levees be degraded to natural ground elevations to provide a sufficient conveyance for flood discharges across the flood plain. During this study, it was determined that locally constructed levees within the flow-way also will need to be degraded to natural ground elevations to ensure that sheet flow across the flood plain is not impacted by unnatural features. Additionally, borrow canals

associated with these levees will be filled or plugged to prevent overdrainage of the adjacent flood plain. Excess material will be used for C-38 backfill material.

9.3.1.9 Bridge Crossings

Two bridges cross the flood plain in Pool D with filled causeways and provide openings for the existing C-38. Although the causeways did not exist prior to channelization, analyses indicates that the existing openings would be sufficient for flood events and would not cause an impact to flood control. However, SFWMD recommended the causeways be modified to promote flows across the flood plain. Without these additional openings, the flood plain flows would be forced to funnel back into the canal upstream of the bridge and would have to be dispersed overbank once through the bridge. This would result in a discontinuity of sheet flow over the flood plain.

During this study, it was determined that C-38 would be left intact under the U.S Highway 98 bridge span for adequate conveyance and navigation and, a berm would be constructed to prevent water upstream of the bridge from entering C-38 after flood plain stages recede. An additional opening with a 400-foot bottom width will be constructed east of the canal to allow sheet flow over the flood plain and promote continuity between the upstream and downstream flood plains. The opening will maintain existing natural ground elevation and no channel will be provided.

C-38 would also remain intact under the CSX Transportation Railroad bridge and a berm will be constructed around the shallowed canal section to prevent water upstream of the bridge from entering C-38 after flood plain stages recede. Additional bridged openings will be constructed in the filled causeway on both sides of the canal. On the west side, an opening at the original river channel will be constructed to pass normal river flows, thereby also restoring navigation through this section of the river. On the east side, an opening will be constructed to restore the historic pattern of continuous flows from Chandler Slough and other small swales through the flood plain.

9.3.2 Lake Kissimmee Outlet Reach Modifications

The SFWMD proposed that the outlet channel reach of C-38, from S-65 to the upstream limit of C-38 backfilling in Pool B, be tapered depth wise, or "shallowed". Shallowing would involve placing material, dredged during original project excavation, into the canal such that water depths conceptually would gradually decrease from the existing depth of about 30 feet at S-65 to grade level at the upstream backfill limit, a distance of about 16.5 miles. In actuality, shallowing might be best accomplished in stepped segments of uniform depth.

The purpose of shallowing would be to improve DO levels in the canal, create overbank flows in this reach, and to remove the adjacent mounds of material from former flood plains dredged during original project construction. Removal of these mounds would be expected to increase flood plain flow conveyance. Gated weirs would be installed to divert normal flows into original river channels; weir gates would open only during flood events. The natural overland gradient of this reach is only one-third to one-half that of the central reach and presents different opportunities and challenges to maximize environmental benefits while meeting outlet discharge requirements. The SFWMD is planning to perform additional modelling of this feature to better understand its hydraulic effects, and the resultant extent of environmental effects. At this time, however, there is not enough information to demonstrate the effectiveness or efficiency of shallowing. Therefore, the Lake Kissimmee outlet reach modifications have been retained as a part of the recommended Federal project, but it is a locally preferred feature and it's cost will be fully paid by the non-Federal sponsor with no credit for cost sharing.

9.3.3 Revegetation

SFWMD recommended that disturbed ground surfaces be revegetated to minimize erosion from surface flow over the area. Subsequent evaluation, based on the results of the SFWMD Phase I Demonstration Project, has shown that local wetland plants would be expected to quickly invade disturbed areas; and, within two to three months, the extent of natural revegetation would be about the same as would occur with a managed artificial planting program. The risk of significant erosion that could be prevented by plant cover over this brief time is not considered high enough to warrant the costs of a managed revegetation program. Therefore, this feature was dropped from the plan.

9.3.4 Pool B Weir Modifications

Following publication of the 1990 *Restoration Report*, the SFWMD identified the need to modify the Demonstration Project weirs in Pool B to restore flows through oxbows and facilitate local flood plain inundation early in the construction period to maximize environmental benefits during construction. This component had not been presented in the *Restoration Report.*

The three Demonstration Project weirs constructed by SFWMD in Pool B will be modified to restore flows through oxbows and facilitate local flood plain inundation for the purposes of environmental restoration. The weirs' navigation notches will be closed and the crest elevations will be lowered. The weirs will eventually be incorporated into the backfill. At this time, however, there is not enough information to demonstrate the effectiveness or efficiency

of the Pool B Weir modifications. Therefore, the Pool B Weirs have been retained as a part of the recommended Federal project, but it is a locally preferred feature and it's cost will be fully paid by the non-Federal sponsor with no credit for cost sharing.

9.3.5 Paradise Run

Paradise Run is a 3,000 - 4,000 acre area immediately west of C-38 just downstream from S-65E. Prior to construction of the Government Cut and channelization of the Kissimmee River, Paradise Run was a highly productive complex of meandering river channels, oxbows and marsh (Perrin et al., 1982). The ecology of this ecosystem was dependent on seasonal fluctuations in water stages and velocities. Game fish populations in the Paradise Run area have declined since construction of basin water control works.

Restoration of Paradise Run would involve significant "re-plumbing" of existing water control works to provide river flow to the remnant river and flood plain at the confluence of C-41A and C-38, as well as to return river flow to the Government Cut immediately upstream of State Road 78. A brief description of the plan for this feature is provided in a previous chapter of this report and Figure 15.

Consideration of a flow-through marsh plan for restoration of Paradise Run was initially considered during the Corps' first feasibility study, but it was not economically justified and therefore not recommended for implementation in the 1985 *Feasibility Report.* In 1987, at the request of the SFWMD, the Corps developed a proposal for a demonstration project in Paradise Run. In 1989, under the continuing authority of Section 1135 of the Water Resources Development Act of 1986, the Corps began studying Paradise Run; but this study was suspended at the State's request in early 1990 pending completion of the SFWMD's *Restoration Report.* Although not included in the *Restoration Report,* Paradise Run was again raised during this feasibility study for consideration as an increment to the basic backfilling plan. However, the SFWMD indicated that it would not support this feature at this time because it is not integral to restoration of the Lower Kissimmee River Basin. Paradise Run was subsequently dropped from further study.

The previous Corps' studies had indicated that restoration of Paradise Run would produce substantial environmental outputs for the small area involved. However, without the support of a non-Federal sponsor, this feature could no longer be considered in this feasibility study. If, in the future, a non-Federal agency agrees to sponsor the restoration of Paradise Run, this feature could be reconsidered for implementation.

9.3.6 Project Cost Adjustments

In addition to the above project features, the Corps' analysis of the SFWMD's Level II Backfilling Plan description revealed the following project features that were not included in the SFWMD cost estimate. These features are integral to the project, and therefore have been included in the Corps cost estimate:

* Protection or acquisition of 356 residential homes, 5 farms (14 buildings) and 24 miscellaneous out buildings.

* Demolition of acquired structures in the flood plain.

* Permanent relocation of three telephone cables and three power lines.

* Permanent relocation of three boat launching ramps.

* Navigation marker system, to assist boaters in traversing the waterway to avoid dead-end channels and to inform boaters of the critical sections of localized low depths under extreme low flow conditions.

* Operation, maintenance, repair, rehabilitation, and replacement, including: aquatic plant control and program, containment levees, plug, Pool E weir and flood gates.

Table 20 presents a comparison of the Level II Backfilling Plan, as recommended by the SFWMD, and the Modified Level II Backfilling Plan as developed during the Corps' analyses. Further discussion on the differences between SFWMD's cost estimate and the Corps' estimate for the Modified Level II Backfilling Plan will follow in the next section in the Cost Estimate subsection.

TABLE 20
COMPARISON OF THE SFWMD'S LEVEL II BACKFILLING PLAN AND THE CORP'S RECOMMENDED PLAN (MODIFIED LEVEL II BACKFILLING PLAN)

COMPONENTS	SFWMD's 1990 PLAN	CORPS' RECOMMENDED PLAN	REMARKS
Dechannelization			
Backfill (includes: Hardened Plugs, New River Channels, and Grading)	included	included	Distance refined.
Land Interest: Restoration Flood Control Induced Flooding	 included included included	 included included included	Differences explained in text.
Tributary Modifications	included	included	Impacts mitigated through land acquisition. Corps' Plan includes two containment levees in lieu of land acquisition.
S-65 Bypass Weir and Channel	included	included	
S-65A Gate Ext & Tieback Levee Modifications	included	included	
Removal and degradation of S-65B, C & D spillways, locks, tieback levees and buildings	included	included	Removal of spillway structures limited to existing grade.
S-65E Modifications	included	included	Modification not cost effective, grade control structure substituted.
Local Levee Modifications	not included	included	Refer to text.
Bridge Crossings	included	included	
Separable Elements			
Outlet Reach Modifications (Shallowing)	included	included	Locally preferred feature.
Revegetation	included	not included	Eliminated from the Recommended Plan.
Pool B Weir Modifications	not included	included	Locally preferred feature.
Paradise Run	not included	not included	No non-Federal Sponsor.

9.4 EVALUATION OF ALTERNATIVE PLANS

The four alternative restoration plans developed by the SFWMD were evaluated in the same manner as plans would be evaluated in any Corps water resources study, with the previously noted exception of not conducting a benefit-cost analysis. The evaluation consisted of analyzing the effects of the plans against various sets of evaluation categories and criteria. The results of the evaluations listed below were arrayed and compared to identify significant differences among plans.

9.4.1 Section 122 Effects

Effects of the alternatives on air, noise and water pollution, natural resources, and other types of resources listed in Section 122 of the 1970 River and Harbors and Flood Control Act are displayed in Table 21.

9.4.2 Principles and Guidelines Effects

Effects of the alternatives on endangered and threatened species, historic and cultural properties, and other types of resources listed in the P&G are displayed in Table 22.

9.4.3 Evaluation Accounts

Effects of the alternatives in the four evaluation accounts listed in the P&G - national economic development, environmental quality, regional economic development, and other social effects - are displayed in Table 23.

9.4.4 Determinants of Ecological Integrity

Effects of the alternatives on the determinants of ecological integrity listed in the SFWMD *Restoration Report* - food (energy) base, water quality, habitat quality, biotic interactions, and ecosystem properties - are displayed in Table 24.

9.4.5 Environmental Outputs

Effects of the alternatives on the physical characteristics of the Lower Basin watercourses and categories of environmental outputs are displayed in Tables 25 and 26.

9.4.6 Planning Criteria

Performance of the alternatives with respect to planning criteria, including the planning objectives, the SFWMD restoration criteria, planning constraints, and the four P&G criteria of completeness, effectiveness, efficiency, and acceptability, is displayed in Table 27.

9.4.7 Environmental Compliance

The alternative plans were considered in relation to compliance with Federal environmental review and consultation requirements. The requirements considered, and the status of compliance, were as follows:

* *Archeological and Historic Preservation Act of 1974, as amended.* Full compliance at this stage; the letter from the Florida Division of Historical Resourcese dated October 16, 1991 documents the State Historic Preservation Officer's (SHPO) willingness to proceed with planning and design, with appropriate investigations and mitigation planning.

* *Clean Air Act, of 1972, as amended.* Partial compliance at this time; full compliance will be achieved through coordination of this integrated feasibility report and EIS with the Environmental Protection Agency, which will permit that agency to review and comment publicly on the environmental impacts of the alternatives, including the Recommended Plan.

* *Clean Water Act of 1972, as amended.* Partial compliance at this time. Although this document meets the requirements of *Section 404(r) of the Act* (see Annex B), the Corps will request a Section 401 State water quality certificate during the later preconstruction engineering and design phase. The November 18, 1991, letter from the Governor of Florida includes a statement from the Florida Department of Environmental Regulation expressing full support of the project to date. The State of Florida requires information at the level of final design for consideration of an application for water quality certification (Section 401 permit).

* *Coastal Zone Management Act of 1972, as amended.* The study is in full compliance at this stage. The above referenced letter from the State Clearinghouse states that the study at this time is in full compliance. A Federal consistency determination in accordance with *15 CFR 930 Subpart C* is provided as Annex C.

* *Endangered Species Act of 1973, as amended.* The study is in full compliance at this time. Consultation with the U.S. Fish and Wildlife Service for the Recommended Plan is complete and in full compliance with the

TABLE 21
EFFECTS EVALUATION:
CATEGORIES OF EFFECTS LISTED IN "SECTION 122"*

CATEGORIES OF EFFECTS	HISTORIC CONDITION	EXISTING CONDITION	"WITHOUT PROJECT" CONDITION (NO ACTION)	SFWMD WEIR PLAN	SFWMD PLUGGING PLAN	SFWMD LEVEL I BACKFILLING PLAN	SFWMD LEVEL II BACKFILLING PLAN	CORPS RECOMMENDED PLAN
Air Pollution	L	L	L	0	0	0	0	0
Noise Pollution	L	L-M	L-M	0	0	0	0	0
Water Pollution	L	M**	M**	-	-	-	+ +	+ +
Man-made Resources	L	M	M	0	0	0	-	-
Natural Resources	H	L	L	+	+	+	+ +	+ +
Aesthetic Values	H	L	L	+	+	+	+ +	+ +
Community Cohesion	M	M	M	0	0	0	-	-
Public Facilities and Services	L	M	M	0	0	0	0	0
Employment	L	L	L	-	-	-	-	-
Tax Values	L	L	L	-	-	-	-	-
Property Values	L	L	L	-	-	-	-	-
Displacement of People	N/A	N/A	N/A	-	-	-	-	-
Displacement of Businesses	N/A	N/A	N/A	-	-	-	-	-
Displacement of Farms	N/A	N/A	N/A	-	-	-	-	-
Desirable Community Growth	N/A	N/A	N/A	0	0	0	0	0
Desirable Regional Growth	N/A	N/A	N/A	0	0	0	0	0

*"Section 122" is included in the River and Harbor Act of 1970.
** Low Dissolved Oxygen routinely measured

Historic, existing and "without project" conditions display estimates of each resources relative values : H = high, M = moderate, L = low.
Plans' effects are estimates of net overall changes from the "without project" condition:

+ + = very beneficial change - = adverse change
+ = beneficial change -- = very adverse change
0 = no change N/A = not applicable

TABLE 22
EFFECTS EVALUATION:
CATEGORIES OF NATURAL AND CULTURAL RESOURCES EFFECTS LISTED IN THE "PRINCIPLES AND GUIDELINES"

CATEGORIES OF EFFECTS	HISTORIC CONDITION	EXISTING CONDITION	"WITHOUT PROJECT" CONDITION (NO ACTION)	SFWMD WEIR PLAN	SFWMD PLUGGING PLAN	SFWMD LEVEL I BACKFILLING PLAN	SFWMD LEVEL II BACKFILLING PLAN	CORPS RECOMMENDED PLAN
Air Quality	Good	Good	Good	No change	No change	No change	No change	No change
Areas of particular concern within the coastal zone	None	None	None	No change	No change	No change	No change	No change
Endangered and threatened species	Not applicable	6 species; No critical habitat	6 species; No critical habitat	Minor Benefit	Minor Benefit	Minor Benefit	Benefit recovery of 3 species: bald eagle, snail kite, wood stork. No change for 3 species: crested caracara, Florida grasshopper sparrow, indigo snake	
Fish and wildlife habitat	340,000 Habitat units	123,000 Habitat units	<123,000 Habitat units	between 123,000-170,000 Habitat units	between 123,000-170,000 Habitat units	between 123,000-170,000 Habitat units	285,000 Habitat units	285,000 Habitat units
Flood plains*	44,000 acres	44,000 acres	44,000 acres	44,000 acres	44,000 acres	44,000 acres	44,000 acres	44,000 acres
Historic and cultural properties	Not applicable	Few known sites	Some sites affected	Moderate adverse effects, more sites affected	Moderate adverse effects, more sites affected	Moderate adverse effects, more sites affected	Significant adverse effects, more sites affected	Significant adverse effects, more sites affected
Prime and unique farmlands	Not applicable	0 acres	0 acres	No change	No change	No change	No change	No change
Water Quality	"Good" in 111 miles of watercourse	"Fair" in 124 miles of watercourse; DO problems	"Fair" in 124 miles of watercourse; DO problems	"Fair" in 123 miles of watercourse; DO problems	"Fair" in 123 miles of watercourse; DO problems	"Fair" in 110 miles of water course; DO problems	"Good" in 99 miles of watercourse	"Good" in 99 miles of watercourse
Wetlands	35,000 acres	14,000 acres	14,000 acres	17,000 acres	17,000 acres	17,000 acres	29,000 acres	29,000 acres
Wild and scenic rivers	Not applicable	0 miles	0 miles	No change	No change	No change	Potential 56 miles	Potential 56 miles

*Flood plains are based on vegetative communities rather than hydraulic characteristics.

TABLE 23
EFFECTS EVALUATION:
EVALUATION ACCOUNTS LISTED IN THE "PRINCIPLES AND GUIDELINES"

EVALUATION ACCOUNTS	HISTORIC CONDITION	EXISTING CONDITION	"WITHOUT PROJECT" CONDITION (NO ACTION)	SFWMD WEIR PLAN[1]	SFWMD PLUGGING PLAN	SFWMD LEVEL I BACKFILLING PLAN	SFWMD LEVEL II BACKFILLING	CORPS RECOMMENDED PLAN
NATIONAL ECONOMIC DEVELOPMENT ACCOUNT								
Project Cost ($million)[2]	NA	NA	NA	$105/$144[3]	$162[3]	$253[3]	$359[3]	$423
Project Benefits								
Urban flood damage reduction	NA	30% SPF	30% SPF	30% SPF	30% SPF	30% SPF	30% SPF	30% SPF
Municipal and industrial water supply				NA	NA	NA	15,000 acre-feet annual loss	15,000 acre-feet annual loss
Recreation (navigation)		136,600 user days	136,600 user days	NA	NA	NA	134,500	134,500 user days
ENVIRONMENTAL QUALITY ACCOUNT								
Ecological Value	high	low	low	minimum effect - low	minimum effect - low	minimum effect - low	improvement - moderate to high	improvement - moderate to high
Cultural Value	high	high	high	minimum effect - moderate to high	minimum effect - moderate to high	minimum effect - moderate to high	moderate effect - moderate	moderate effect - moderate
Aesthetic Value	high	low	low	some effect - moderate	some effect - moderate	some effect - moderate	improvement - high	improvement - high

[1] SFWMD Weir Plan costs are listed for the Fixed Weir Plan/Gated Weir Plan

[2] July 1991 price levels

[3] Costs for the Headwaters Revitalization Project are included in the SFWMD project cost estimate.

NA - not applicable

TABLE 23 (Continued)
EFFECTS EVALUATION:
EVALUATION ACCOUNTS LISTED IN THE "PRINCIPLES AND GUIDELINES"

EVALUATION ACCOUNTS	HISTORIC CONDITION	EXISTING CONDITION	"WITHOUT PROJECT" CONDITION (NO ACTION)	SFWMD WEIR PLAN[1]	SFWMD PLUGGING PLAN	SFWMD LEVEL I BACKFILLING PLAN	SFWMD LEVEL II BACKFILLING PLAN	CORPS RECOMMENDED PLAN
REGIONAL ECONOMIC DEVELOPMENT ACCOUNT								
Regional income	low	low	low	minimum effect - low	minimum effect - low	minimum effect - low	minimum effect - low	minimum effect - low
Regional employment	low	low	low	minimum effect - low	minimum effect - low	minimum effect - low	minimum effect - low	minimum effect - low
OTHER SOCIAL EFFECTS ACCOUNT	NA	NA	NA	few relocations	few relocations	few relocations	some homes and farms relocated	some homes and farms relocated

[1]SFWMD Weir Plan costs are listed for the Fixed Weir Plan/Gated Weir Plan
[2]July 1991 price levels
[3]Costs for the Headwaters Revitalization Project are included in the SFWMD project cost estimate.
NA - not applicable

TABLE 24
EFFECTS EVALUATION
SFWMD DETERMINANTS OF ECOLOGICAL INTEGRITY

Determinants of Ecological Integrity	Historic Condition	Existing Condition	"Without Project" Condition (No Action)	SFWMD Weir Plan	SFWMD Plugging Plan	SFWMD Level I Backfilling Plan	SFWMD Level II Backfilling Plan	Corps Recommended Plan
WATER QUALITY								
Dissolved oxygen	Conducive for diverse river fish and invertebrate communities	Depressed and periodically lethal; less than 2 mg/l during summer and fall; conducive primarily for degraded reservoir communities		Depressed and frequently lethal; less than 2 mg/l during summer and fall; conducive primarily for degraded reservoir communities			Consistently greater than 3 mg/l; increased levels conducive for diverse river fish and invertebrate communities	
Nutrients	0.020 mg/l total phosphorus; 1.3 mg/l total nitrogen	Elevated 0.04-0.09 mg/l total phosphorus; 1.4-1.6 mg/l total nitrogen		Possibly slightly reduced			Potential 22% reduction along 56 miles of river	
Turbidity	Low; filtered by flood plain	Low; limited source		High due to erosive velocities			Low; filtered by flood plain	
HABITAT QUALITY								
Wetlands	35,000 acres; mosaic of 9 major plant communities; full complement of wetland values	14,000 acres; mosaic virtually eliminated; broadleaf marsh dominates; reduced wetland values	14,000 acres; mosaic virtually eliminated; broadleaf marsh dominates; reduced wetland values	17,000 acres with limited mosaic and wetland values			25,200 acres with complete mosaic and wetland values restored; 3,800 acres with limited mosaic and wetland values	25,200 acres with complete mosaic and wetland values restored; 3,800 acres with limited mosaic and wetland values
Overland flood plain flow	Provided periodic flushing and continuous rejuvenation of flood plain habitat	Does not occur		Periodic flushing rejuvenation limited by rapid recession rates			Periodic flushing and continuous rejuvenation of flood plain habitat	
Winter water	High quality feeding habitat for waterfowl and wading birds; but annually variable area	Habitat too sparse to support waterfowl or wading bird feeding		Will support only limited waterfowl and wading bird feeding			High quality feeding habitat for waterfowl and wading birds; but annually variable area	
Refuge availability	Abundant over 40,000 acres of aquatic ecosystem	Limited over 17,000 acres of aquatic ecosystem	Limited over 17,000 acres of aquatic ecosystem	Common over 18,000 acres of aquatic ecosystem			Abundant over 28,600 acres of aquatic ecosystem; common over 4,800 acres of aquatic ecosystem	
Riverine habitat diversity	High along 103 miles of river	Low along 68 miles of remnant river and 56 miles of canal		Moderate high along 36 miles of disjunct river; low along 32 miles of remnant river and 42-56 miles of canal			High along 56 miles of continuous river; low along 16 miles of remnant river and 24 miles of canal	
Substrate	Good spawning habitat; supported diverse, riverine benthic community	Poor spawning habitat; supports degraded, reservoir benthic community		Poor spawning habitat; would support limited number of benthic species			Good spawning habitat; would support diverse riverine benthic community	
Flow velocity	Conducive to spawning, feeding and other life history functions of most species	May indirectly interfere with life history functions of some species		Prevents or disrupts life history functions of most species			Conducive to spawning, feeding and other life history functions of most species	

TABLE 24 (Continued)
EFFECTS EVALUATION
SFWMD DETERMINANTS OF ECOLOGICAL INTEGRITY

Determinants of Ecological Integrity	Historic Condition	Existing Condition	"Without Project" Condition (No Action)	SFWMD Weir Plan	SFWMD Plugging Plan	SFWMD Level I Backfilling Plan	SFWMD Level II Backfilling Plan	Corps Recommended Plan
FOOD (ENERGY) BASE								
River to flood plain contributions	Occurred during July - Dec over 103 miles of river	Does not occur		Will occur during July - Dec over 22 miles of river		Will occur July - Dec over 23 miles of river	Will occur July - Dec over 36 miles of river	
Riparian vegetation to river contributions	Integral component of riverine flood web over 103 miles of river	Integral component of food web over 7 miles of river; greatly reduced component over 61 miles of remnant river		Integral component of food web over 32 miles of river; greatly reduced component over 36 miles of river			Integral component of riverine food web over 56 miles of continuous river; greatly reduced component over 15 miles of river	
Flood plain to river contributions	Integral component of riverine food web over 103 miles of river	Integral component of food web along 7 miles of river; does not occur along 61 miles of river		Limited component of riverine food web along 32 miles of river; does not occur along 36 miles of river			Integral component of riverine food web along 56 miles of continuous river; limited component over 16 miles of remnant river	
Instream primary production	Primarily native emergent and submergent vegetation	Reduced native contributions; increased exotic contributions		Primarily native emergent and submergent contributions, but some Hydrilla				
BIOTIC INTERACTIONS								
Species diversity	High in 103 miles of river,and 35,000 acres of wetlands	Low in 68 miles of remnant river, 56 miles of canal, 14,000 acres of flood plain wetlands, and 21,000 acres of drained flood plain		Low in 68 miles of river and 42-55 miles of canal; moderate in 17,000 acres of flood plain wetlands and low in 18,000 acres of drained flood plain			High in 56 miles of river and 25,200 acres of flood plain wetlands; moderate in 3,800 acres of flood plain wetlands; low in 16 miles of remnant river, 24 miles of canal, and 6,000 acres of drained flood plain	
Trophic structure	Complex in entire river & flood plain, full complement of feeding groups	Simple in river, canal & drained flood plain; moderately complex in wet flood plain; reduced number of feeding groups (guilds)		Moderately complex in wet flood plain; simple in river, canal & drained flood plain; some change in types of feeding groups (guilds)			Complex in 32,000 acres of river flood plain ecosystem; moderately complex in 3,800 acres of wet flood plain; simple in 16 miles of remnant river, 24 miles of canal & 6,000 acres of drained flood plain	
ECOSYSTEM PROPERTIES								
Resilience	High over 48,800 acres of river & flood plain; biological communities buffered against perturbations	Low over 48,800 acres of river, canal and flood plain; biological communities susceptible to perturbations		Low over 48,800 acres of river, canal and flood plain; biological communities susceptible to perturbations			High over 32,000 acres of river and flood plain; low over 16,800 acres of river, canal & flood plain; biological communities buffered against perturbations	
Biological dynamics	Many species; naturally fluctuating populations	Artificially stable (managed); few species with low population fluctuntions		Artificially stable (managed); slightly increased numbers of species with low population fluctuations			Many species with naturally fluctuating populations	

TABLE 25
PHYSICAL CHARACTERISTICS EVALUATION

Physical Characteristics	Historic Condition	Existing Condition	Weirs and Plugging Plan	Level I Backfilling Plan	Level II Backfilling Plan	Recommended Plan
length of river, canal, and oxbows (miles)	103 river (continuous) 8 canal 0 oxbows	0 river 56 canal 68 oxbows	36 river (disjunct) 55 canal 32 oxbows	36 river (disjunct) 42 canal 32 oxbows	56 river (continuous) 27 canal 16 oxbows	56 river (continuous) 27 canal 16 oxbows
depth of river, canal, and oxbows (feet)	2-8 river when within bank; 4 average	30 canal 1-6 oxbows 0-8 river remnants	30 canal 1-6 oxbows 0-8 river sections	30 canal 1-6 oxbows 0-8 river sections	30 canal 1-6 oxbows 2-8 river	30 canal 1-6 oxbows 2-8 river
top width of river, canal, and oxbows (feet)	50-300 river	225-425 canal 25-100 oxbows	225-425 canal 25-10 oxbows 50 river sections	225-425 canal 25-100 oxbows 50 river sections	225-425 canal 25-100 oxbows 50-300 river	225-425 canal 25-100 oxbows 50-300 river
SPF flooded area (acres)	–	38,292	43,702	49,418	69,461	69,461

TABLE 26
ENVIRONMENTAL OUTPUTS EVALUATION[1]

Environmental Outputs	Historic Condition	Existing Condition	Without Project Condition	Weirs and Plugging Plans	Level I Backfilling Plan	Level II Backfilling Plan	Recommended Plan
River/Flood plain ecosystem (acres)	48,800	0	0	0	0	48,800	48,800
wetlands (acres)	35,000	14,000 (impounded)	14,000 (impounded)	17,000 (impounded)	17,000 (impounded)	29,000	29,000
HEP habitat units	339,799	123,443	< 123,443	between 123,443 - 170,000	between 123,443 - 170,000	285,342	285,342
Instantaneous fish biomass (lbs)	81,000	3,000	3,000	300 - 4,000	200 - 3,000	46,000	46,000
winter water (acre-days)	unknown	27,000	27,000	not available	not available	327,000	327,000
ducks (winter population)	12,500	140	140	550	550	12,500	12,500
wading birds (population; excluding cattle egrets)	18,000	3,500	< 3,500	10,000	10,000	16,000	18,000

[1]See Annex G for an explanation of the quantities displayed in this table.

TABLE 27
PLANNING CRITERIA EVALUATION

PLANNING CRITERIA	"WITHOUT PROJECT" CONDITION (NO ACTION)	SFWMD WEIR PLAN	SFWMD PLUGGING PLAN	SFWMD LEVEL I BACKFILLING PLAN	SFWMD LEVEL II BACKFILLING PLAN	CORPS RECOMMENDED PLAN
OBJECTIVES						
SFWMD - ecosystem restoration	No	No	No	No	High	High
Corps - fish and wildlife restoration	No	Low	Low	Low	High	High
SFWMD RESTORATION CRITERIA						
Discharge characteristics	No	High	High	High	High	High
Flow velocities	No	Low	Low	Low	High	High
Overbank flow threshold	No	Moderate	Moderate	Moderate	Moderate to High	Moderate to High
Stage recession rates	No	Low	Low	Low	High	High
Flood plain inundation frequencies	No	Low	Low	Low	High	High
CONSTRAINTS -						
Upper Basin flood control	High	High	High	High	High	High
Navigation	High	High	High	High	High	High
P&G FOUR CRITERIA						
Completeness	Not applicable	High	High	High	High	High
Effectiveness	Not applicable	Low	Low	Low	High	High
Efficiency	Not applicable	High	Moderate	Low	Moderate	Moderate
Acceptability	Not applicable	No	No	No	High	High

Endangered Species Act. The Biological Opinion of the USFWS is included in Annex E.

* *Estuary Protection Act of 1968, as amended*. This act is not applicable, since estuaries will not be affected by this project.

* *Federal Water Project Recreation Act of 1965, as amended*. The project is in full compliance at this stage. Continued recreation planning will be performed during project engineering and design.

* *Fish and Wildlife Coordination Act of 1958, as amended*. Full compliance at this stage; the final *Coordination Act Report* is at Annex E.

* *Land and Water Conservation Fund Act of 1965*. The study is in full compliance. No funding under this act is involved.

* *Marine Protection, Research and Sanctuaries Act of 1972*. This act is not applicable to this study.

* *National Environmental Policy Act of 1969, as amended*. The study is in full compliance at this stage. A systematic interdisciplinary approach to planning has been utilized; alternatives have been studied, developed and described; and ecological information has been developed and utilized.

* *National Historic Preservation Act of 1966, as amended*. The study is in full compliance at this stage. The above referenced letter from the State Preservaton Officer reflects compliance at this stage.

* *Rivers and Harbors Appropriation Act of 1899*. The study is in full compliance. The proposed work would not obstruct navigable waters of the United States.

* *Watershed Protection and Flood Prevention Act of 1954, as amended*. This act is not applicable to Corps projects.

* *Wild and Scenic Rivers Act of 1968, as amended*. The study is in full compliance. The Kissimmee River is not part of the Wild and Scenic River System, nor is it proposed at this time.

* *Executive Order 11988, Flood Plain Management*. The study is in full compliance. The recommended plan supports avoidance of development in the flood plain, continues to reduce hazards and risks associated with floods and to minimize the impact of floods on human safety, health and welfare, and restores and preserves the natural and beneficial values of the base flood plain.

* *Executive Order 11990, Protection of Wetlands*. The study is in full compliance. By nature the of the project, it involves work in wetlands, and no practicable alternative to working in wetlands exists. Losses and degradation to the beneficial values of wetlands are minimized, and such values are preserved and enhanced. The public has been involved early in planning.

* *Executive Order 12114, Environmental Effects Abroad of Major Federal Actions*. This Executive Order is not applicable to this study.

9.4.8 Public Views

There are a few general themes that persist throughout public sentiment with regard to the alternative plans. Among established professional fishing guides and boaters who utilize larger boats, there is general preference to not dechannelize C-38. This is because of the ease of navigation and the speed at which fishing guides can move from one point on the river to the next. Also, though not understood, perhaps the few remaining active tributary flows into C-38 form a perfect fishing boundary for sportfishing. It seems, the larger predator fish will stay near the inflow point, utilizing the zone as lake fish. Fishing guides have cued in on the few remaining spots that create this feature. They believe the fishing is quite good, however the biologists indicate the fishery is on a steady decline and that a major collapse of the fishery may be imminent in the near future.

The next group of alternatives involve dechannelization, but leave the original pools in place. They provide perhaps more control of flood waters and water control in droughts by stabilizing levels and maintaining individual pools. These plans are favored by fishing guides and large boat owners as a second preference to the "no action" plan. In general, less enthusiastic proponents of restoration who may be overly cost conscious rather than concerned with pure performance seem to prefer these plans.

The Level II Backfilling Plan and the Modified Level II Backfilling Plan is the plan most universally supported by proponents of the river restoration project, but there is concern over how it might be funded. In general opponents to river restoration uniformly focus dissatisfaction of this plan. There are allegations of sediment problems, drought problems and navigation problems. Although many of these have been addressed in technical studies, opponents still prefer to indicate mistrust for the technical studies and follow their alleged intuition or gut feeling that backfilling can not be accomplished safely and successfully.

Although years of studies have addressed the technical concerns, there are tough social and economic questions regarding the adoption of the the Level

II Backfilling Plan. There appears to be a struggle on two planes; first, this type of civil works project versus other societal needs such as education and health, secondly this type of public works project versus other public works projects that add less subjectively and more traditionally to net economic development.

9.4.9 Evaluation

Alternative plan evaluation confirmed the results and recommendation of the SFWMD study; that is, that the Level II Backfilling Plan is the best plan of those studied to accomplish restoration of the Kissimmee River's ecological integrity. While each of the restoration alternatives retain flood control and navigation capabilities within the study area, the Level II Backfilling Plan maximized the extent of ecological restoration within the Lower Kissimmee River Basin. Brief comparisons of plans are as follows:

* **Physical Form** - Information displayed in Table 25 illustrates that the Level II Backfilling Plan would best restore the historic river mileage and establish remnant oxbows as active, functioning parts of the river system.

* **Hydrology** - Although each of the restoration plans performed similarly in restoring discharge characteristics and overbank flows comparable to pre-project conditions, only the Level II Backfilling Plan would restore acceptable flow velocities, stage recession rates, and flood plain inundation frequencies. In the Weir, Plugging, and Level I Plans, water would be impounded in the downstream ends of pools, leaving upper ends dry. Modelling results from evaluation of the Level II Backfilling Plan indicate that the maximum velocities for the restored channel would be between 1.8 and 2.0 feet per second for a bankfull stage. Discharges which exceed bankfull would flow overland as flood plain as sheet flow. Modeling of the Level II Backfilling Plan resulted in average flood plain velocities on the order of 0.2 to 0.4 feet per second.

* **Water Quality** - All plans would have similar construction-related turbidity effects, with the more extensive Level II Backfilling Plan resulting in the greatest effects. The high river flow velocities generated by the Weir, Plugging and Level I Plans would result in long-term periods of erosion and turbidity. Rapid recession rates produced by these plans also would affect water quality and induce fish kills in the retained canal stretches below the point of the uppermost diversion (SFWMD, 1991). These effects would not occur with the slower velocities and stage recession rates expected with the Level II Plan.

* **River/Flood Plain Ecosystem** - The Weir, Plugging and Level I Backfilling Plans will not reestablish the full complement of hydrologic criteria and physical form guidelines on any portion of the river/flood plain. Therefore,

the plans would not restore any acres of ecosystem comparable to that which existed prior to channelization. The Level II Backfilling Plan would restore 33,000 acres of river/flood plain ecosystem which would reestablish habitat for 318 fish and wildlife species.

* **Fish and Wildlife Habitat** - The Weir, Plugging and Level I Plans would be expected to result in habitat units in the range of 123,000 (existing condition level) to 170,000, increasing to 285,342 with the Level II Plan. The Weir, Plugging and Level I Plans would result in flooding and rapid runoff on pasture not now subject to frequent flooding. Wildlife in these areas would be subject to population disruptions from habitat flooding. Fish populations may be adversely affected due to water quality effects of rapid flood water recession. The Level II Backfilling Plan would create more stable hydrologic conditions, leading to the reestablishment and distribution of more natural habitat and wildlife populations.

* **Wetlands** - The Weir, Plugging and Level I Plans would result in about 17,000 acres of impounded wetlands with limited fish and wildlife values. The Level II Backfilling Plan would result in about 29,000 acres of wetlands with full complement of functional values.

* **Aquatic Plant Control** - Hydrilla distribution and other floating and submerged aquatic plants requiring management could increase in relation to restored river miles, with the Level II Plan resulting in the greatest increase.

* **Fishery** - Under the Weir, Plugging and Level I Plans, flooding and rapid recession rates would adversely affect fish. Fish kills would occur more frequently as a result of lowered dissolved oxygen levels resulting from organic matter carried off the flood plain by rapidly receding flood waters. Periodic excessive flow rates would degrade spawning habitat. Fish biomass would decline to an estimated 200 - 4000 pounds. With the Level II Backfilling Plan, these adverse effects would not be expected due to slower recession rates and velocities, and fish biomass would increase to about 46,000 pounds.

* **Waterfowl** - Based on the results of the Demonstration Project waterfowl densities are projected to increase to a mean day winter population of 550 ducks with the Weir, Plugging and Level I Plans, and 12,500 ducks with the Level II Plan.

* **Wading Birds** - A mean daily population of 10,000 birds would be expected with the Weir, Plugging and Level I Plans. An estimated 16,000 birds would be expected with the Level II Backfilling Plan.

* **Alligators** - Improvement in the alligator population should be proportional to river miles receiving reintroduced flow. Population density should be at least about three per mile of restored river, resulting in populations of about 108 alligators with the Weir, Plugging and Level I Plans and 168 alligators with the Level II Backfilling Plan.

The Level II Backfilling Plan provides the highest level of fish and wildlife outputs, which include acres of wetlands and associated wildlife habitat units. This plan also provides the greatest extent of continuous river restoration within the Lower Kissimmee River Basin and more closely resembles the historic riverine ecosystem that existed prior to implementation of basin flood control works. Evaluation of the SFWMD 1990 restoration plans verified selection of the Level II Backfilling Plan as the measure for implementation to restore the ecological integrity of the Kissimmee River.

9.5 FISH AND WILDLIFE RESTORATION ANALYSIS

In the June 25, 1990 *Statement of New Environmental Approaches,* the Assistant Secretary of the Army for Civil Works established the Administration's policy to support the restoration of fish and wildlife habitat resources as a priority objective of Corps water resources projects. This policy is reflected in the Chief of Engineers' *"Strategic Direction for Environmental Engineering"* (February 14, 1990) and the Director of Civil Works' *"Policy Guidance Letter No. 24, Restoration of Fish and Wildlife Habitat Resources"* (March 7, 1991). The annual program and budget requests for the Corps of Engineers civil works activities for Fiscal Years 1992 and 1993 have accorded high priority to the restoration of environmental resources, including fish and wildlife habitat resources.

In developing the Level II Backfilling Plan, the SFWMD defined its planning objective as restoration of the ecological integrity of the Kissimmee River ecosystem. The "ecosystem" approach used by the SFWMD is much broader than the "fish and wildlife restoration" concept of current Federal policy. While fish and wildlife would certainly be the major component of an ecosystem analysis, other components, such as water quality, water supply, recreation and aesthetics, would also be ecosystem objectives. Since these other objectives have their own analytical and procedural requirements (economic evaluation, cost sharing, etc.) for determining the extent of the Federal participation in them (separate from those for fish and wildlife), it was necessary to determine the separable fish and wildlife component of the Level II Backfilling Plan's ecosystem output.

9.5.1 Basis for Federal Fish and Wildlife Planning Objectives

The Federal interest in restoration of fish and wildlife habitat resources is founded in numerous Federal laws and other policy statements that define purposes and programs for Nationally significant resources. These include, but are not limited to, the following:

* *Fish and Wildlife Coordination Act of 1958, as amended*, which encompasses, *"birds, fishes, mammals, and all other classes of wild animals and all types of aquatic and land vegetation upon which wildlife is dependent... Wildlife conservation shall receive equal consideration and be coordinated with other features of water-resource development programs through the effectual and harmonious planning, development, maintenance, and coordination of wildlife conservation and rehabilitation".*

* *Endangered Species Act of 1973, as amended*, which states that *"the purposes of this Act are to provide a means whereby the ecosystem upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species".*

* *Executive Order 11990, Protection of Wetlands*, which requires that each Federal agency, *"shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands, in carrying out its responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities".*

* North American Waterfowl Management Program, which is based on a 1986 agreement between the United States and Canada and is legislatively supported by the *North American Wetlands Conservation Act (Public Law 101-223)*, is an international program to reverse the downward trends in North America's waterfowl populations by protecting and improving waterfowl habitats nationwide, particularly in thirty-four areas within the United States identified as being critical to meeting the Program's goals and objectives. The Everglades Drainage Basin, which includes the Kissimmee Basin, is one of the Program's waterfowl habitats of major concern. Department of the Army support to the Program is set forth in an agreement signed with the Department of the Interior on January 23, 1989.

9.5.2 Fish and Wildlife Problems and Opportunities

These Federal laws and policies embrace a wide variety of fish and wildlife resources present in the historic, existing and future ("without project"; "no action") Kissimmee River. Construction of C-38 converted a riverine and associated wetlands ecosystem into a flood conveyance waterway with predominantly uplands adjacent to it. In order to evaluate the extent of this degradation and the potential for future restoration, the following resource categories were selected as meaningful indicators of the Federal fish and wildlife restoration interest in this study:

* **Wetlands** - Prior to channelization, the Kissimmee River marshlands was a rich mosaic of wetland vegetation, covering about 35,000 acres that supported a diversity of fish and wildlife. Today, only about 14,000 acres remain, dominated by broadleaf marsh with reduced wetland values. No major change in wetland area or values would be expected in the future "without project" condition.

* **Fishery** - The historic Kissimmee River fishery produced about 81,000 pounds (1957 instantaneous measurement). Spawning conditions were excellent, and the survival rate for immature game fish was good. The ratio of rough fish (gar, bowfin) to game fish (bass) was about 2:1. Currently, the central section of the river can produce about 3,000 pounds. Spawning success is good, but there is a poor survival rate for immature bass. The ratio of rough fish to game fish is about 3:1. In the future "without project" condition, fish biomass is not expected to improve.

* **Waterfowl** - The historic wintering population was estimated to be about 12,500 ducks. Since the 1950's, there has been a significant decline in Florida's top three inland duck species: ringneck, pintail and widgeon. The current winter population is estimated to be only 140 ducks, and represents the expected winter population in the future "without project" condition.

* **Wading Birds** - The historic Kissimmee River wading bird population (egret, heron, ibis, etc.) was about 18,000 birds. The current population is about 3,500 birds. That level would be expected to decline in the future "without project" condition.

* **Endangered Species** - Historically the Kissimmee River contained 21,000 more acres of wetlands than currently exist. To the extent that the project will restore these wetlands, a commensurate return of endangered and threatened species numbers dependent on this habitat type is expected to occur.

* **Habitat Value and Extent** - Habitat value and extent is measured in habitat units (HUs) using the U.S. Fish and Wildlife Service's Habitat Evaluation Procedures (HEP). Habitat units for the Kissimmee River were estimated using the suitability requirements of twenty-five fish and wildlife species or species groups over seventeen habitat types. The procedure showed that the Lower Basin historically provided about 340,000 Hus, and was reduced to about 123,000 Hus under existing conditions. In the future "without project" condition, habitat units are expected to decline in the study area.

9.5.3 Federal Interest and Significance of Problems and Opportunities

There are clear and direct interrelationships among these indicators and the laws and policies that define the Federal interest in fish and wildlife restoration:

* *The Fish and Wildlife Coordination Act* covers all fish and wildlife resources, including:

Wetlands and their fish and wildlife values (measured in acres),

Fishery (measured in fish biomass pounds),

Waterfowl (measured in number of individuals in the wintering population),

Wading birds (measured in numbers of individuals in the population), and,

Habitat value and extent (measured in habitat units).

* *The Endangered Species Act* covers Federally listed endangered species and threatened species and their critical habitats.

* *Executive Order 11990, Protection of Wetlands* covers wetlands and their fish and wildlife values (measured in acres).

* The North American Waterfowl Management Program covers waterfowl (measured in number of individuals in the wintering population).

In addition to having a Federal interest, each of these resources is considered to be "significant" as defined by the three significance criteria in the *"Principles and Guidelines"*: technical recognition, institutional recognition, and public recognition.

* Institutional recognition - As described above, the individual resources fall within the scope of at least one of the following Federal laws and policies: *Fish and Wildlife Coordination Act of 1958, as amended; Endangered Species Act of 1973, as amended; Executive Order 11990, Protection of Wetlands; and the North American Waterfowl Management Program.*

* Public recognition - During the course of the first Corps feasibility study, the SFWMD restoration study, and this study, the public has been afforded numerous opportunities to be involved in the formulation and evaluation of alternative plans. Public concerns focused on the river and flood plain ecosystem and its component wetlands and fish and wildlife populations, including the river fishery, waterfowl, and wading birds. The interests that have recognized the importance of these resources span the spectrum of public interest groups, and include both private groups, such as the Sierra Club and the Audubon Society, and public agencies at Federal, State and local levels.

* Technical recognition - The Lower Kissimmee River Basin ecosystem has technical, scientific significance based on its diverse fish and wildlife characteristics. The flood plain has the potential to create winter water characteristics for waterfowl that are virtually unique in the United States. Its maidencane and mixed species wet prairie are critical to both waterfowl and wading birds that range through the region. Most of the basin's fish and wildlife resources were severely degraded, if not eliminated, as a result of the construction of C-38. It is technically feasible to restore most of the diverse natural environmental conditions, and, as a result, many of the fish and wildlife resources that existed before channelization. Scientific experts from throughout the nation have been integrally involved in the planning and evaluation of the Kissimmee River over the past twenty years, and have recognized the scientific basis for the basin's significance. Of particular note were the 1988 Restoration Symposium, sponsored by the SFWMD, which merged the insights and knowledge of over 150 top scientists and engineers into restoration goals and objectives; and the involvement in this study of ecological experts in the Corps, SFWMD, USFWS, and Florida Department of Fish and Game, and Florida DER.

9.5.4 Federal Fish and Wildlife Planning Objectives

Given the degraded condition of the wide range of the Lower Kissimmee River Basin's fish and wildlife resources that resulted principally from the construction of C-38, and the Federal interest in the selected significant resources, the following Federal planning objectives were developed for this study:

* Improve the extent of wetlands in the Lower Kissimmee River Basin, as measured in acres.

* Improve the fishery in the Lower Kissimmee River Basin, as measured in fish biomass.

* Improve the waterfowl resource in the Lower Kissimmee River Basin, as measured in number of individuals in the winter population.

* Improve the wading bird resource in the Lower Kissimmee River Basin, as measured in number of individuals in the population.

* Improve the value and extent of Lower Kissimmee River Basin fish and wildlife habitat, as measured HUs.

Goals to measure success in meeting these Federal fish and wildlife planning objectives are twofold. First, *"Policy Guidance Letter No. 24"* states:

> *"Fish and wildlife restoration consists of measures undertaken to return fish and wildlife habitat resources to a modern historic condition... The goal of fish and wildlife restoration is to reverse the adverse impacts of human activity and restore habitats to previous levels of productivity but not a higher level than would have existed under natural conditions in the absence of human activity or disturbance".*

In this study, those levels would be for the conditions that existed in the decade before the construction of C-38. However, for this study, a second goal was established which required that any plan recommended by the Corps as a result of the study will achieve the same results as the Level II Backfilling Plan unless agreed to by the sponsor. Therefore, a second goal equal to at least the levels of outputs that would be produced by the Level II Backfilling Plan was established. Although this second goal supersedes the goal defined in *"Policy Guidance Letter No. 24"*, this analysis looked at outputs against both goals as a sensitivity check for decision makers. Table 28 displays the goals for the selected resources. (The above stated Federal fish and wildlife planning objectives could be restated to reflect these goals by replacing the introductory word *"Improve..."* with *"Restore the historic level of..."* for the first goal; or with *"Achieve the Level II Backfilling Plan output's level of..."* for the second goal.)

TABLE 28
FISH AND WILDLIFE RESTORATION OBJECTIVES

Fish and Wildlife Resource	Measurement Unit	Modern Historic Condition	Level II Backfilling Plan Outputs
Wetlands	Acres	35,000	29,000
Fishery	Pounds	81,000	46,000
Waterfowl	Individuals in winter population	12,500	12,500
Wading Birds	Individuals in population	18,000	16,000
Habitat Value and Extent	Habitat Units (Hus)	340,000	285,000

9.5.5 Options for Meeting Federal Fish and Wildlife Planning Objectives

Given the Federal fish and wildlife planning objectives, and the goals for meeting these objectives, options for meeting the objectives were identified. These options were limited to those that had been previously considered during the SFWMD's 1990 restoration study, which drew on the plan formulation experience and results of the first Corps feasibility study. Both of these studies included extensive investigations of a wide variety of management measures and design concepts that would produce a range of fish and wildlife outputs. Therefore, although the list of options considered in this analysis is not extensive, it uses the most effective options from the previous studies which were exhaustive in their consideration of planning and design measures. For this analysis, options for meeting the Federal fish and wildlife planning objectives are:

* **Fixed Weir Option,**
* **Gated Weir Option,**
* **Plugging Option,**
* **Level I Backfilling Option, and**
* **Level II Backfilling Option.**

Previous sections of this report presented detailed descriptions and maps of these options, and should be consulted for more information about their construction and operation.

9.5.6 Evaluation of Options

Each of these options was evaluated against the goal of restoring the modern historic condition, as shown in Table 29, and against the goal of accomplishing the Level II Backfilling Plan outputs, as shown in Table 30. These evaluations indicated:

* The "without project" condition will not return resource levels previously experienced in the historic condition, nor will it lead to resource conditions expected to occur with the Level II Backfilling Plan.

* Four options, while different in technique, are essentially identical in accomplishment - fixed weir, gated weir, plugging, and the limited Level I backfilling. With the exception of fishery resources, which these options would degrade due to adverse water quality effects, these options would represent only a moderate improvement over the "without project" condition.

* The remaining option - the Level II Backfilling Plan - would produce the highest levels of fish and wildlife resources, and would therefore make the greatest contribution to the priority output of fish and wildlife restoration. Since the Level II Plan was initially formulated and designed (during the SFWMD restoration study) to address the full range of ecosystem values, it will provide outputs for all fish and wildlife.

This analysis has shown that, given a range of fish and wildlife resources in the Lower Kissimmee River Basin, the Level II Backfilling Plan, as developed by the SFWMD and modified by the Corps of Engineers is the most effective comprehensive plan for restoration of the Kissimmee River fish and wildlife values.

TABLE 29
PERCENT OF MODERN HISTORIC FISH AND WILDLIFE CONDITIONS RESTORED

Fish and Wildlife Resources	"Without Condition"	Fixed Weir	Gated Weir	Plugging	Level I Backfilling	Level II Backfilling
Wetlands (acres)	40%	49%	49%	49%	49%	83%
Fishery (lbs.)	4%	5%	5%	5%	4%	57%
Waterfowl (individuals in winter population)	1%	4%	4%	4%	4%	100%
Wading Birds (individuals in population)	< 19%	56%	56%	56%	56%	89%
Habitat Value and Extent (Habitat Units)	< 36%	36% - 50%	36% - 50%	36% - 50%	36% - 50%	84%

Note: Percentages are based on data from Table 26.

TABLE 30

PERCENT OF LEVEL II BACKFILLING PLAN
FISH AND WILDLIFE OUTPUTS ACCOMPLISHED

Fish and Wildlife Service	"Without Condition"	Fixed Weir	Gated Weir	Plugging	Level I Backfilling	Level II Backfilling
Wetlands (acres)	48%	59%	59%	59%	59%	100%
Fishery (lbs.)	7%	9%	9%	9%	7%	100%
Waterfowl (individuals in winter population)	1%	4%	4%	4%	4%	100%
Wading Birds (individuals in population)	< 22%	63%	63%	63%	63%	100%
Habitat Value and Extent (habitat units)	< 43%	43% - 60%	43% - 60%	43% - 60%	43% - 60%	100%

Note: Percentages are based on data from Table 26.

9.6 INCREMENTAL ANALYSIS

Corps policy requires an incremental cost analysis to be performed for all plans recommending Federal participation in a water resources development project, including fish and wildlife restoration projects. The purpose of such analyses is to assure that all features of the Recommended Plan are justified based on both monetary (dollars) and non-monetary (environmental quality) factors. The following analysis is designed to aid reviewers and decision makers in understanding the fish and wildlife habitat restoration objective of this study, and the rationale used to support and justify each feature (increment) included in the Recommended Plan.

Incremental analysis requires that fish and wildlife resources be inventoried and grouped into resource categories as meaningful indicators of

their relative significance from a national, regional and local perspective. The high, ecological significance of the Kissimmee River Basin has been well documented in this report. Planning objectives are developed to reflect specific problems and opportunities to be addressed during the study. In this instance, the objective of the study is to determine the most cost effective, justified means to restore degraded ecological conditions (expressed in fish and wildlife habitat quality) of the Kissimmee River.

Based on established planning objectives, suitable fish and wildlife management measures are identified. Candidate management measures identified and evaluated during this study focused on means to restore the river basin's historic hydrological conditions that directly and indirectly influence the area's fish and wildlife habitat quality. Selected management measures are analyzed to determine if they can function independently, or if they must be combined with other management measures to form independently functioning units. Each management unit, comprised of one or more management measures, are considered separate increments for analysis purposes. The monetary cost for implementing each management unit (increment) must be determined.

Also, the environmental output (performance) attributed to each management unit must be established. These two factors form the basis for performing incremental cost analysis, where the costs of implementing the management measures are measured in dollars, and the benefits reflected in other non-monetary units of measure, such as fish and wildlife habitat quality units. Once costs have been estimated for the plan increments, they must be arrayed from lowest to highest cost per unit of output. The purpose of incremental analysis is to discover and display variations in costs for producing a given unit of output, and to assure the recommended plan consists of the most cost effective, justified management measures required to produce the least cost plan responsive to established planning objectives.

During both the Corps' first feasibility study and the SFWMD's restoration study, much consideration was given to the cost effectiveness of restoration increments and the reasonableness of scope of each alternative restoration plan. During the more recent restoration study, which produced the alternative plans evaluated in this feasibility study, the SFWMD team of engineers and scientists gave extensive consideration to incremental analysis through an implicit approach, though it was not termed as such in the 1990 *Restoration Report*. The following paragraphs describe the incremental cost analysis performed for this study, and fully utilizes information developed during previous Corps and SFWMD studies.

9.6.1 Fish and Wildlife Resources Categorization

Construction of C-38 converted a riverine and associated wetlands flood plain ecosystem into a flood conveyance waterway which dramatically altered its historic fish and wildlife habitat quality. In order to evaluate the extent of this degradation and the potential for future restoration, numerous resource categories were selected as meaningful indicators of fish and wildlife habitat quality. The following incremental cost analysis uses habitat quality and quantity for selected fish and wildlife species as a surrogate for a wide range ecological values attributed to the area's ecosystem.

Habitat quality determination were measured using the USFWS's Habitat Evaluation Procedures (HEP). Habitat units for the Kissimmee River were estimated using the suitability requirements of twenty-five (25) fish and wildlife species or species groups for seventeen (17) habitat types that represent pre-project (1962) conditions, as presented in the *Fish and Wildlife Coordination Act Report* in Annex E.

9.6.2 Significant Net Losses

The Habitat Evaluation Procedure showed that the Lower Basin historically provided about 340,000 average annual habitat units (AAHUs), and was reduced to about 123,000 AAHUs under existing conditions. This represents a loss of approximately 217,000 AAHUs (65%), and ongoing degradation is expected to continue in the "without project" condition. The significance of these losses were determined by established procedures based on the resource's technical, institutional, and public recognition, as described previously in sub-section *9.5.3, Federal Interest and Significance of Problems and Opportunities.*

9.6.3 Planning Objective

Given the highly degraded condition of the Kissimmee River Lower Basin's ecosystem that resulted principally from the construction of C-38, and the established significance of these losses, numerous restoration planning objectives were developed for this study. However, as stated above, fish and wildlife habitat quality/quantity values were used in this analysis as a surrogate to reflect broader ecological values attributed to this Basin. Therefore, the restoration planning objective is: restore the loss of 217,000 AAHUs representing the seventeen major habitat types historically found in the Kissimmee River Lower Basin prior to 1962.

9.6.4 Unit of Measurement

The output of plan increments are described in the same units of measurement (AAHUs) used to calculate specific fish and wildlife resource losses, and to determine restoration planning objectives.

9.6.5 Potential Strategies

Each selected management measure must show potential for contributing towards meeting the stated restoration planning objective, and must be placed in functionally independent management units (increments) as described above. Table 20 lists 13 components of the recommended plan. Out of these, the following three are management measures that could be implemented independently, and therefore analyzed separately:

* Outlet reach modifications
* Pool B weir modifications
* Paradise Run

The remaining ten components can not be implemented individually and must be combined either to function properly, or to maintain flood protection caused by changes in the flood plain's hydrology. Four of the components are functionally dependent as follows:

* Backfilling - dependent on land interests which are necessary to convey the water for all project purposes (flood control, navigation, and environmental restoration). Backfilling could not be constructed unless interests were acquired in the necessary lands.

* Land Interests - dependent on backfilling to realize the benefits of reflooding these land interests. Land interests would not be acquired if the hydrologic conditions created by backfilling were not established.

* Bridge Crossings - dependent on backfilling being constructed to realize any environmental benefits. Bridge crossing would not be necessary if the flood plain conveyance caused by backfilling did not occur.

* Revegetation - dependent on backfilling since it would only be necessary as result of the construction (as previously described, this component was eliminated from the recommended plan).

The final six management measures are required to maintain flood protection because of the changed hydraulic conditions caused by backfilling and would not be required if backfilling did not occur:

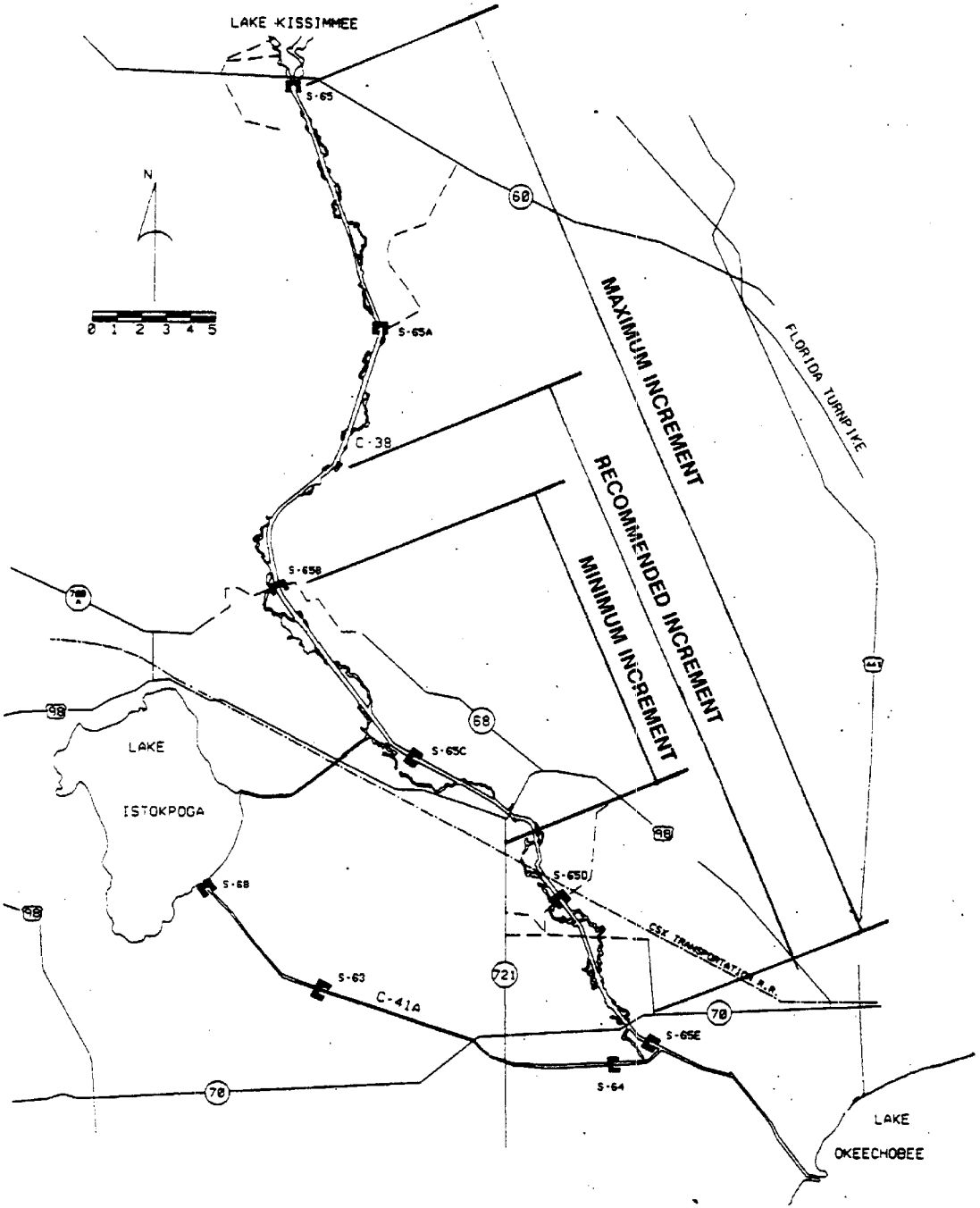
* Tributary modifications.
* S-65 by-pass weir and channel.
* S-65A modifications.
* Removal and degradation of S-65B, C, and D spillways, locks, tieback levees, and buildings.
* S-65E modifications.
* Local levee modifications.

Refer to the previous sub-section (Modifications to the Level II Backfilling Plan) for more detail.

None of the three independent management measures (outlet reach modifications, Pool B weir modifications, Paradise Run) were analyzed in further detail. The data on environmental outputs for the outlet reach and Pool B weir modifications which is needed for incremental analysis is not available at this time. As previously discussed, the outlet reach modification and the Pool B weir modifications will be analyzed in detail during later studies to determine the hydraulic and environmental effects. In the absence of this data, these measures have been identified as locally preferred features, and if implemented they will be a non-Federal cost. In addition, since there is currently no non-Federal sponsor for Paradise Run, this feature was dropped from further consideration prior to obtaining the environmental data needed for incremental analysis.

In addition, to define functionally independent management units (increments), further incremental cost analyses were conducted for alternative lengths of backfill. This analysis was required to demonstrate that the study identified, and the Corps recommended, the most cost effective, justified plan to accomplish the stated restoration planning objective. Three alternative lengths of backfill were analyzed. For clarity, each length is described and analyzed as an independent increment even though they also can be considered alternative plans. These three plan/increments are as follows: the Minimum Plan/Increment - "1" (15 miles of backfill), the Recommended Plan/Increments - "1+2" (an additional 14 miles of backfill, totaling 29 miles), and the Maximum Plan/Increments - "1+2+3" (an additional 19 miles of backfill, totaling 48 miles). Figure 30 shows the locations of these increments. These increments were defined based on engineering constraints and major changes in costs required to implement the management measures included in the increment.

In this analysis, the financial costs of plan increments are defined in two general categories: fixed costs and variable (incremental) costs. Variable costs generally consist of costs that are a direct function of the length of C-38 to be backfilled, and include the costs of backfill construction and adjacent lands needed for restoration and flood control purposes. These variable costs are assumed to be approximately the same for each mile of backfill, but would be different for each plan increment since they would change as the extent of backfilling changes.



PLAN INCREMENTS

FIGURE 30

Fixed costs consist of costs for essential project features that must be implemented in order for backfilling to be possible. Two major groups of fixed costs were identified for this analysis. First, in order to fill even one mile of C-38, it would be necessary to acquire re-flooding rights along the upper Pool B and Pool A areas that would be affected by backwater from any blockage of the canal. The fixed cost for this initial essential feature, which would be included in any increment, is estimated to be about $106 million. A second group of fixed costs would be incurred if backfilling extends upstream from about the middle of Pool B. Above that point, backfilling would cause Lake Kissimmee outlet channel backwater effects to extend upstream of S-61 or S-63A in the Upper Basin, and, consequently, there would be an extraordinary increase in costs to mitigate induced backwater flooding effects to the high level of development and infrastructure in the more populated areas of the Upper Basin. These fixed Upper Basin costs, which are estimated to be about $894 million, would become another fixed cost component for all increments causing Upper Basin backwater effects. All increments assume that the Headwaters Revitalization Project is in place in the without condition; therefore, its fixed costs are not included for the purpose of this analysis.

Although, in theory, it would be technically and financially possible to implement any length of backfilling, environmental requirements bracketed the range of plan increments considered. As previously discussed (see Section 8, "Formulation of Alternative Plans: South Florida Water Management District Restoration Study"), the SFWMD restoration study determined that the minimum area needed to restore a functioning ecosystem with a full complement (mosaic) of fish and wildlife habitats is about 25 square miles in size. While smaller areas could be created, they would lack the essential critical mass of physical, hydrologic, and biological characteristics necessary for ecological integrity, and therefore would not have met the SFWMD's restoration goal. This report supports that conclusion. Further analyses (see below) indicated that about 15 miles of backfilling would be needed to create the minimum 25 square mile area; therefore, 15 miles would be the minimum backfilling increment. The recommended backfilling increment was established by an analysis of fixed project costs and was found to be 29 miles in length. The maximum backfilling increment is limited by the length of Kissimmee River that is channelized in C-38, which is about 48 miles.

9.6.6 Plan Increments and Costs

As discussed in the previous section, properly defining plan increments is critical to incremental analysis.

9.6.6.1 Minimum Plan/Increment "1"

As previously discussed, the minimum area needed to restore a self sustaining, functioning ecosystem with a full complement of fish and wildlife habitats is 25 square miles. Based on the assumption that the distribution and functionality of major habitat types in the pre-channelization ecosystem would be reestablished, as verified by the Demonstration Project studies, the optimum placement of this minimum area would include all of Pool C and the northern half of Pool D up to about one mile south of U.S. Highway 98. About 15 miles of C-38 would need to be backfilled to produce this Minimum Plan Increment, leaving 41 miles of canal intact. The Minimum Plan Increment also would include necessary structural modifications and land requirements.

Pool C includes a fairly complete complement of the pre-channelization habitat types, but lacks a significant cypress-wetland hardwood and switchgrass component, as shown in Table 1. Cypress wetlands provide high quality habitat for river otter, limpkin, alligator, and the endangered wood stork, while switchgrass is a transitional wetland-upland habitat of particular importance to species such as bobcat and snipe (see habitat suitability index values for these habitats in the Habitat Evaluation Procedures analysis). Inclusion of part of Pool D in the Minimum Plan Increment would reclaim some of the largest remaining patches of cypress and wetland hardwoods, as well as switchgrass habitat. The Minimum Plan Increment would restore about 27 miles of river channel, and about 25 square miles of ecosystem, including 53 percent of the broadleaf marsh, 17 percent of the wet prairie, 18 percent of the wetland shrub, 33 percent of the forested wetlands, 12 percent of the switchgrass, and 32 percent of the open water river habitat that occurred in the pre-channelization ecosystem as shown in Table 31. About 79,000 AAHUs would be provided by the Minimum Plan Increment as shown in Table 32. This represents approximately a 36 percent contribution to the restoration planning objective (217,000 AAHUs).

The Minimum Increment would have a fixed cost of about $106 million and a variable cost of about $101 million, for a total cost of about $207 million. The average annual cost for Increment 1 would be $18,751,000.

9.6.6.2 Recommended Plan/Increments "1+2"

The next largest plan increment is the increment represented by the Recommended Plan. This would consist of backfilling C-38 from the middle of Pool B to the middle of Pool E (a distance of about 29 miles), as well as related structural modifications and land requirements. This represents an additional 14 miles of backfill over Increment 1.

The basis for defining the additional backfilling that this increment would provide over Increment 1 was established by an analysis of project costs, and the assumption that environmental outputs would increase linearly with

increases in miles of backfilling. Additional variable costs of the added increment beyond Increment 1 would be proportional to the environmental outputs that would result from the backfilling of each additional mile of C-38. Since the initial fixed cost (flooding rights for the backwater affected area) is already included in the cost of Increment 1, the unit costs of restoration decrease as each additional mile of backfill is added.

The unit cost of ecosystem restoration would continue to decline as increments of backfilling are added, until it reached the upstream point where backfilling caused the Lake Kissimmee outlet channel backwater effects to extend upstream of S-61 or S-63A in the Upper Basin - that is, the point where the second major fixed cost is incurred, as described below under the Maximum Plan/Increment discussion. At this point, unit costs would increase dramatically due to the addition of the second major fixed cost. The Recommended Plan/Increment ends just before this point, in the middle of Pool B, at the estimated location where any additional upstream backfilling would induce Upper Basin backwater flooding effects and incur the second major fixed cost, while environmental benefits (AAHUs) would continue to increase linearly, i.e., at a constant level for each mile of backfill. This stopping point location is a planning estimate, and is subject to evaluation and adjustment based on the results of the hydraulic monitoring program to be conducted concurrent with construction.

Backfilling Increment 2 would restore an additional 14 miles of C-38 would leave about 27 miles of C-38 intact and result in an additional 29 miles of restored river channel. In the restored reach between mid-Pool B and mid-Pool E, an additional 25 square miles of ecosystem, including an additional 39 percent of the broadleaf marsh, 35 percent of the forested wetlands, 61 percent of the wet prairie, 52 percent of the switchgrass, 33 percent of the wetland shrub, and 50 percent of the open water river habitat from Increment 1, as shown on Table 31. Figure 31 displays the restored acres in graphic form. Therefore, the Recommended Plan Increment would restore twice the wetland acreage as the Minimum Increment Plan. Compared to the Minimum Plan Increment, the additional restoration of the remainder of Pool D and portions of Pools B and E would be of particular value in reclaiming significant patches of the habitat types that had the most restricted distributions in the pre-channelization ecosystem. These include wetland hardwood, cypress, switchgrass, and maidencane habitats. The maidencane acreage in Pool B includes the largest remaining Rhynchospora prairie, which would be of particular importance to waterfowl (see habitat suitability index values for this habitat in the Habitat Evaluation Procedures analysis in Annex E). Increment 2 would provide about 96,000 AAHUs above Increment 1, for a total of 175,000 AAHUs for the Recommended Plan. This increment/plan would restore

approximately 80 percent of the 217,000 AAHUs required to accomplish the stated restoration planning objective as shown on Table 32.

The Recommended Plan Increment would have a fixed cost of about $106 million and a variable cost of about $254 million, for a total cost of about $360 million. The average annual cost for the Recommended Plan Increment would be $32,114,000, an increase of $13,363,000 over the Minimum Plan Increment. Therefore, the marginal cost for Increment 2 is $13,363,000.

9.6.6.3 Maximum Plan/Increments "1+2+3"

The Maximum Plan Increment would consist of backfilling the entire 48 mile length of C-38 between Lake Kissimmee and Government Cut, as well as related structural requirements and land requirements. This additional 19 miles of backfill would most fully restore the basin's historic physical characteristics and maximize a functional ecosystem in the Lower Kissimmee River Basin. Backfilling 48 miles would leave 8 miles of C-38 intact (Government Cut) and result in 103 miles of restored river channel, producing an estimated 70 square miles of restored ecosystem in the Lower Basin. While it is not possible to exactly duplicate the pre-channelization ecosystem, the Maximum Plan Increment would result in the fullest restoration of the complete complement of the Lower Basin's wetland habitats. Backfilling Increment 3 would restore an additional 20 square miles of ecosystem, including an additional 8 percent of the broadleaf marsh, 31 percent of the forested wetlands, 21 percent of the wet prairie, 36 percent of the switchgrass, 49 percent of the wetland shrub, and 18 percent of the open water river habitat above the Recommended Plan Increment as shown on Table 31. Increment 3 would provide 44,000 AAHUs above the Recommended Plan Increment, for a total of about 217,000 AAHUs for the Maximum Plan Increment.

Furthermore, as discussed above, the Maximum Plan Increment also would induce extensive flooding of residential properties around the Upper Basin lakes and would therefore require additional real estate interests in the affected properties. Therefore, fixed costs to mitigate this effect are significantly greater for this increment. The Maximum Plan Increment would have a total fixed cost of about $1 billion and a variable cost of about $432 million, for a total cost of about $1.432 billion. The average annual cost for the Maximum Plan Increment would be $127,402,000, an increase of $95,288,000 over the Recommended Plan Increment. Therefore, the marginal cost for Increment 3 is $95,288,000.

TABLE 31

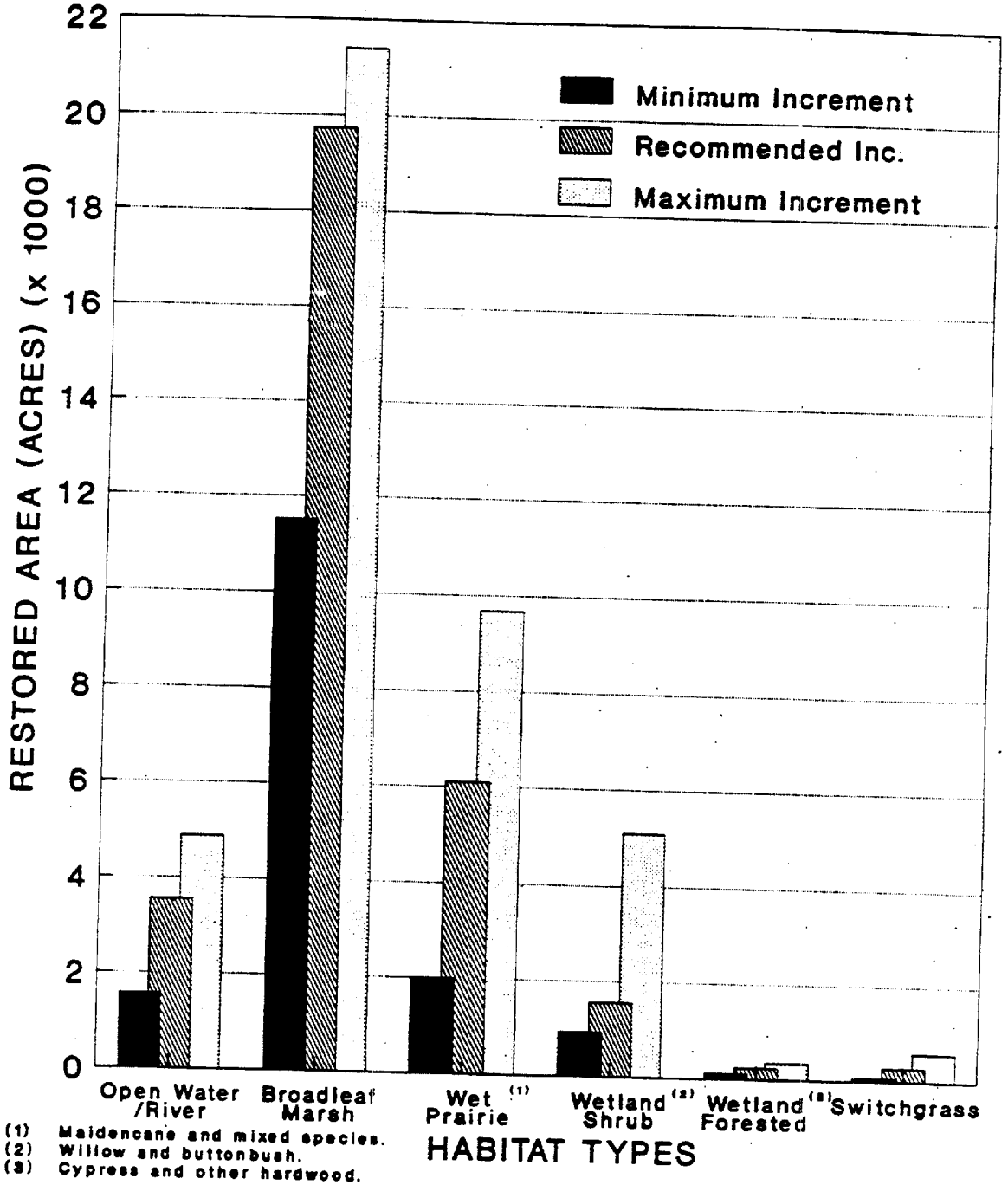
PROJECTED ACREAGE OF RESTORED HABITATS

Habitat Types	Planning Objective (Acres)	Minimum Increment		Recommended Plan Increment				Maximum Plan Increment			
		Contribution to Objective "1" (Increment 1)		Contribution to Objective (Increment 2)		Total Performance "1+2" (Recommended Plan)		Contribution to Objective (Increment 3)		Total Performance "1+2+3" (Maximum Plan)	
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Open Water/River	4,801	1,536	32	2,421	50	3,957	82	844	18	4,801	100
Broadleaf Marsh	19,767	10,476	53	7,757	39	18,233	92	1,534	8	19,767	100
Wet Prairie	9,060	1,540	17	5,609	61	7,149	78	1,911	21	9,060	100
Wetland Shrub	5,386	969	18	1,776	33	2,745	50	2,641	49	5,386	100
Wetland Forested	429	141	33	151	35	292	68	137	31	429	100
Switchgrass	444	53	12	231	52	284	64	160	36	444	100

TABLE 32

UNIT COSTS OF BACKFILLING INCREMENTS

	Minimum Plan Increment (Increment 1)	Recommended Plan Increment		Maximum Plan Increment	
		Increment 2	Total "1+2"	Increment 3	Total "1+2+3"
AAHUs	79,000	96,000	175,000	44,000	219,000
Cost (x $1,000)	18,751	13,363	32,114	95,288	127,402
Unit Cost ($/AAHUs)	237	139	184	2,166	581



HABITATS RESTORED BY INCREMENTS

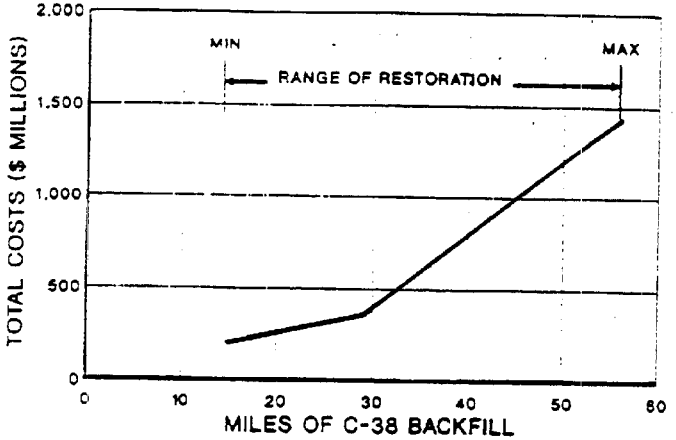
FIGURE 31

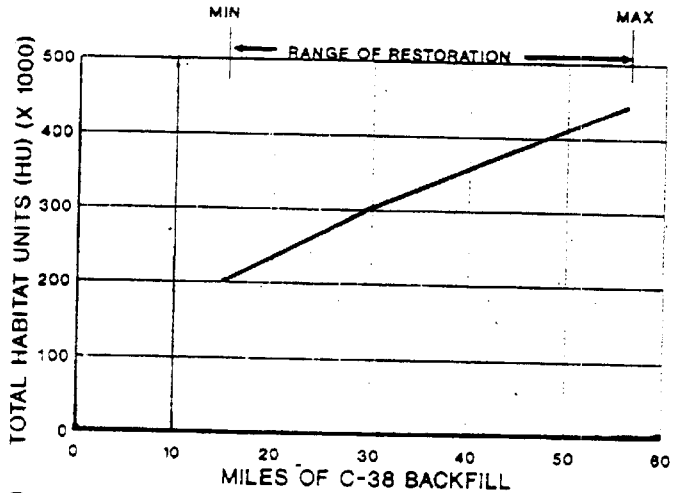
9.6.7 Incremental Costs Displayed

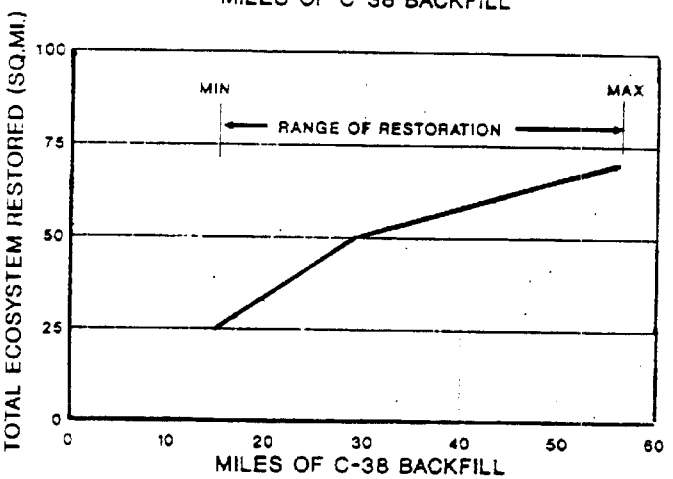
Figure 32 displays estimated financial costs and environmental outputs, in habitat units and square miles of restored ecosystem, over the 15 - 48 mile range of backfilling considered in this incremental analysis. Figure 33 displays unit costs for habitat units and square miles of ecosystem restored in line graphs; Figure 34 displays unit costs in bar charts.

The information presented in the figures shows that the Recommended Plan Increment has the lowest unit cost over the range of backfilling considered; and, based on the assumptions and limited data used in the analysis, is the most cost effective plan increment for producing fish and wildlife outputs in the Lower Kissimmee River Basin. In addition to what can be demonstrated through this analysis, it is expected that additional fish and wildlife outputs will accrue well beyond the levels that would result based on the generally linear outputs-to-backfilling relationship assumed here. These greater outputs will occur as more miles of C-38 are backfilled, and more area of ecosystem is restored and numbers of species increase. This relationship between species richness and area has been demonstrated repeatedly in island biogeography studies. Moreover, through restoration of a naturally functioning ecosystem, including the complex physical, chemical and biological processes and interactions that led to temporal and spatial habitat heterogeneity, diverse food webs, and stable energy flow in the pre-channelization system, ecosystem-level benefits will emerge.

Perhaps the most important of these emergent properties is resilience, which enables plant and animal species to withstand both natural and human disturbances and survive in a highly variable environment. Natural ecosystems have an intrinsic buffering capacity that preserves species and their interrelationships. Because species richness and the ability of natural ecosystems to provide resilience and buffering capacity both increase with the size of the ecosystem, the outputs-to-backfilling relationship will tend to increase exponentially rather than linearly. In this sense, the incremental analysis is conservative and underestimates the likely level of fish and wildlife outputs from restoration through backfilling.

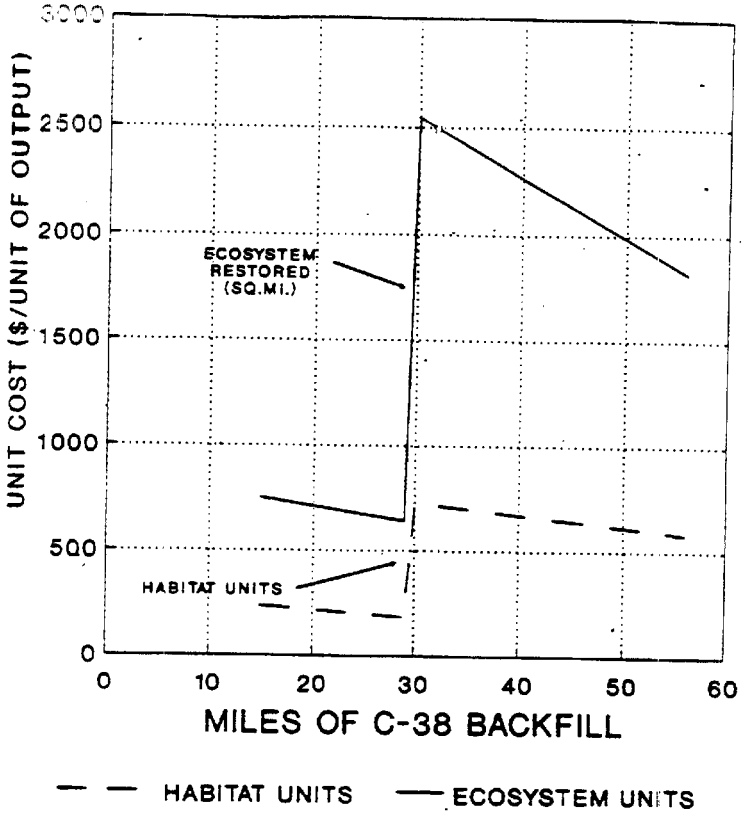






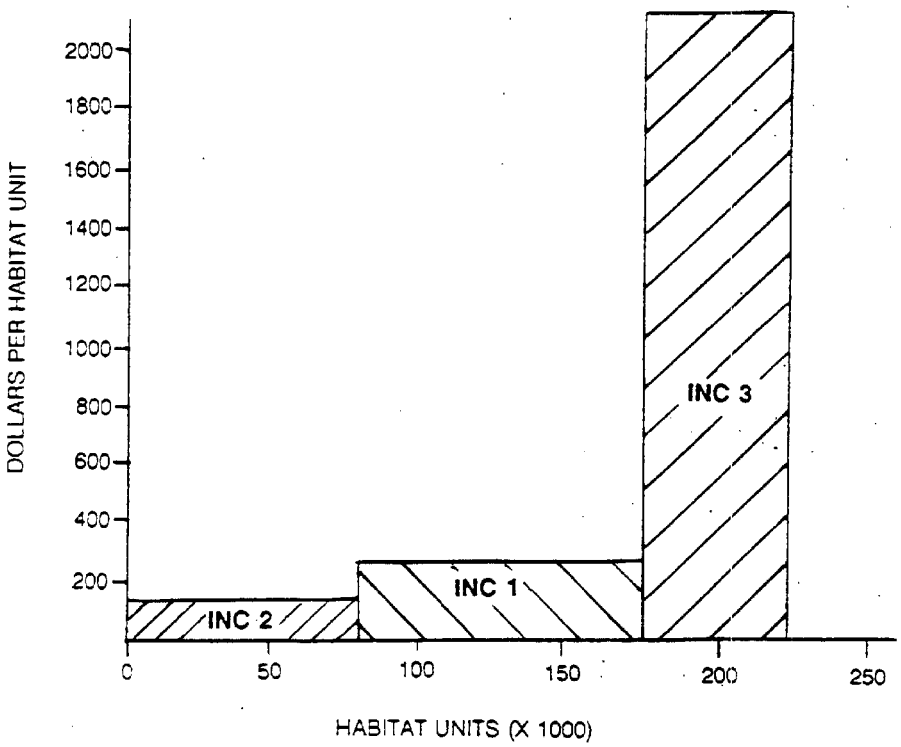
UNIT COST AND OUTPUTS OVER THE RANGE OF BACKFILLING INCREMENTS

FIGURE 32



UNIT COSTS OVER THE RANGE OF BACKFILLING INCREMENTS

FIGURE 33



UNIT COSTS OF BACKFILLING INCREMENTS

FIGURE 34

9.7 MODIFIED LEVEL II BACKFILLING PLAN

The Modified Level II Backfilling Plan that resulted from the previous analyses is described in detail in the next section of this report. The modified plan consists of backfilling about 29 miles of C-38; excavating about 11.6 miles of new river channel; constructing a bypass weir and channel at S-65; shallowing and construction of weirs in the Lake Kissimmee outlet channel reach; modifications of the Pool B weirs, and S-65A and S-65E structures; construction of containment levees, bridge crossings at U.S. Highway 98 and the CSXT Railroad, and new structures in Pool E; removing the existing S-65B, S-65C and S-65D structures, and local levees; and installation of navigation channel markers. About 67,843 acres of land will be acquired in fee or easement to meet restoration needs and preserve flood control in the Lower Basin. A number of residences, businesses, and farms may need to be relocated. Boat launching ramps, and utilities will be relocated.

9.8 EVALUATION OF MODIFIED LEVEL II BACKFILLING PLAN

Descriptions of the effects of the modified Level II Backfilling Plan are included in Tables 21 - 27. As shown in these displays, the modified plan would be expected to provide essentially the same level of outputs and other effects that would result from the basic Level II Backfilling Plan developed by the SFWMD. Effects will be:

9.8.1 Physical Form

The modified Level II Backfilling Plan will create a more natural physical environment in the lower Kissimmee River. It is not feasible to fully restore the 103 miles of historic river which meandered, often through braided and ill-defined channels, from Lake Kissimmee to the upstream end of the Government Cut at the lower end of the river. However, backfilling 29 miles of C-38 and excavating 11.6 miles of new river channel will restore about 56 miles of continuous, more natural river. About 16 miles of C-38 will remain above the restored area in Pools A and B; 11 miles will remain below the restored area; and about 16 miles of oxbows - remnants of the original pre-channelization river - will remain isolated across the flood plain. Pre-channelization river characteristics, including slope and multiple, meandering channels, are expected to eventually reestablish across the flood plain.

9.8.2 Hydrology

The Upper Basin's Headwaters Revitalization Project will provide flows to the restored Kissimmee River approaching the duration and variability of

discharges which occurred before the river was channelized. Minimum flows are expected to exceed 250 cfs about 95 percent of the time, compared to the current flows which are less than 30 cfs 50 percent of the time. Maximum velocities for the restored channel would be between 1.8 and 2.0 feet per second during bankfull stage, and the stage recession rate should rarely exceed one foot per month. Over bank flooding will occur within the restored area when discharges exceed 1,400 - 2,000 cfs. Average flood plain velocities would be on the order of 0.2 to 0.4 feet per second.

Based on historic stage-duration hydrologic data and expected future flows from Lake Kissimmee, overbank flooding of the river valley will start in July or August, reach a peak from September through November, and gradually recede from December through June. Very wet or dry years and storm events will vary this pattern. Depth of overbank flow may be as much as six feet near the river at the peak in a wet year, to only a few inches at the outer edge of the flood plain. Sheet flow should be constantly moving outward and inward, and south toward Lake Okeechobee. Potholes and backwater sloughs will be cut off from the river when it is flowing within bank.

Tributary inflows within the Lower Kissimmee Basin were generally evaluated to assess impacts of river restoration. Model results show that while stages within the tributaries were higher as a backwater effect of river restoration, these differences in stage were determined to be negligible. As an example, the stage at Lake Istokpoga Canal increased by 0.14 feet, while the stage at Pine Island Slough increased by 0.06 feet.

9.8.3 Environmental Resources

Restoration of the altered physical and hydrologic determinants of ecological integrity, through backfilling and the other features and operation of the modified plan, will lead to reestablishment of the natural structure and functioning of the Kissimmee River ecosystem. This, in turn, will lead to reestablishment of most of the fish and wildlife and other biological attributes of the pre-channelization ecosystem. The former expectation is based on well-established ecological principles relating to factors that govern the development and organization of ecosystems. The later expectation was verified by the reestablishment of biological attributes that occurred during the SFWMD Demonstration Project, despite the limited extent to which that project actually restored the lost determinants of ecological integrity. A complete description of the results of the Demonstration Project is presented in Section 8.

A measure of the modified plan's success is the amount of ecosystem that it will restore. This can be quantified by determining the area over which the lost or altered determinants of ecological integrity are reestablished. Because

this restored area will be driven by the same forces that formed and maintained the pre-channelization river and flood plain, the restored ecosystem can be expected to reorganize with an ecological structure which provides the same environmental values and supports a similar complement of species, including fish and wildlife, as the historic Kissimmee River ecosystem. Thus, the benefits of ecosystem restoration will involve all species, including transient and migratory species, within this geographic area which use habitats provided by the natural river and flood plain. Ecosystem restoration also will have implicit functional benefits, including attributes relating to water quality, energy flow, and other ecological processes and interactions. For a further discussion of this aspect of restoration, see "An Ecosystem Perspective on Restoration Benefits" (Toth, 1991) in Annex D.

Other quantitative procedures for measuring the modified plan's environmental outputs provide measurements of subsets of ecosystem restoration, and are based on similar assumptions and expectations. In all procedures, projections of environmental outputs assume that provision of appropriate habitat or select habitat parameters will result in favorable responses by fish and wildlife that use that habitat. The most comprehensive of these other procedures is the Habitat Evaluation Procedure (HEP). For this feasibility study, the HEP analysis, conducted by an interagency team of ecologists under the direction of the U.S. Fish and Wildlife Service, analyzed the effects of the plan on twenty-five species or taxonomic groups of fish and wildlife from the Lower Kissimmee River Basin. The HEP analysis concluded that the Recommended Plan will result in a net increase of about 162,000 habitat units, for a basin total of about 285,000 habitat units.

The results of other, more traditional measures of environmental outputs, such as acres of wetlands, acre-days of winter water, and duck populations, also show that, with the plan in place, resource conditions would be expected to improve across the entire range of fish and wildlife outputs considered, including:

* **Wetlands** - While over 3,800 acres of existing wetlands are not expected to change significantly, about 10,200 acres of other existing wetlands will be rejuvenated and will have increased functional values, and over 15,000 acres of new wetlands will quickly respond to restored river flows and will reestablish in the flood plain. An estimated 29,000 acres of wetlands will result as shown on Table 33. Restoration of wet prairie will be particularly important to dabbling ducks and shallow water feeding wading birds. As water recedes from these wet prairies, they also will be heavily used by probers such as snipe and glossy ibis. Because it is generally the easiest to fill or drain, this habitat type has been severely reduced in the basin and throughout the state of Florida.

TABLE 33
ACREAGE OF WETLAND HABITATS IN THE
KISSIMMEE RIVER FLOOD PLAIN WITH THE RECOMMENDED PLAN*

TYPE	POOL A	POOL B	POOL C	POOL D	POOL E	TOTALS
WETLAND FORESTED						
Cypress	0	109	40	105	38	292
WETLAND PRAIRIE						
Rhynchospora	0	460	0	0	0	460
Aquatic Grass	493	1372	884	1262	674	4685
Maidencane	815	1111	65	0	0	2004
WETLAND SHRUB						
Buttonbush	395	80	178	0	4	657
Primrose Willow	112	24	0	0	3	139
Willow	580	662	447	178	81	1949
BROADLEAF	59	3949	7293	5084	1848	18233
SWITCHGRASS	117	80	17	70	0	284
TUSSOCK	19	28	0	0	57	103
TOTALS	2590	7875	8924	6699	2718	28806

*From U.S. Fish and Wildlife Service, 1991.

Much of the pre-channelized flood plain of the Kissimmee was dependent on overland flow to maintain its varied wetland communities. That characteristic has been completely lost in the existing condition of short hydroperiods and impounded wetlands. The modified Level II Backfilling Plan will provide 326,474 acre-feet of overland flows. The topography indicates that water on the flood plain will average less than three feet, and a flow-through turnover between three-to-one and five-to-one should be realized. No other marsh-wet prairie flood plain ecosystem in Florida has this potential.

In Florida, winter water is water one foot or less in depth between 1 December and 1 March; it is measured in acre-days. The North American Waterfowl Plan identifies a critical need to restore wetlands of value to

waterfowl in the Everglades drainage system. In the south, the most urgent need is generally for shallow winter water. The modified Level II Backfilling Plan is estimated to produce about 327,000 acre-days of winter water. This means there should be a shallow pool less than one foot in depth covering 3,600 acres on an average day in an average winter. During some years this winter water pool will be over 5,000 acres. This will be particularly important for migrating dabbling ducks and the non-migrating mottled duck. Given the topography of the flood plain and the stage duration curves, this pool should be largest between August and October, and will gradually disappear between February and May. The declining pool in late winter and spring is also ideal for foraging wading birds, including the Federally endangered wood stork. These birds nest in this period and need large quantities of food concentrated relatively near nesting sites.

Some limited wetland losses will be unavoidable with the project. About 6.6 acres of existing wetlands, as well as 48 acres of existing pasture, will be lost by the construction of the containment levees and related structures. The temporary bypasses for U.S. Highway 98 and the CSXT Railroad causeway will be constructed on existing spoil mounds which are adjacent to wetlands and support saltbush, willow and wax myrtle. While the bypasses will eliminate existing vegetation, the site will be regraded after construction is complete to restore the original wetland elevations.

* **Fish** - Improved habitat diversity and quality, higher and consistent dissolved oxygen, and an abundance of forage organisms are expected to restore the river fishery to its pre-channelization levels. Improved water quality and habitat are expected to increase the game fish (bass) to rough fish (bowfin and gar) ratio to about two-to-one, and restore forage fish and fresh water shrimp populations. These forage species will be exported slowly to the river as water levels on the flood plain recede.

* **Waterfowl** - The restored Kissimmee River wetlands also will support an estimated population of about 12,500 ducks, which would be a significant increase over the future "without project" population of less than 200 individuals.

* **Wading Birds** - The limited restoration of wetlands produced by the SFWMD Demonstration Project in Pool B resulted in a tenfold increase in wading birds (exclusive of cattle egrets). The modified Level II Backfilling Plan is expected to provide habitat that will support a population of about 18,000 wading birds, also a significant increase over the 3,500 population expected in the "without project" condition. The expected winter water conditions also would be ideal for fish eating wading birds, including the endangered wood

stork, which nest during this period and need large quantities of bait fish concentrated in sloughs and pot holes.

* **Alligators** - An improvement in the basin alligator population should be proportional to river miles restored. Under the modified Level II Backfilling Plan, the number of alligators in the 56 miles of restored river should increase from about 1.5 per river-mile to at least the statewide riverine average of about three per river-mile, for a population increase of about 168. There would also be a significant but undetermined increase in alligators throughout the restored wetlands.

* **Upland Habitat** - There will be a loss of about 15,000 acres of pasture and dry shrub land that will be re-flooded. Some oak, cabbage palm-palmetto hammocks will be affected around the flood plain edge by higher and more frequent flood waters. However, these hammocks persisted in these locations through frequent flooding regimes during the pre-channelization period. Affected wildlife includes low populations of deer, quail, ground dove, and possibly turkey and feral hog. Pasture and its shrubby edges also are habitat for armadillo, gophers and many reptiles. Insectivorous birds that feed on or over pastures, such as shrike, kestrel, and cattle egrets, also would be affected. While there would be a loss of habitat that supports upland wildlife, dry pastures in the Kissimmee River Basin and central Florida do not represent a threatened or decreasing habitat type; in the last 23 years, dry pastures have increased in the basin from 60,000 to 287,000 acres.

Although these and other outputs can provide indicators of likely effects on selected fish and wildlife resources, the best measure to evaluate overall fish and wildlife restoration is the amount of ecosystem over which ecological integrity will be restored. The modified Level II Backfilling Plan will reestablish the ecological integrity of the Kissimmee River by restoring the river's pre-channelization form and more natural hydroperiod and flow discharge characteristics over about fifty square miles of the river and flood plain ecosystem in the Lower Basin. The restored ecosystem will include 56 continuous miles of rejuvenated or recreated river channel, which will provide flow over reestablished flood plain wetlands. Levees, disposal piles, and other obstructions to movements of water, energy and biological components will be removed; and biological, chemical, and hydrological interactions between the river and its flood plain will be reestablished. Restoration of physical form and hydrologic conditions will lead to reestablishment of the dynamic food webs, habitat heterogeneity, water quality, energy flow, and other complex physical, chemical, and biological interrelationships and processes that supported the historic ecosystem's high levels of resilience, and allowed for persistence of highly diverse biological communities. As a result, most of the diverse communities that historically constituted the Kissimmee River ecosystem will

redevelop, and the restored river and flood plain ecosystem can be expected to again support:

* A mosaic of nine distinct emergent, shrub, and forested wetland communities, including several threatened plant species;

* The Federally endangered wood stork and fourteen other species of resident and migratory wading birds;

* Nineteen species of resident and migratory ducks and waterfowl;

* Seven other wetland bird species;

* The Federally endangered bald eagle, crested caracara, and snail kite, and nineteen other birds of prey species;

* Twenty species of shore birds and diving birds;

* Seventy-eight species of resident and migratory perching birds;

* Seventeen other bird species, including turkey, quail and woodpeckers;

* The Federally endangered Florida panther, river otter, and thirty-one other species of mammals;

* Twenty-one species of frogs, toads and salamanders;

* Alligator and thirty-five species of turtles, lizards and snakes;

* Ten game fish species and thirty-eight other fish species; and

* Numerous species of snails, clams, crustaceans, insects and other invertebrates.

As in the pre-channelization system, these communities will be subjected to random climatic, hydrologic, and other environmental fluctuations and likely will be in a continuous transient state. Although individual species populations will vary widely, any chance local extinctions will be overcome rapidly by re-invasion from other habitats within the system. A constant source of colonists will be available because the project will restore a large enough area of ecosystem to reestablish replicate habitat types, and hence refuge habitats.

9.8.4 Threatened and Endangered Species

The following is a summary of impacts anticipated from the proposed project:

* **Bald Eagle** - The project will increase feeding area for bald eagles, and would beneficially affect the bald eagle by providing new foraging habitat that will accommodate more nesting.

* **Snail Kite** - The project will greatly increase habitat for the apple snail. The principal food source for the snail kite, will be beneficial to the continued existence of the snail kite and will assist in recovery of the species.

* **Wood Stork** - The project will increase for aging and nesting areas for wood stork and is therefore likely to greatly benefit the wood stork and aid in its recovery.

* **Audubon's Crested Caracara** - The project will not benefit conditions for the species, but will have no significant adverse affect on its continued existence.

* **Florida Grasshopper Sparrow** - No direct impact, beneficial or detrimental, is anticipated on the species or even its potential habitat.

* **Indigo Snake** - The loss of pasture by re-flooding as envisioned in this project should have no impact, either beneficial or adverse, on this species.

The USFWS Biological Opinion is included as an Annex E to this report.

9.8.5 Vectors

The project will result in a limited reduction of the cattle population, and related vector conditions, in the basin. Ticks, however, will continue to be carried in the wild animal population. No significant incidence of Lyme's disease is recorded for the Kissimmee Basin, and the project is unlikely to produce a significant change in this condition. Mosquitoes and biting flies spend part of their life-cycle in water, and the project will increase the area of standing or slowly moving water. Concurrently, increased populations of mosquito fish (Gambusia) and other insectivorous fishes as well as insectivorous insects and spiders are expected in the flood plain. Swallows, swifts and bats will take their toll on flying insects. The net effect is expected to be a dynamic balance, not unusual in a natural system. The Lower Basin has a sparse human population, and no human health problems related to vectors are expected.

9.8.6 Water Quality

Restoration may reduce nutrient loads presently transported by the channelized system; however, river restoration measures cannot be expected to assimilate high nutrient loads contributed by tributaries to pools D and E. In fact, these nutrient loads may interfere with restoration efforts. Wetland plant communities that would develop under high nutrient regimes likely will be drastically different, both structurally and functionally, than those that occurred on the flood plain prior to channelization. To realize full benefits of Kissimmee River restoration efforts, high nutrient loads associated with intensive agricultural land use must be reduced at the source. Implementation of measures such as Best Management Practices (BMP's), which control nutrient sources on-site rather than allowing nutrients to be passed into the basin's water courses, have been effective water quality improvement and management tools. Such measures are currently being used in the basin.

A related nutrient loading and transport issue surfaced during the SFWMD Demonstration Project when it was discovered that reintroduction of flow through old river runs flushed deposits of organic material that had accumulated on the river bottom since channelization. Concern was voiced regarding downstream impacts of re-suspension of these sediments and associated nutrient loads. While the quantity of sediments and nutrients that could potentially be re-suspended with extensive river restoration is significant (Toth, unpublished), monitoring studies indicate flushing of these organic deposits does not pose a significant threat to downstream resources. Flushing of bottom sediments occurred slowly during a three-year monitoring period, and at least a portion of the organic material was buried under new sand deposits (Toth, 1990b). Because no detectable increases in turbidity or nutrient concentrations were found downstream, it is likely that flushed river sediments were redeposited on the bottom of C-38, or otherwise absorbed by the system.

In addition, during construction there will be local increases in turbidity where backfilling is placed in the canal and where new river segments are excavated. With regard to long-term sedimentation effects, the SFWMD contracted with the University of California at Berkeley to study river morphology and potential sedimentation problems associated with restoration. Findings (Shen et al., 1990) indicate that excavated material can be backfilled into the canal and made stable enough, through erosion armoring, to resist erosional forces of any expected flood flow velocities. No mass transport of sediment is expected to occur, and, therefore, no sediment problems are expected in Lake Okeechobee.

Dissolved oxygen levels are expected to improve in the restored river channels as flows return and water column characteristics approach pre-

channelization conditions. This improvement will provide conditions more conducive to the river's game fish populations. Figure 9 illustrates expected dissolved oxygen conditions in the restored river.

9.8.7 Water Supply

Restoration of the Kissimmee River will reduce the average annual inflows to Lake Okeechobee by about 15,000 acre-feet, reducing the current Kissimmee River flows to Lake Okeechobee (948,400 acre-feet per year; U.S. Geological Survey Water-Data Report FL-89-1A) by about 1.6%. This reduction would result from additional evapo-transpiration associated with increased flood plain flooding.

Lake Okeechobee is an important source of water supply for south Florida. Other than direct rainfall, it is the primary source of water supply for agricultural development in the Everglades Agricultural Area. It also provides supplemental water supply for the water conservation areas. The water conservation areas are important sources of water for agricultural and urban development along Florida's lower east coast. Additionally, Water Conservation Area No. 3 provides water supply for Everglades National Park. Significant reductions in Lake Okeechobee water supply would result in adverse effects on the lake's water users, particularly the Everglades Agricultural Area.

The SFWMD estimates the median Lake Okeechobee stage to be at elevation 15.2 feet (Technical Publication 88-5, May 1988, Preliminary Evaluation of the Lake Okeechobee Regulation Schedule). Inasmuch as the lake storage is about 4,000,000 acre-feet at this stage, a 15,000 acre-feet reduction in storage applied totally at a single point in time would only reduce the median storage by about .375%. Because the reduced Kissimmee River flows will occur over a period of time throughout a normal year, this assessment exaggerates potential water supply effects but provides an estimate of the maximum potential effect on water supply.

The 15,000 acre-feet reduction of inflows to the lake would not result in an equal reduction in water supply. Periodically, water levels in Lake Okeechobee exceed the regulation schedule and regulatory flood control discharges are made to tidewater through the St. Lucie Canal and the Caloosahatchee River. The total average annual discharge through both the St. Lucie Canal and the Caloosahatchee River is 1,357,000 acre-feet (U.S. Geological Survey Water Data Report FL-90-2A).

Most increases in evapo-transpiration associated with re-flooding the Kissimmee River flood plain will occur during wet years when the flood plain is inundated and regulatory releases from Lake Okeechobee are most likely.

Therefore, the net reduction in available, usable water supply in Lake Okeechobee will be less than 15,000 acre-feet. No resultant effects are expected in the Everglades National Park.

During dry years, potential effects on Kissimmee River inflows to Lake Okeechobee are the most critical with respect to water supply. Discharges from the Kissimmee River basin have historically shown progressively higher reductions with increased drought conditions. For example, a 7% reduction in rainfall will result in a 28% reduction in runoff. During dry times releases from Lake Kissimmee will remain in-bank. Evapo-transpiration losses will be commensurate with the flooded wetland acreage. Therefore, during the critical dry years, the total Kissimmee River wetlands will experience a natural reduction and consequently, the additional losses due to evapo-transpiration will also be reduced substantially below the average annual estimate of 15,000 acre-feet.

In summary, there will not be a significant effect on Lake Okeechobee water supply with restoration of the Kissimmee River. In fact, the measurement accuracy for the key elements of the water budget, such as evapo-transpiration, rainfall, and structure discharge, is not adequate to detect such minor changes.

9.8.8 Flood Control

The restoration project will fill portions of C-38 and provide nonstructural flood control in the Lower Kissimmee Basin. The level of flood protection authorized and provided by the existing project, which is thirty percent of the standard project flood, will be retained.

9.8.9 Navigation

Channel depths in the restored river will depend on the availability of flowing water; thus, wet and dry seasons will have an effect on navigation. During extremely dry periods, the three-foot channel depth for navigation may be reduced due to low flows. Based on pre-channelization conditions, it is expected that a threshold flow of 150 cubic feet per second will be available in the restored river about 90 percent of the time; and this flow will provide a channel depth of three feet or greater except in four locations in the river (see the Navigation and Recreation Appendix for locations).

Abandoned river channels have suffered siltation over the last twenty to thirty years, but discharges in the restored river should quickly return the original river cross-section. Navigation markers will be placed to assist boaters in avoiding dead-end channels and hazards such as shoals.

Improved fishing conditions expected on the restored river should provide increased boating opportunities for those smaller recreational fishing boats which are the predominant users of the river. Initial reduction in fishing opportunities could be expected following implementation of river restoration, however, these opportunities will increase as fish populations return in the natural river system. Restored flow through a meandering river system is also expected to generate additional usage by those who prefer the canoe experience or the use of other small recreational craft.

The restored river will restrict navigation by vessels which require drafts greater than three feet. These larger craft, such as houseboats used during trips by the Kissimmee Boat-A-Cade, would be unable to navigate the shallow, meandering turns of the restored river. It is estimated that these larger craft currently represent approximately two percent of the boats using the waterway. Other craft such as bass boats which traverse the canal, would be unable to navigate the areas of the restored river with the shallower depths. Their use would be restricted to the areas in the restored river that have adequate depth. Additionally, those boats have other alternatives which generally involve use of the upper and lower most sections outside the restoration area of the canal. Approximately 80 to 85 percent of the vessels that currently use C-38 require at least a three-foot channel, however the impact to current boating activity is not considered significant, with the exception to houseboat usage as previously described.

Construction of the gated structure upstream of S-65E, as proposed in the river restoration plan, would provide a seasonal impediment to through traffic on the waterway. This problem could be reduced by providing information on seasonal lock closures to those navigating the waterway during high water periods in order to plan around such an event.

9.8.10 Recreation

Sportfishing is greatly dependent on the functioning flood plain for baitfish and shrimp, improved water quality, some game fish spawning, and escape cover for small bass. Although loss of about half of the existing canal by backfilling would eliminate about 21,000 annual fishing days, overall fishing should increase to an estimated 112,000 fishing days annually, including 21,000 days in the remaining canal and 91,000 days in the restored river.

Major recreational sites are located at each end of C-38, and provide recreational services for both lake users and those using the canal. These facilities are not expected to be impacted by river restoration. Existing recreational facilities along the central portion of the canal, within the restored reaches of the river, will be affected by implementation of river restoration.

Adverse impacts could be initially anticipated with implementation of river restoration. Long term effects, however, would be beneficial with the return of seasonal water level fluctuations associated with a natural, meandering river system.

A generation of boaters has grown accustomed to using C-38 as a watery highway to get from one point to another in the quickest possible time. Many are only vaguely aware of the true nature of the old river channel, but will now be able to see and enjoy its beauty at leisure. While power boaters will have to slow down and exercise more caution along the restored river, their opportunities to see waterfowl and other riverine wildlife will be greatly improved. Enjoyment of this environmental diversity will compensate many for their loss of time in traversing the river. Others will be aggravated by the delay. Offsetting the increased time required to navigate the river will be the removal of delays at three locks and the fact that the central portion of the river will be navigable on a 24-hour basis.

Public acquisition of lands within the flood plain of the Lower Basin will create additional recreational opportunities for state and local interests. This could include campgrounds, picnic areas, and other passive activities which are considered compatible with the restoration program. Extension of the Florida National Scenic Trail system within the Kissimmee Basin is expected to be compatible with the intent of protecting the basin's natural resources.

9.8.11 Displacement of People, Businesses and Farms

Preliminary estimates identified 356 homes, 5 farms with 14 buildings and 24 miscellaneous outbuildings that may be impacted. These impacts may require displacing some residents from their existing locations, as discussed in Annex H and Annex I. Flood proofing such as the use of ring levees or modifications to site and structure elevations will be utilized whenever feasible to limit the possibility of displacement. During later preconstruction engineering and design, further analyses will be conducted to determine what structural solutions can be implemented. None of the lands to be acquired are considered *"prime and unique farmlands"*. Relocation assistance will be provided to affected residents and businesses in accordance with the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.*

9.8.12 Aesthetics

Restoration of the Kissimmee River will provide a more natural riverine environment, with more variation in vegetation communities, and will be more naturally scenic than the existing canal. Travel through oxbow meanders, with

overhanging oaks, cypress and palms, will exhibit a diversity of habitat and associated wildlife. Increased numbers of waterfowl and other riverine animals will provide a greater aesthetic appeal to use of the waterway when compared to the present canal usage.

River restoration will not impact continued use of the Avon Park Bombing Range. Low flying aircraft which detract from the pristine nature of the area, are expected to continue utilizing air space over the restored river.

9.8.13 Cultural Resources

Effects to historic and prehistoric archeological sites and standing structures, engineering structures and architectural features will be evaluated. Effects from the proposed project are anticipated to come from construction, erosion, human disturbance, and changes in the hydrologic regime in the flood plain. Annex F includes a cultural overview, detailed assessment of effects to cultural resources, and a plan of future cultural resources investigations.

In preparation of the 1985 Corps report, the SHPO indicated that at least 17 sites of historic or archeological significance were recorded within the Kissimmee River basin, and that 30-50 additional unrecorded sites were likely to be present. In a letter dated June 18, 1991, the SHPO reaffirmed the archeological and historical potential of this region. Inspection of the Florida Master Site File in Tallahassee revealed that at least 50 archeological sites are now recorded in the river basin. Approximately 3000 archeological and historical properties are recorded in the four-counties included in the lower basin. Few of the recorded sites have been evaluated for eligibility to the National Register of Historic Places. Therefore, effects to these resources must await further investigation. Approximately 400 standing structures may also be affected by the recommended plan.

Based on a preliminary assessment, the proposed project is expected to have no effect on standing structures, engineering structures or architectural features. Construction of the proposed project may cause effects from creation of new river channel, excavation of C-38 spoil piles, degrading of tieback levees, excavation of borrow material, and other construction related activities. Based on data collected during the archival and literature search, the Corps expects that unrecorded archeological sites were covered by spoil during construction of C-38, and predicts that removal of that spoil during restoration may create adverse effects. The Recommended Plan will change the existing condition hydrologic regime by restoring discharge characteristics, overbank flows, flow velocities, stage recession rates and flood plain inundation frequencies to pre-project conditions. In considering how the proposed project will create effects to significant historic properties, investigations will evaluate potential changes

to historically wet archeological sites which are presently dry, but will be reinundated during restoration.

9.8.14 Hazardous and Toxic Waste

A preliminary evaluation of potential hazardous and toxic waste problems has concluded that potential contamination is deemed negligible. This conclusion was based on consideration of the following:

* **Urban Development** - Comparisons of pre-channelization and current land uses indicate that there are very few urbanized or modified areas that would have a potential for hazardous and toxic waste contamination. Most of the area's construction is relatively new and the potential for breaching and underground storage tanks is relatively minimal. There are no landfills, industrial waste treatment plants, light industries, or other facilities likely to generate contaminants in the area to be inundated. Two fish camps along Pool D have fueling areas and one has a small airstrip. Visual examination did not show any fueling facilities at these sites, and no large fueling facilities were noted at any of the fish camps along the river. Further visual examination will be needed before construction.

* **Agriculture** - Pastures and limited agricultural areas pose little or no threat due to the effects of weathering on any pesticides or herbicides that may have been applied.

* **Navigation** - There have not been any reported or otherwise known incidents of contaminant spills in C-38.

* **Project Structures** - There is no evidence of any spill or contamination problems at any of the project structures. Any potential sources of contamination from the structures to be removed, such as fuel storage tanks or asbestos in buildings, will be properly removed during construction.

* **Avon Park Air Force Bombing Range** - The bombing range is located sufficiently to the west to preclude the presence of related waste materials in the study area. In the event that rounds accidently fall outside the designated target zone, the affected area is immediately cleaned, and only limited contamination would be expected.

9.8.15 Air Quality

Fugitive dust from vehicular traffic, earth moving, and breaking down concrete structures will be unavoidable but insignificant. There are no air quality issues in the study area.

No significant effects are expected if controlled blasting is used to demolish concrete structures. Charges will not be placed in-ground or in-water, but may be placed below ground level in the open space enclosed by a structure. This method is frequently used in downtown areas to drop buildings with no harm to adjacent properties or public safety.

9.8.16 Unavoidable Adverse Environmental Effects

The following unavoidable adverse effects are expected to occur with implementation of the modified Level II Backfilling Plan:

* **Wetlands** - A limited number of acres of wetlands, as well as pasture, will be lost or disrupted at the sites of the containment levees and related structures, and at the bridge relocations.

* **Uplands** - About 15,000 acres of pasture and dry shrub will be re-flooded; upland species will be displaced to similar habitat which is abundant throughout the region.

* **Water Quality** - Turbidity will be temporarily elevated during construction, but will return to natural levels upon project completion.

* **Water Supply** - About 15,000 acre-feet of water will be lost annually to evapo-transpiration; the loss is not considered significant to the water budget of Lake Okeechobee or downstream uses in the Everglades system.

* **Navigation** - Deeper-draft vessels, such as houseboats, which comprise about two percent of the craft that use the existing canal, will not be able to navigate throughout the restored river.

* **Residences and Farms** - About 356 homes and five farms and 24 miscellaneous out buildings will be affected; residents may have to relocate and the existing residential communities could be eliminated or disrupted. Relocation assistance will be provided as required by law.

* **Cultural Resources** - An unknown number of historic and archeological sites will be affected; later studies will identify significant sites and necessary mitigation will be implemented.

* **Air Quality** - Fugitive dust from vehicular traffic, earth moving, and breaking down concrete structures will be unavoidable but insignificant.

9.8.17 Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

The comparatively short project construction period will produce several unavoidable effects, such as increases in turbidity, disruption of habitat and other resources, and relocations of residents, as previously described. Such immediate adverse effects will be avoided where possible, and, where unavoidable, mitigated to the extent possible. In the longer-term, restoration of physical form and hydrologic conditions will lead to reestablishment of the dynamic food webs, habitat heterogeneity, water quality, energy flow, and other complex physical, chemical, and biological interrelationships and processes that supported the historic ecosystem's high levels of resilience, and allowed for persistence of highly diverse biological communities. As a result, most of the diverse communities that historically constituted the Kissimmee River ecosystem will redevelop, and the restored river and flood plain ecosystem can be expected to again support populations of many fish and wildlife species.

9.8.18 Irreversible and Irretrievable Commitments of Resources

Construction and ongoing operation and maintenance will require the expense of time and resources, such as labor, energy and project materials, purchased with the Federal and sponsor's financial contributions. Once used, these resources could not be recovered.

In a larger sense, the Kissimmee River restoration represents a recovery - a practicable reversal and retrieval - of natural resources that had been lost or degraded with the commitment of lands and improvements for the flood control project over twenty years ago. Although it is not possible or desirable to fully restore an identical pre-channelization ecosystem, the restoration project will provide more natural conditions that will facilitate the reestablishment and long-term maintenance of a full range of physical, chemical and biological characteristics necessary for a resilient ecosystem.

9.8.19 Cumulative Effects

The Kissimmee River Basin is the headwaters origin of the unique and complex regional ecosystem of central and southern Florida that extends from the Kissimmee through Lake Okeechobee and culminates in the Everglades at the southern tip of the State. The Kissimmee is a critical link in that overall system, providing both hydrological and ecological inputs. Restoration of the Kissimmee River Basin will ensure that the larger system can function in a more natural manner, reflecting its historic values. The beneficial environmental effects of restoration will make important contributions to many

significant resources which require cumulative efforts to preserve their values, including:

* Restoration of Atlantic flyway habitat of critical concern as recognized by the international North American Waterfowl Management Program.

* Improvement of the quality of Kissimmee River waters will benefit the clean up of Lake Okeechobee.

* Increased wading bird populations will assist wading bird recovery in the southeast landscape.

Restoration of the Kissimmee River wetlands also will make contributions to both the State's environmental protection and conservation objectives, such as the *Save Our River's Program*, as well as National environmental goals, such as the long-term goal to increase the quality and quantity of the Nation's wetlands, as established in the *Section 307 of the Water Resources Development Act of 1990.*

9.8.20 Sustainable Development

Restoration of the ecological integrity and fish and wildlife values of the Kissimmee River Basin will be accomplished in a manner that is compatible with the original, traditional project purposes of navigation (authorized in 1902) and flood control (authorized in 1954). The canal and related structures that have successfully fulfilled these purposes for many years will be replaced, in part, by a nonstructural approach that will not only continue to meet navigation and flood control needs, but will make a significant contribution to the Nation's environment. The project will serve the full range of the water resource needs, both providing developmental services and sustaining environmental values in the central-south Florida region.

SECTION 10

RECOMMENDED PLAN

The recommended plan is the Level II Backfilling Plan, as recommended in the SFWMD *Restoration Report* and modified by the analyses conducted during this second Corps feasibility study of the Kissimmee River. The plan, which is shown in Figure 35 and in detail on Plates 1 through 5, consists of construction components, real estate requirements, construction monitoring, and operation and maintenance for the completed project.

10.1 CONSTRUCTION COMPONENTS

The construction components of the recommended plan are: backfilling 29 miles of C-38; excavating 11.6 miles of new river channel; constructing a bypass weir and channel at S-65; shallowing and constructing weirs in the Lake Kissimmee outlet reach; modifying the Pool B weirs and structures at S-65A and S-65E; constructing containment levees in Pool C and D, bridge crossings at U.S. Highway 98 and the CSX Transportation (CSXT) Railroad, and new structures in Pool E; removing the existing structures at S-65B, S-65C, and S-65D; modifying tributaries and local levees in the flood plain; and installing navigation channel markers.

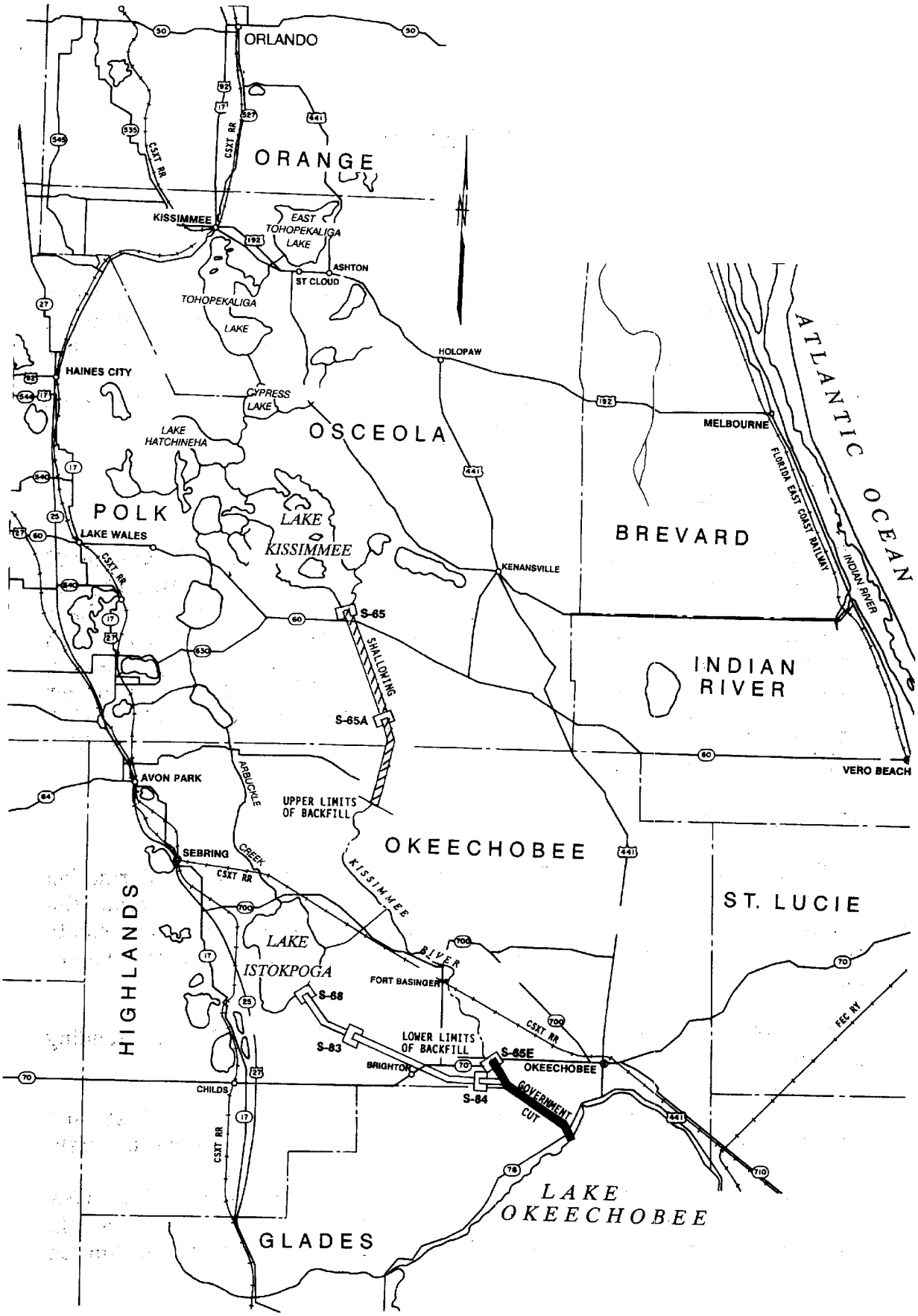
10.1.1 Backfill

Twenty-nine miles of C-38 will be backfilled in five reaches. Information obtained from monitoring the initial reaches will be used to refine the upstream limit of backfill in Pool B, degree of shallowing, real estate requirements, and operational plans. A typical backfill reach is shown in Figure 36. The backfilled reaches are:

* **Reach 1** - In Pool C, beginning 1.5 miles north of S-65C, and extending approximately 5.3 miles to a point about 1.5 miles south of S-65B.

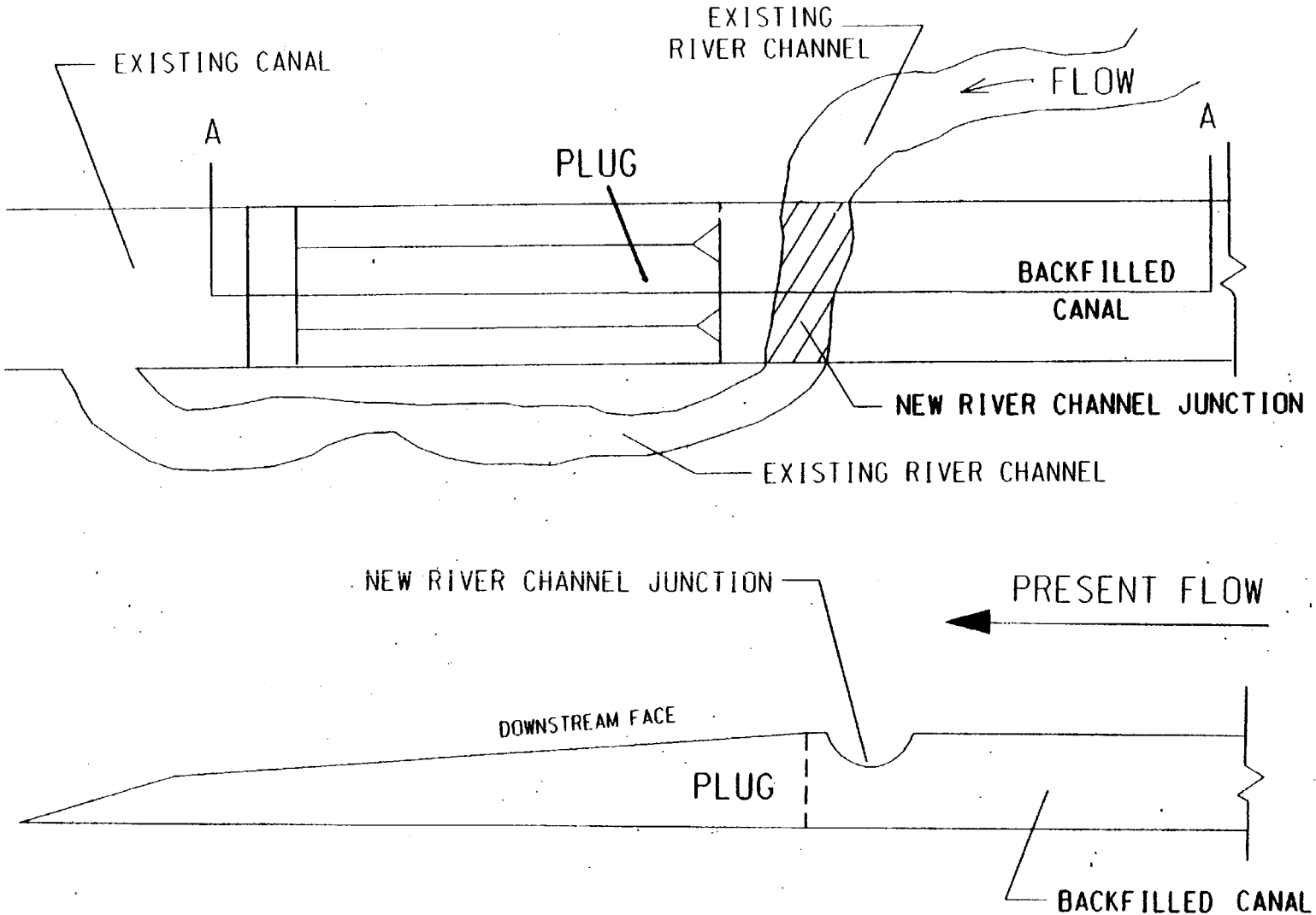
* **Reach 2** - In Pool D, beginning about one mile north of U.S. 98, and ending in Pool C at the downstream limit of Reach 1, about 5.4 miles in length.

* **Reach 3** - In Pool D, beginning about one-half mile south of the CSX Railroad bridge, to the southern limit of Reach 2, about 4.0 miles in length. Backfilling under the U.S. Highway 98 and CSX Railroad bridges will be limited to an elevation of 20 feet.



RECOMMENDED PLAN
(For details, see Plates 1-5)

FIGURE 35



CONCEPTUAL BACKFILL REACHES

FIGURE 36

* **Reach 4** - In Pool E, beginning about one mile upstream of State Road 70, and ending in Pool D at the downstream limit of Reach 3, about 6.3 miles in length.

* **Reach 5** - In Pool C, beginning at the upstream limit of Reach 1, and ending in Pool B near Weir 3 of the Demonstration Project, about 8.0 miles in length.

Plugs will be constructed at the downstream end of the first four reaches. They will be designed for stability to resist scouring under the full range of expected flow conditions. Plugs in the first three reaches will be temporary since they will be incorporated into the expanding backfill as construction progresses. The final plug in the fourth reach in Pool E will be a permanent plug at the downstream limit of backfill. A preliminary design of this downstream plug was developed by Dr. Shen (see *1990 Restoration Report,* Appendix I), and included a 1:4 slope on the upstream face, a minimum top width of fifty feet, and a flat 1:16 for the lower 15 feet of the downstream slope and 1:4 for the remaining 15 feet protected with riprap. Alternative plug designs will be investigated during later preconstruction engineering and design to determine whether the temporary plugs can be constructed to less stringent standards. The fifth reach will not require a plug since backfilling will begin at the first reach's upstream limit of backfill.

Backfilling will proceed upstream from each plug (upstream from the first reach for Reach 5). Backfill will be taken from the piles of material adjacent to the canal that remain from the original channel excavation. The first and last reaches will require upstream approach sections, while the other reaches will terminate at upstream plugs. Approach sections are tapered fill zones that provide topographic transition from remaining upstream canal depths to the fully backfilled section where fill emerges from the water.

An estimated 49,000,000 cubic yards of earthen material will be needed for backfill, and the amount available in the adjacent disposal piles is estimated to be adequate for this need. No off-site borrow material is expected to be needed. Material will be moved and placed using earth moving equipment, such as bulldozers and scrapers, to fill across C-38. Fill is expected to be placed without mechanical compaction or dewatering.

Disturbed surfaces in the project area will be graded to maximize both the use of fill material adjacent to the canal and environmental outputs. Much of the backfilled reaches will be topped by a mound of fill material about 2.5 feet above grade to allow for settling of the fill. Settling would be complete in less than three years, and the resulting topography would approximate prechannelization conditions. In selected areas, potholes and backwater areas

will be created by filling the canal to slightly below the surrounding grade. One to two acre potholes would result by filling below surrounding grade to produce water depths of about three to five feet over various distances 150 to 300 feet in length and 300 feet in width; about two potholes could be spaced over each mile of backfill. In other areas, backwater sloughs, with water depths of about five to ten feet and about four to six acres in size (about 300 feet wide, and 600 to 900 feet in length), could be retained in areas about 400 to 500 yards from where the restored river crosses a backfilled reach. In addition, if, along a given stretch of canal, the requirement for fill material should exceed the volume of material available in adjacent disposal mounds, material will be excavated from the adjacent flood plain, rather than trucking material from other pools or borrow sites outside the flood plain, to create potholes adjacent to the channel. The resulting adjacent borrow pits will vary in size and depth depending on the amount of materials needed, but depths will not exceed ten feet and side slopes will be gradual, avoiding vertical or steep slopes. This overall grading approach, involving the creation of potholes, backwater sloughs and borrow pits to take advantage of filling and borrow situations, will mimic the Kissimmee River flood plain's historical topographic contouring, providing natural, seasonally-drying habitat areas.

10.1.2 New River Channel

Where the original river channel was eliminated by the excavation of C-38 or the placement of excavated material, a new channel will be excavated to connect existing river remnants. These are shown on Plates 3-5. The channel will be dug through the existing disposal areas in order to avoid construction impacts to undisturbed flood plain, where possible. Each segment will be constructed to approximate the original meandering pattern, gradient, and cross-section. This new channel will cross backfilled areas as near as possible to a right angle to maximize stability at their junction. Approximately 18 new river channel sections will be constructed with a total length of 11.6 miles and an average cross section of 1,230 square feet.

10.1.3 S-65 Bypass Weir and Channel

At S-65, a bypass spillway and channel will become the primary outlet from Lake Kissimmee and are shown on Plate 1. The new structures will permit flows to be discharged at a rate that corresponds closely to the prechannelization stage-discharge rating for lake stages above the bypass spillway crest elevation of 51.0 feet. The spillway will be a sheet pile weir, with a fixed crest at elevation 51.0 feet, which will allow for insertion of flash boards to elevation 53.5 feet. A bridge will be constructed on the downstream side of the weir to provide access to the flash boards. While the spillway will pass most discharges without manual operation, the flash boards will provide a tool

to manage the system after project monitoring is completed. The bypass channel will direct discharge to C-38 downstream from the existing S-65 structure.

10.1.4 Lake Kissimmee Outlet Reach Modifications

Shallowing of the Lake Kissimmee outlet reach below S-65 will consist of tapering the depth of C-38 from thirty feet immediately downstream from S-65 to between ten and fifteen feet at S-65A. Downstream from S-65A, shallowing will continue from a depth of ten to fifteen feet to natural ground elevation at the upstream limit of backfill. Water depths are depicted on Plates 1 and 2. An estimated 8,100,000 cubic yards of earthen material will be needed for shallowing. The amount available in adjacent disposal sites is estimated to be adequate for this need, and no off-site borrow material will be needed. Several gated weirs would be installed to divert normal flows into the original river channels and promote wetland inundation and are shown on Plate 1. During flood events, the weir gates would be open.

10.1.5 S-65A Modifications

S-65A will be required to operate with much higher headwater and tailwater stages. Gate extensions will be installed at S-65A to maintain higher stages during periods of low flow. The crest of the tie-back levee will be lowered to about elevation 49 feet. Six small overflow structures will be constructed along the tieback levee to allow flood flows to discharge over the levee when stages exceed elevation 48 feet while maintaining the capability to impound water upstream. The levee will remain at full height at the residence, spillway, and boat lock, forming an "island" during flood flows. The levee also will remain at full height at the auxiliary structure, forming another "island" during flood flows.

10.1.6 Pool B Weir Modifications

Three Demonstration Project weirs constructed by SFWMD in Pool B will be modified to restore flows through oxbows and facilitate local flood plain inundation. Location of the three weirs are on Plates 2 and 3. The weirs' navigation notches will be closed and the crest elevations will be lowered. The weirs will eventually be incorporated into the Reach 5 backfill.

10.1.7 S-65B, C and D Removals

The existing project structures that will be included in backfilled reaches will be removed. These structures include the S-65B, C, and D spillways, boat locks, tie-back levees, and auxiliary structures. The tie-back levees will be

degraded to natural ground elevations. Items that may involve hazardous or toxic substances, such as fuel storage tanks and any asbestos in the structures, will be properly removed and disposed of off-site in accordance with applicable requirements. Salvageable items, such as engines and other mechanical items, will be removed for salvage. Remaining structures will be demolished to existing grade level to ensure safety of the public. Resulting debris will be pushed into the remaining canal and graded to existing ground elevations with material from nearby disposal piles.

10.1.8 Containment Levees

Two levees are included to reduce the real estate acquisition costs and are shown on Plates 4 and 5. First, two levee segments will be constructed to provide 100-year flood protection for 35 improvements over 5,300 acres adjacent to Chandler Slough and Yates Marsh. The first segment will form a closure with the CSX Railroad causeway, and the second segment will terminate at high ground. Two flap-gated culverts will allow drainage to the Kissimmee River. Second, the Istokpoga levee will be a continuous levee which will prevent the Kissimmee River from backflowing to Lake Istokpoga through Istokpoga Canal. An 800 cubic feet per second capacity culvert will allow drainage to the Kissimmee River through the Istokpoga Canal. This containment levee and culvert will provide protection for approximately 700 improvements.

10.1.9 Bridge Crossings

Two bridges cross the flood plain in Pool D with filled causeways and provide only minimum openings for the existing C-38 and are shown on Plate 4. These will be modified to promote flows across the flood plain for restoration and provide necessary conveyance for flood flows.

U.S. Highway 98 crosses the flood plain with a filled causeway across the eastern flood plain and an elevated bridge span over C-38. No original river channel remains at this location. C-38 would be left intact under the bridge span for adequate conveyance and navigation, but would be shallowed to elevation 20 feet, for 4,000 feet upstream and 1,500 feet downstream of the bridge; a berm will be constructed around the shallowed canal section. The berm would prevent water upstream of the bridge from entering C-38 after stages recede to elevation 31.0 feet. An additional opening with a 400-foot bottom width will be east of the canal to allow sheet flow over the flood plain and promote continuity between the upstream and downstream flood plains. The opening will maintain existing natural ground elevation and no channel will be provided. The existing highway grade will be maintained. During

construction, a temporary bypass will be constructed to maintain highway traffic.

The CSX Railroad Bridge consists of a filled causeway across the flood plain, a bridge across C-38, and a non-navigable culvert at the original river channel on the western edge of the flood plain. C-38 would remain intact under the bridge but would be shallowed to elevation 20.0 feet, 4,300 feet upstream and 1,500 feet downstream of the bridge. A berm will be constructed around the shallowed canal section to prevent water upstream of the bridge from entering C-38 after stages recede to elevation 31.0 feet. Additional bridged openings will be constructed in the filled causeway on both sides of the canal. On the west side, an opening with a 100-foot bottom width at the original river channel will be constructed to pass normal river flows, thereby also restoring navigation through this section of the river. On the east side, an opening with a bottom width of 150 feet will be constructed to restore the historic pattern of continuous flows from Chandler Slough and other small swales through the flood plain. Existing natural ground elevation will be maintained under the bridge, and no channel will be provided at this location. During construction, temporary bypasses will be constructed at both bridges to maintain rail traffic.

10.1.10 Pool E Grade Control Structures

A weir will be built just upstream of S-65E to minimize velocity stress on the downstream plug and reduce the stage difference across S-65E. The weir and flood gates are shown on Plate 5. New tieback levees will be constructed to connect the weir into the existing tieback levee to the east and west, and the existing levee will be reinforced to accommodate higher upstream stages. The navigation channel will be rerouted with its confluence with C-38 upstream of the weir to permit navigation through the existing lock.

A flood gate will be added immediately upstream from the lock to prevent lock machinery from being flooded during high flows. The gates will ensure continued use of the lock under normal flow conditions, but will be closed when stages upstream of S-65E rise to elevation 23.0 feet.

The new weir and flood gate will isolate a drainage basin located northeast of S-65E. This area currently drains to the upstream pool of S-65E through an existing channel. A new drainage system will be constructed to convey runoff from that area to the approach channel downstream of the S-65E lock.

10.1.11 S-65E Modifications

Because of the increased water depths expected across S-65E, the structure will require installation of stability measures. The addition of stilling basin anchors will counteract the increased lateral and overturning forces from the increase in water depths upstream from S-65E.

10.1.12 Tributary Modifications

There are approximately fifty tributaries in the Lower Basin. In most cases, backwater influences in the tributaries are such that interests in lands beyond the Kissimmee Valley flood plain are minimal. Adverse impacts produced by the project on flooding in the tributaries of the Lower Basin will be mitigated through acquisition of appropriate real estate interests (see below). Modifications specific to each tributary will be identified during later preconstruction engineering and design studies to determine whether there are more cost effective structural solutions that would be consistent with the restoration purpose of the project. Typical modifications could include channel clearing and small water control structures to reduce overdrainage.

10.1.13 Local Levee Modifications

Locally constructed levees within the restoration area will be degraded to natural ground elevations to promote sheet flow across the flood plain. Approximately 1,600,000 cubic yards of material in local levees will be graded. Borrow canals associated with these levees will be filled or plugged to prevent overdrainage of the adjacent flood plain. Excess material will be used for C-38 backfill material.

10.1.14 Navigation Markers

The U.S. Coast Guard does not mark navigation channels with three foot depths. However, a navigation marking system will be installed to assist boaters in traversing the waterway to avoid dead-end channels and to inform boaters of the critical sections of localized low depths under extreme low flow conditions.

10.2 REAL ESTATE

10.2.1 Lands and Easements

Lands needed for the purpose of ecosystem restoration and flood control will be acquired in fee to ensure that they will continue to be available solely for

that purpose over the life of the project. This will require acquisition of the flood plain that includes the plant communities of the historic Kissimmee River ecosystem as previously described, and the area required for the flood discharge flow-way capacity of 11,000 cfs. The fee acquisition area up to the five year flood line is approximately 58,487 acres.

A flowage easement will be acquired on lands between the five-year and substantially the 100-year flood lines. Easements will be acquired because there may be significant effect at the 100-year line, and changes in the Federal flood insurance categories as a result of the project. The flowage easement area is about 9,143 acres.

Levee easements, channel easements associated with the levees and temporary construction easements will also be acquired. These easements consist of a total of approximately 213 acres.

During later preconstruction engineering and design studies, tributaries subjected to induced flooding will be reanalyzed to determine if structural solutions consistent with restoration, such as clearing and snagging, would be more cost effective than real estate acquisition.

10.2.2 Relocation Assistance (Public Law 91-646)

Preliminary estimates identified 356 residential homes, 5 farms with 14 buildings, and 24 miscellaneous out buildings may be impacted. Flood proofing, such as the use of ring levees or modifications to site and structure elevations, will be utilized whenever feasible to limit the possibility of impacts. During later preconstruction engineering and design, further analyses will be conducted to determine where structural solutions can be implemented. Relocation assistance will be provided to affected residents and businesses in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Public Law 91-646).

10.2.3 Construction Relocations

Boat launching ramps at S-65, S-65B and S-65C will be relocated to the edge of the flood plain. Ramps will be connected with the restored river by access channels.

U.S. Highway 98 will be temporarily relocated to maintain traffic flow during construction of bridge openings. A temporary 840 foot bypass extending 50 feet south of the existing road will be constructed on existing spoil.

The CSX Railroad causeway will also require a temporary bypass at both bridges to maintain rail traffic during construction. The bridge located east of the canal will require a 3,200 foot bypass at the existing railroad grade, while the bridge located west of the canal will require 3,150 foot bypass.

Utilities to be relocated include:

* The Williams submarine fiber optic telephone cable north of and parallel to the CSX Railroad causeway.

* The MCI submarine fiber optic telephone cable and an overhead power line south of and parallel to the CSX Railroad causeway.

* The United Telephone Company submarine telephone cable and the Seminole Cooperative 69 kilovolt overhead powerline north of U.S. Highway 98.

* The Glades Electric 25 kilovolt overhead powerline south of U.S. Highway 98.

10.3 MONITORING

Four monitoring programs will be conducted during construction: ecological monitoring, hydraulic monitoring, sedimentation monitoring, and stability monitoring. These programs are intended to evaluate the success of the project as it is being constructed and beginning to function, and to check areas of uncertainty. Based on monitoring results, refinements can be made during the phased construction process and in future operation and management. Further justification for each of the monitoring programs is given in the following sections.

10.3.1 Fish and Wildlife Monitoring

There are several major reasons for conducting an extensive fish and wildlife monitoring program: construction impact assessment, applications to other restoration efforts, and adaptive management.

Construction impact assessments ensure that temporary or incidental environmental impacts are documented and minimized during construction. Because of the phased construction approach, this aspect of the monitoring program could prove to be particularly valuable in reducing effects of construction-related disturbance, including potential effects on endangered species and downstream effects that could affect subsequent restoration phases.

Also, because public attention will be aroused by expected localized increases in turbidity, an accurate evaluation of turbidity impacts will be required.

The potential applicability of the Kissimmee River restoration project to other restoration endeavors is another important reason to conduct extensive fish and wildlife monitoring studies. The principles of ecosystem restoration that have been employed in the planning and design phases of this project are pioneering. Use of ecosystem-level hydrologic and physical habitat criteria, and natural processes, to effect ecosystem restoration is, conceptually, a more simple approach than the individual species criteria that have historically been used in previous restoration efforts. It also may be the most environmentally sound and cost-effective means of restoring the natural resource values of damaged ecosystems. This model restoration project should demonstrate if these planning principles, guidelines and criteria are applicable to other restoration projects.

Fish and wildlife monitoring also will provide a basis for adaptive management measures that may be needed to facilitate early recovery, as well as, subsequent persistence of the full complement of natural resource values. Although restoration of the Kissimmee River's resources will occur primarily through natural processes, the restored system will have one significant management component - headwater inflow regulation. Modeling studies have shown that the proposed management scheme for the headwaters will produce hydrologic characteristics that are within the required range of variability of the ecological restoration criteria. However, to achieve restoration and persistence of all biological components, some hydrologic characteristics, particularly discharge and flood plain inundation characteristics, must vary over the established historic range. Moreover, early recovery of some biological components could be slowed or inhibited if management of the headwaters produces hydrologic characteristics that are perhaps at one end of the spectrum of required variability. Comprehensive fish and wildlife monitoring will track restoration progress and provide the necessary data to effectively modify or adjust operation and management schemes to meet restoration objectives.

The stated objectives of restoration of fish and wildlife values have a broad scope (over 300 fish and wildlife species will use the restored ecosystem) and require reestablishment of a complex array of environmental attributes and interactions. The monitoring program must have a sufficiently broad scope and scale to not only document reestablishment of biological components, but also explain the intricacies of the restoration process.

Restoration monitoring will utilize an ecosystem perspective to meet the following objectives:

* Provide a thorough understanding of the ecosystem with and without restoration.

* Show direct cause-effect relationships between restoration measures and ecological responses.

* Include quantifiable biological responses.

* Document changes that are of social and scientific importance.

Demonstration Project studies conducted by the SFWMD expanded knowledge of the present channelized system and provided data indicating that restoration of the system's environmental values is feasible. These studies also provided direction for the comprehensive monitoring program that is needed to evaluate the state of the existing system, provided data to assess changes associated with restoration efforts, and advanced understanding of the dynamics of this complex river and flood plain ecosystem. The following features are necessary basic components of a comprehensive Kissimmee River Restoration fish and wildlife monitoring program:

Wading Bird and Waterfowl Studies - Wading bird and waterfowl monitoring efforts will provide distribution data reflecting spatial and temporal patterns of use of different flood plain habitats. Census data will be collected and evaluated in the context of wading bird and waterfowl population dynamics in the south-central Florida landscape (Kissimmee-Okeechobee-Everglades system). Census information will be related to monitoring of wading bird and waterfowl food production in the range of flood plain habitats.

Endangered Species - Utilization of the river/flood plain by wood stork, bald eagle and snail kite will be monitored.

Fisheries Studies - This monitoring will include long-term studies of population dynamics, recruitment, and habitat utilization (including flood plain) of primary game fish species. Recommended features include radiotelemetry studies to monitor game fish distributions and habitat utilization, and periodic creel surveys to assess resource exploitation and user perceptions.

Fish Community Analysis - In addition to monitoring of game fish populations, comprehensive studies of fish community structure, dynamics and habitat utilization also are required. Application of the *"Index of Biological Integrity"* (Karr et al., 1986) for Florida streams would provide a quantitative measure of the success of restoration efforts.

Habitat Studies - The following data are needed to complement biological studies: (1) mapping of vegetation community composition of the flood plain and littoral and submergent zones of river channel, including remote sensing and/or photointerpretation of large scale aerial photography, (2) monitoring of revegetation of backfilled canal, (3) flood plain hydrologic monitoring using an extensive network of stage recorders to precisely define flood plain inundation characteristics (this will be provided by the hydraulic monitoring program), and (4) measurements of river channel habitat parameters, including depth, flow and substrate characteristics.

Water Quality Monitoring - Water quality studies will include routine nutrient monitoring, analysis of effects of the project on river channel dissolved oxygen regimes, a detailed river and flood plain oxygen budget study, and extensive suspended solids and turbidity studies and monitoring which will be integrated with the sediment monitoring program.

Ecosystem Function Studies - This component of the "ecosystem" restoration evaluation program will include monitoring of standing crop biomass of major flood plain plant communities, habitat-based measures of invertebrate productivity, and monitoring of energy flow pathways. Plant biomass data is required as a correlate for flood plain roughness measurements. Aquatic invertebrate productivity studies will evaluate functional values of different river and flood plain habitats, including flood plain vegetation communities and all river habitat types. Energy flow studies will include investigations of energy (e.g., fish food organisms) transfer from the flood plain to river channel, and vice versa, and the importance of riparian and flood plain litter inputs to the river food web.

In implementing the fish and wildlife monitoring program, the highest priority will be given to collecting baseline data in the section of river and flood plain that will be affected by the first segment of construction. This area will include most of Pool C. To achieve the required ecosystem perspective, the data must involve all of the major components outlined above, and two to three years of studies prior to reflooding are needed. Detailed study design, coordination, sample site location, and development and testing of sampling methodologies will precede the beginning of baseline data collection. Limited monitoring studies (primarily water quality) will be conducted during early segments of construction. A five-year (or until major effects stabilize), post-construction evaluation phase should follow, and include all ecosystem components incorporated in preconstruction monitoring. Corps involvement will be limited to monitoring before and during construction that is necessary to support decisions about further design modifications that could be made to improve the project.

10.3.2 Hydraulic Monitoring

Hydraulic resistance over the flood plain following the restoration of wetland vegetation is a critical body of information needed to determine the upstream limit of backfilling, the degree of shallowing upstream from backfilling, and how the Upper Basin should be operated for flood control. The hydraulic monitoring program will measure this critical change in resistance and ultimately the final resistance of the restored flood plain.

Monitoring will be conducted at about thirty water level and velocity vector points in the reach influenced by the first segment of backfilling. Monitoring gages will be installed before reflooding to take advantage of dried flood plain conditions. Stilling wells will be installed such that the first two feet of water table can be measured to allow monitoring of wetting and drying at the edge of the flood plain. Vertical control will be of extremely high order such that required precision in measuring water surface slope is not limited by the precision of the level surveys. A local traverse can be used for control because relative precision between gages within this network is much more important than global precision; however, this gage network should be tied to overall basin water levels at prevailing level precision.

Instrumentation will be read at frequent but variable intervals. For instance, during floods, a short interval of five minutes to one hour should be used, and during dry seasons or periods of gradually varied flow, longer intervals can be used.

The gaging network will be designed to provide observed data for calibration as input for a two-dimensional unsteady flow flood plain model. The gaging network will be supplemented with actual stream gaging in the river channels to establish flow distributions and velocity profiles. Stream gaging will be conducted during a range of flow conditions.

Hydraulic monitoring will continue from initial reflooding until no more increase in hydraulic resistance is observed; this is expected to take several years. At that time, the observed roughness values can be employed to complete the determinations of upstream backfilling, degree of shallowing, and any modifications necessary for operational plans.

Additional water level monitoring locations will be established in Lakes Kissimmee, Hatchineha, and Cypress in order to better manage operations in that sub-basin. More gage locations will avoid existing problems with wind setup in the lakes which can cause erroneous estimates of average lake stage. Lake regulation schedules are based on stages of hypothetically flat lake

surfaces; therefore, average lake stages are preferable for use in daily operations.

Other hydrologic monitoring ongoing in the basin will continue. Rainfall gages presently located at S-65 structures that will be destroyed will be relocated.

10.3.3 Sedimentation Monitoring

Because of the uniqueness of this construction project, many of the determinations that have been made regarding sedimentation issues have not been site proven in similar settings. The program will begin prior to construction in order to gather baseline data, and will continue until such time as it can be established that the components of the project are stable.

The sediment monitoring program will be designed to include assessment of localized erosion and deposition at backfilled sections, river-canal junctions, and shallowed sections. Final graded and revegetated reaches of any completely backfilled canal reaches also will be monitored. The program also will monitor the stability of banks and bed of the river channels, especially any new river channels excavated to connect remnant river channels. Overall monitoring of the project area will be conducted so that any mass transport to Lake Okeechobee can be detected.

This program will include monitoring of suspended and bed loads at a range of discharge conditions to assure that gradually developing problems with sediment and erosion control, if they occur, do not go undetected and lead to greater or catastrophic problems. In case any do occur, technical analyses and solution approaches will have site specific data.

10.3.4 Stability Monitoring

While the constructed features of this project will be subjected to normal inspections, including quality assurance - quality control, and "as-built" comparisons to specifications, long-term monitoring is desirable for some of the features. Features normally submerged and subjected to erosional forces will be monitored to determine stability. Concerns include armoring, unprotected soil in abutment areas, and gross stability of slopes and structural mass. Also, revegetated areas will be monitored for survivability of plants and overall coverage for erosion protection.

10.4 OPERATION, MAINTENANCE, AND MANAGEMENT

10.4.1 Water Management

Water Control and Operations and Maintenance Manuals will be prepared and provided to the non-Federal Sponsor prior to final turnover of the project. Refer to Figure 8 showing the regulation schedule. During construction, interim water control plans will be prepared to ensure that project objectives are safely accomplished.

10.4.2 Land Management

Land management practices for the lands acquired for restoration shall be consistent with project purposes. As previously discussed, restoration will occur by allowing the system to return to as near a natural state, as hydrologically possible. However, some land management practices, including prescribed burning, limited livestock grazing, and fencing and posting to prevent trespassing, will be necessary.

10.4.3 Aquatic Plant Control

An integrated biological, mechanical and herbicidal program will be used to manage floating and submerged aquatic plants. The category of plant and number of acres to be treated annually, in addition to the existing program on the Kissimmee River, are projected to be: water hyacinth and water lettuce, 300 acres; hydrilla, 100 acres; tussock, 30 acres. This increase is expected because of the increased water surface area that will result from the project.

10.4.4 Navigation

After restoration, more natural hydrological and hydraulic characteristics will cause channels to migrate, become cut-off, change course, and occasionally become blocked with debris or sediments. Any required navigation maintenance will allow for evolution of the most natural channel possible.

Types of maintenance for the navigation channel include clearing snags and sandbars; maintaining a navigational marking system; and providing advisories to navigators on water conditions such as flood stages, currents, clearance under bridges, and drought stages and draft clearances at critical grade control sections. Maintenance will be limited to the minimum disturbance possible to meet navigation needs. For instance, when fallen trees block the navigation channel, maintenance will only clear the minimum channel passage and leave the remainder for channel bank habitat. Where shallows occur in the areas of the critical grade control sections they will not be dredged to provide the three-

foot project depth for navigation. Dredging shallows along the Kissimmee River would simply move the controlling depth to another critical grade control section and would not alleviate the problem of drought induced loss of minimum navigation depths. Any such low-water controlling sections would be marked with warnings to navigators.

10.4.5 Structures

The structures of the completed project include the S-65 bypass weir; S-65, S-65A and S-65E spillways; containment levees and culverts; permanent plug in Pool E; and Pool E grade control structures. These structures will be operated in accordance with the operation manuals described above. The maintenance of these structures include activities such as periodic maintenance of mechanical equipment; sand blasting and painting gates; ensuring levees are grassed and mowed to prevent erosion and settling; periodic maintenance of electrical equipment; and ensuring inlet and outlet channels are clear of snags.

10.5 PROJECT IMPLEMENTATION

10.5.1 Project Management Plan

A Project Management Plan has been prepared for the Recommended Plan to identify specific tasks to be accomplished during the next preconstruction engineering and design (PED) phase, and to identify specific contracts and construction management activities for the construction phase.

10.5.2 Construction Sequencing

The expected sequence of construction is illustrated in Figure 37. The implementation plan and schedule will be refined during later preconstruction engineering and design studies. At this time, construction is expected to proceed generally as follows:

* Real estate requirements must first be met, including land acquisitions (both fee title and easement purchases) and relocations of houses and other structures, utilities, and recreational facilities.

* Monitoring network sites will be established two years prior to construction.

* Project construction will proceed by segments until the five previously described reaches are completed. Within each segment, the sequence of construction will generally be:

First, the restored channel will be excavated.

Next, where necessary, structural modifications, such as the bridge crossings, degrading local levees and canals, and construction of levees and structures to protect tributary areas will be sequenced to take advantage of the dried flood plain before reflooding.

Next, backfilling will occur, including the construction of a plug, backfilling upstream from the plug, and, in the first and last reaches, installation of an upstream approach section above the backfill.

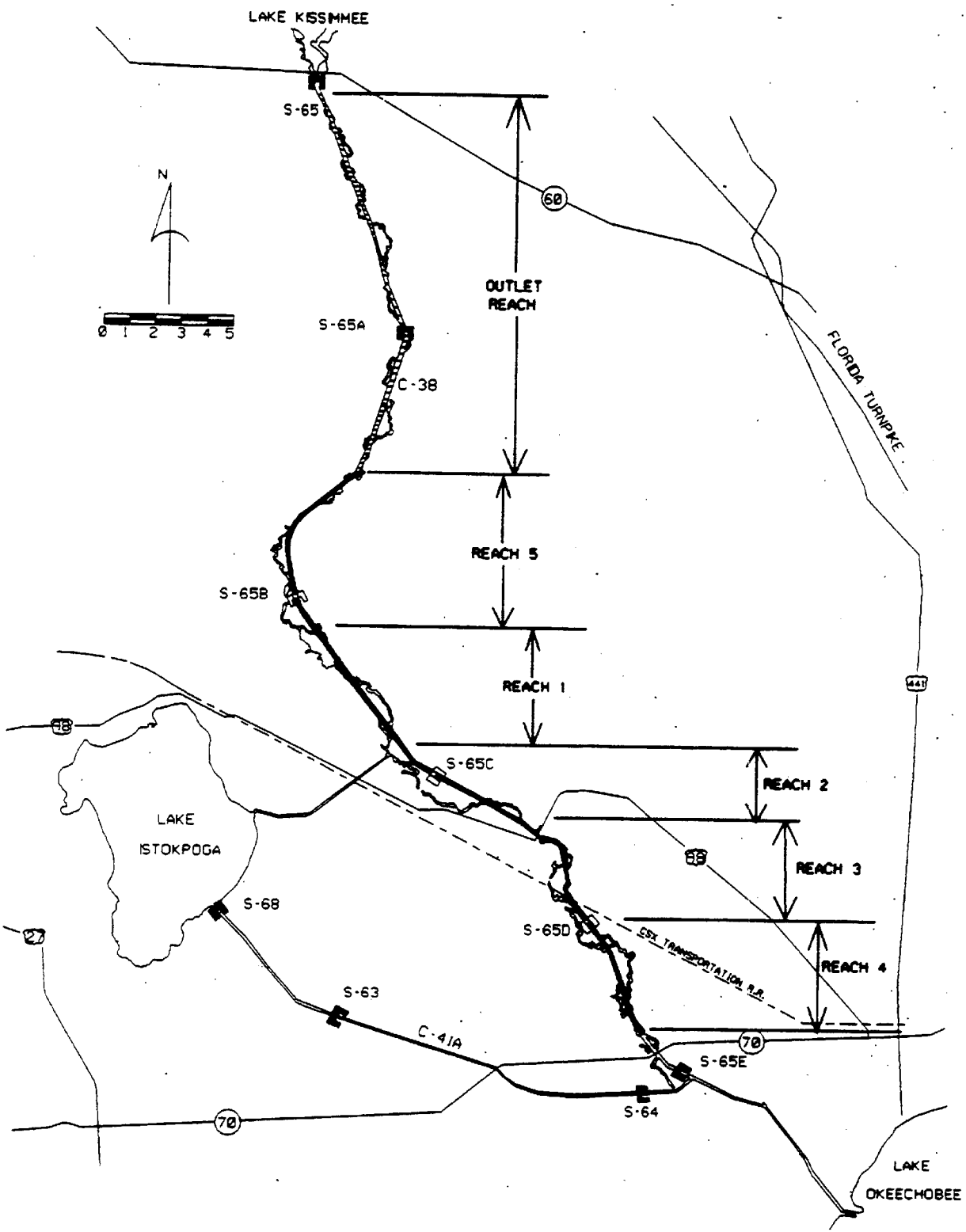
Next, remaining structural modifications will be completed. S-65 B, C and D will be removed only after the immediate downstream reaches of C-38 have been sufficiently backfilled to provide adequate backwater influence to control flow at their respective locations. Degrading tieback levees adjacent to these structures will be the last order of work for the respective reaches to preserve access during construction.

Finally, navigation aids will be provided in the original and restored river sections.

* Modifications of the Lake Kissimmee outlet reach will be completed after the final reach is backfilled.

Construction is estimated to take fifteen years to complete. Construction of the first reach is expected to be complete during the fourth year of construction. The performance of this segment will be monitored (see section on Monitoring) to determine the best construction techniques and design for the remaining segments.

The first reach is located in Pool C and construction will proceed as described above. Reaches 2 through 4 are numbered consecutively downstream with reaches 2 and 3 located in Pool D and reach 4 located in Pool E. After Reach 1 is backfilled, the downstream plug will be constructed for reach 3 (just upstream of S-65D) and backfilling will begin. Construction of Reach 2 will begin once the tailwater from the Reach 3 backfill inundates the Reach 2 plug to prevent erosive velocities. Reach 4 backfilling will then proceed in the



CONSTRUCTION SEQUENCE

FIGURE 37

manner described above with placement of the permanent plug in Pool E. The final backfilling, Reach 5, in Pool B will terminate upstream based on data collected from the monitoring program. Shallowing of the Lake Kissimmee outlet reach in Pool A will be the final order of work.

10.5.3 Environmental Protection During Construction

Corps construction contract specifications include environmental protection requirements. These requirements cover prevention of environmental pollution and damage as a result of construction operations under the contract. Environmental pollution and damage are defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for esthetic, cultural and/or historical purposes. The control of environmental pollution and damage requires consideration of air, water, and land, and includes management of visual aesthetics, noise, solid waste, radiant energy and radioactive materials, as well as other pollutants. Staging, storage and vehicle routes and parking areas are subject to advanced planning and approval by the Corps and local sponsor. The transportation and storage of petroleum products for use during construction is regulated by existing laws and by Corps regulations and practice.

Within 20 calendar days after the date of the notice of award of a contract, the construction contractor is required to submit an environmental protection plan. The contractor cannot proceed with construction until the plan is approved. The environmental protection plan includes the following:

* A list of Federal, State and local laws, regulations, and permit requirements concerning environmental protection and pollution control and abatement that are applicable to the contractor's proposed operations, and the requirements imposed by those laws, regulations, and permits.

* Methods for protection of features to be preserved within authorized work areas. The contractor shall prepare a listing of methods to protect resources needing protection, including: trees, shrubs, vines, grasses and ground cover, landscape features, air and water quality, fish and wildlife, soil, and historical, archeological and cultural resources.

* Procedures to be implemented to provide the required environmental protection and to comply with the applicable laws and regulations. The contractor shall provide written assurance that immediate corrective action will be taken to correct pollution of the environment due to accident, natural causes

or failure to follow the procedures set out in accordance with the environmental protection plan.

* Permit or license and the location of the solid waste disposal area.

* Drawings showing locations of any proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of materials.

* Environmental monitoring plans for the job site, including land, water, air and noise monitoring.

* Methods of protecting surface and ground water during construction activities. Special measures shall be specifically addressed and shall include reduction of turbidity and aeration of discharge prior to waters being released into the canal.

* Oil and fuel spill contingency plan.

* Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or non-use. The plan would include measures for marking the limits of use areas.

* Plan for any dewatering activities associated with borrow areas.

The above minimum environmental protection procedures are expected to completely prevent avoidable environmental damage during construction. Since the Kissimmee Basin surface and subsurface groundwater are separated from the underlying deep aquifer by impervious geological strata, the potential for pollution of groundwater used for human consumption is not a concern. Typical spill contingency plans and measures are intended to contain, absorb and remove pollutants from the ecosystem for disposal in previously identified approved disposal areas.

10.6 COST ESTIMATE

10.6.1 Initial Costs

The total estimated cost of the Recommended Plan is $422,667,000, at July 1991 price levels. This estimate is the "base line" estimate, and does not account for future price escalation. However, price escalation may occur during project design and construction. A full funded estimate, reflecting anticipated price escalation based on standardized future escalation factors from the Office

of Management and Budget, also has been developed to identify projected construction costs. Both the baseline cost estimate and the full funding estimate are summarized in Table 34.

TABLE 34
BASELINE AND FULL FUNDED PROJECT COST ESTIMATES

Feature Account	Baseline[1]	Full Funded[2]
02-Relocations	$8,266,000	$10,302,000
09-Channel and Canals	229,794,000	396,510,000
SUBTOTAL	$238,060,000	$406,812,000
01-Lands and Damages	116,946,000	141,237,000
30-Planning, Engineering and Design, Monitoring and Test Fill	43,854,000	80,218,000
31-Construction Management	23,807,000	54,733,000
TOTAL PROJECT COST	$422,667,000	$683,000,000

1/ Baseline construction cost estimate prepared using Corps of Engineers M-CACES system.
2/ Full funding estimate, assuming unconstrained Federal and non-Federal spending.

10.6.2 Comparison of SFWMD's Initial Costs

In developing the cost estimates included in the 1990 *Restoration Report*, SFWMD recognized that the precision of its estimates was adequate for comparing and selecting plans, but that specific budgetary decisions should not be based on these costs. SFWMD did not follow the same procedure as the Corps in developing cost estimates, and many of the features identified in the 1990 SFWMD *Restoration Report* were not included in its estimate. A comparison between SFWMD's 1990 cost estimate and the Corps' cost estimate is provided as Table 35. Refer to the section on Modifications to the Level II Backfilling Plan for an explanation of the differences between the features.

TABLE 35
COMPARISON OF COST ESTIMATE

COMPONENTS	SFWMD's 1990 PLAN[1]	CORPS' RECOMMENDED PLAN	Difference[2]
Backfill (includes: Hardened Plugs, New River Channels and Grading)	161,492,000	169,851,000	8,357,000
Revegetation	5,852,000	0	(5,852,000)
S-65 Bypass Weir	2,445,000	782,000	(1,663,000)
Outlet Channel (Shallowing)	46,398,000	33,077,000	(13,321,000)
S-65A Gate Ext & Tieback Levee	1,136,000	812,000	(324,000)
Pool B Weir Modifications	0	36,000	36,000
Structure Removals S-65B, C & D	5,173,000	3,627,000	(1,546,000)
Containment Levees:			
Lake Istokpoga	752,000	445,000	(307,000)
Yates Marsh	418,000	839,000	421,000
S-65E Modifications	56,000	0	(56,000)
Pool E Grade Control	0	5,792,000	5,792,000
Tributary Modifications	6,688,000	0	(6,688,000)
Local Levee Modifications	0	1,278,000	1,278,000
Navigation Markers	0	120,000	120,000
Construction Relocations:			
Boat Ramps	0	62,000	62,000
Bridge Crossings:			
US Highway 98	2,174,000	2,631,000	457,000
CSXT Railroad	4,640,000	5,573,000	933,000
Utilities	0	see bridges	
Demolition of Structures	0	4,196,000	4,196,000
Land Acquisition			
Lands and Easements	61,028,000	95,630,000	34,602,000
Administrative	0	11,528,000	11,528,000
Relocation Assistance	0	9,789,000	9,789,000
Mobilize/Demobilize	261,000	8,940,000	8,679,000
Monitoring during Construction	0	15,642,000	15,642,000
Test Fill	0	1,588,000	1,588,000
Engineering and Design	14,661,000	26,624,000	11,963,000
Construction Management	14,661,000	23,806,000	9,145,000
TOTAL	327,835,000	422,667,000	94,831,000

1/ Updated to July 1991 price levels; excluded Headwaters Revitalization Project costs.
2/ Numbers in parentheses represent a cost savings in the Corps' Recommended Plan over SFWMD's 1990 Plan.

10.6.3 Investment Costs

The computation of interest during construction (IDC) is based on scheduled construction expenditures. Calculation of IDC required the 20 year expenditure schedule to be divided into five distinct segments. These five segments generally coincide with the five construction reaches. It is assumed that environmental benefits will be realized during the construction period, specifically after each of these five segments is completed. Therefore, IDC is calculated separately for each segment from initiation to completion of construction. At 8 1/2 percent the IDC for the recommended plan is $80,308,000 with an average annual cost of $6,944,000.

10.6.4 Operation, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) Costs

Annual operation and maintenance costs were estimated for the components of the Recommended Plan. Replacement costs at twenty-five years were calculated for the mechanical equipment contained in the S-65 spillway structures and the Pool E flood gates. The OMRR&R costs are provided in Table 36. A comparison between SFWMD's OMRR&R cost estimates and the Corps' OMRR&R estimated costs are shown in Table 37.

10.6.5 Annual Costs

Investment costs were converted to annual costs using an interest rate of 8 1/2 percent and a project life of 50 years to compute interest and amortization. Annual operation and maintenance costs were then added to the interest and amortization costs to determine the average annual cost, which is $43,936,000 for the Recommended Plan.

TABLE 36
ANNUAL OPERATION, MAINTENANCE, REPAIR, REPLACEMENT, AND REHABILITATION COSTS

Components	Average Annual Cost
Aquatic Plant Control	75,000
Channels	55,000
S-65 Bypass Weir	10,000
S-65 Structures	217,000
Containment Levees	14,000
Culverts	6,000
Plug	23,000
Pool E Weir	10,000
Pool E Flood Gates	37,000
Total Annual OMRR&R	$447,000

TABLE 37
COMPARISON OF ANNUAL OMRR&R ESTIMATE

FEATURES	SFWMD's 1990 PLAN[1]	CORPS' RECOMMENDED PLAN	Difference
Aquatic Plant Control	0	75,000	75,000
Channels	50,000	55,000	5,000
S-65 Bypass Weir	10,000	10,000	0
S-65 Structures	70,000	217,000	147,000
Containment Levees	0	14,000	14,000
Culverts	4,000	6,000	2,000
Backfill Plug	0	23,000	23,000
Pool E Weir & Flood Gates	0	47,000	47,000
TOTAL	**$134,000**	**$447,000**	**$313,000**

1/ Updated to July 1991 price levels.

10.7 COST SHARING

10.7.1 Federal and Non-Federal Shares

Responsibilities for implementing the Recommended Plan will be shared by the Corps of Engineers, on behalf of the Federal government, and the local sponsor. The Corps will design the project and administer construction contracts to build the project. The local sponsor will be involved in the project design and will share a portion of design and construction costs; furnish necessary lands, easements, rights of way, relocation, and disposal sites (collectively referred to as LERRD); and operate and maintain the completed project.

Rules which determine how project responsibilities are shared are established in Federal law and related Administration implementing policies for individual project purposes. For Kissimmee River restoration and any other proposal for modification of an existing water resources development by removal of one or more of the project features which would adversely impact the authorized project purposes or output, Corps policy requires that:

* LERRD will be provided by the non-Federal sponsor.

* 50% of the construction cost, including preconstruction engineering and design costs, be provided in cash by the non-Federal sponsor.

* All future OMRR&R for the restoration project will be accomplished by the non-Federal sponsor at 100% non-Federal cost.

In addition, Corps policy requires that costs for locally preferred project features be funded by the non-Federal sponsor. The Lake Kissimmee outlet reach modifications, including shallowing and weirs in the remaining unfilled reach of C-38 between S-65 and the upstream limit of backfilling in Pool B, and the modifications to the existing Pool B weirs are the locally preferred features of the recommended plan.

Table 38 contains an apportionment of project costs between the Federal government and the local sponsor based on these cost sharing provisions. The sponsor will also be expected to bear all OMRR&R expenses after the project is completed.

TABLE 38
COST APPORTIONMENT OF RECOMMENDED PLAN

ITEM	TOTAL	FEDERAL	NON-FEDERAL
Construction[1]	$254,295,000	$127,147,500	$127,147,500
Lands, Easements, Rights-of-way	116,946,000		$116,946,000
Relocations[2]	9,086,000		9,086,000
SUBTOTAL	$380,327,000	$127,147,500	$253,179,500
Locally Preferred Features[3]	$42,340,000		$42,340,000
TOTAL	$422,667,000	$127,147,500	$295,519,500

1/ Includes PED and Construction Management costs, but excludes locally preferred features.
2/ Includes associated PED and Construction Management.
3/ Includes construction, PED and Construction Management.

10.7.2 Preliminary Credit Analysis

The Headwaters Revitalization Project is a critical component of Kissimmee River restoration. Accordingly, credit against the non-Federal cost share for 75 percent of the value of LERRD costs incurred by the non-Federal sponsor as part of the Headwaters Revitalization Project authorized and approved pursuant to the standing continuing authority of Section 1135 of the Water Resources Development Act of 1986, as amended, will be recommended.

Table 39 shows a preliminary cost estimate for the Headwaters Revitalization Project to be accomplished under Section 1135. A detailed cost estimate for the Section 1135 project will be developed as planning and design of that project proceeds. For the purposes of this preliminary credit analysis, the Headwaters Revitalization Project was considered compatible work which is not part of the project to be authorized (external work). Based on the preliminary cost estimate for the Headwaters Revitalization Project, the value of credit is estimated to be $56,082,000.

TABLE 39
HEADWATERS REVITALIZATION SECTION 1135 PROJECT
PRELIMINARY COST ESTIMATE

Feature Account	Cost
09-Channel and Canals	$12,652,000
01-Lands and Damages	74,776,000
30-Monitoring	180,000
30-Planning, Engineering and Design	2,796,000
31-Construction Management	886,000
TOTAL PROJECT COST	$91,290,000

10.8 FINANCIAL ANALYSIS

It is expected that the SFWMD will have the capability to provide the required local cooperation for the Recommended Plan. The SFWMD has provided a statement of financial capability which is included in the Local Cooperation and Financial Analysis Appendix. The project cost estimate and schedule has been provided to the SFWMD so that it may develop a financing plan. A financial analysis will be conducted to assess the SFWMD's capability to financially participate in the Recommended Plan.

10.9 LOCAL COOPERATION

The project's non-Federal sponsor must provide its share of project costs, including LERRD and cash for construction and later OMRR&R costs, as described above. LERRD are to be furnished to the Federal government prior to the advertisement of any construction contract which involves those LERRD. In providing LERRD, the sponsor must comply with the provisions of the Uniform Relocations Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646), as amended. Any required cash payments for project construction costs are to be made during construction at a rate proportional to Federal expenditures. The sponsor's share of preconstruction engineering and design costs will be repaid during the first year of construction. The sponsor is also required to pay all costs associated with locally preferred features of the

Recommended Plan, such as the Lake Kissimmee outlet reach modifications and the modifications to the existing Pool B weirs.

A project may be initiated only after the sponsor has entered into a binding local cooperation agreement (LCA) with the Department of the Army, which is normally negotiated during the preconstruction engineering and design phase. The LCA assigns Federal and non-Federal responsibilities, which, for this Kissimmee River restoration project, will include the following items of local cooperation:

a. Provide all lands, easements, rights-of-way, relocations and suitable borrow and dredged material disposal areas;

b. Provide during the period of construction a cash contribution of 50 percent of the construction cost of the project;

c. Pay during the period of construction all costs for locally preferred features of the recommended plan;

d. Hold and save the United States free from damages due to the construction, operation, or maintenance of the project except those damages due to the fault or negligence of the United States or its contractors;

e. Operate, maintain, repair, replace, and rehabilitate the completed project in accordance with regulations prescribed by the Secretary of the Army;

f. Ensure that lands acquired for environmental restoration are not used for purposes incompatible with such restoration and prevent future encroachment or modifications which might interfere with proper functioning of the project;

g. Participate in the National Flood Insurance Program and other applicable Federal flood plain management programs;

h. Provide guidance and leadership to prevent unwise future development in the flood plain;

i. Assume financial responsibility for all costs incurred in cleanup of hazardous materials located on project lands covered under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), for which no cost sharing credit shall be given, and operate, maintain, repair, replace, and rehabilitate the project in a manner so that liability will not arise under CERCLA.

10.10 SPONSOR VIEWS

The SFWMD developed and recommended the Level II Backfilling Plan upon which the Recommended Plan is based. As the non-Federal sponsor of this feasibility study, the SFWMD has worked very closely in partnership with the Corps to ensure that the study and this report fairly and accurately reflected their views. On November 19, 1991, the SFWMD provided a Letter of Intent which indicated their strong support for the recommended plan and their desire to continue discussions to develop a cost sharing formula acceptable to the State of Florida and the Federal government. The SFWMD's November 19 Letter of Intent is included in Annex A.

SECTION 11

PUBLIC INVOLVEMENT, REVIEW AND CONSULTATION

This section describes the public involvement activities conducted by the Corps and the SFWMD during the current Federal feasibility study for environmental restoration of the Kissimmee River, Florida.

11.1 PUBLIC INVOLVEMENT PROGRAM

Extensive public involvement activities have been integral to all work since the existing Kissimmee River project was completed in 1972. Complete descriptions of the public involvement programs that preceded this feasibility study before 1991 are available in the following documents:

* *Central and Southern Florida, Kissimmee River, Florida, Final Feasibility Report and Environmental Impact Statement, Appendix F.* (Jacksonville District, U.S. Army Corps of Engineers. September 1985.) - Appendix F, Public Involvement, Views and Responses, describes public involvement during the Corps' first Federal Feasibility study of the Kissimmee River, covering the period 1978 - 1985.

* *Kissimmee River Restoration, Alternative Plan Evaluation and Preliminary Design Report, Appendix B.* (SFWMD. June 1990.) - Appendix B, Public Input Survey/Questionnaire Results, summarizes the results of a June 1989 public opinion survey concerning restoration of the Kissimmee River.

* Letter of July 9, 1991, SFWMD to Jacksonville District, U.S. Army Corps of Engineers, subject: "Public Involvement Appendix and Monitoring Program, Kissimmee River Restoration Feasibility Study" - An enclosure to the letter describes public involvement since the project was completed, particularly during the SFWMD restoration study from 1984-1990.

11.2 REVIEW CONFERENCES

Six review conferences involving various study interests were conducted during the feasibility study to review work and decide courses of action related to specific policy and technical issues. These conferences were:

* **Special Resolution Conference (SRC),** February 6-7, 1991, Jacksonville, Florida. Representatives of the SFWMD, the Office of the Assistant Secretary of the Army for Civil Works, and the Corps met to resolve policy and procedural issues regarding the Kissimmee River Section 1135 proposal and the feasibility study authorized by the Water Resources Development Act of 1990.

* **Interagency Environmental Planning Conference**, April 10, 1991, Jacksonville, Florida, and April 11-12, 1991, River Ranch, Florida. Representatives of the SFWMD, the Florida Game and Fresh Water Fish Commission, the U.S. Fish and Wildlife Service, and the Corps met to discuss technical aspects of the project's environmental analyses.

* **Hydrology and Hydraulics Technical Review Conference,** May 15-16, 1991, River Ranch, Florida, and May 20-22, 1991, Berkeley, California. Representatives of the SFWMD and the Corps met to discuss technical aspects of project hydrology and hydraulics, including a demonstration of the Kissimmee River Pool B physical model at the University of California at Berkeley.

* **Checkpoint Conference**, June 20, 1991, Jacksonville, Florida. Representatives of the SFWMD, the Assistant Secretary of the Army for Civil Works, and the Corps met to review study progress in implementing guidance developed during the Special Resolution Conference.

* **Meeting of the Scientific Advisory Panel for Environmental Monitoring of Kissimmee River Restoration**, July 16-18, 1991, River Ranch, Florida. Representatives of the SFWMD, the Florida Department of Natural Resources, the Florida Department of Environmental Regulation, the Florida Game and Fresh Water Fish Commission, the U.S. Fish and Wildlife Service, and the Corps met to better define monitoring of project environmental effects.

* **Feasibility Review Conference,** September 5-6, 1991, Jacksonville, Florida. Representatives of the SFWMD, the Assistant Secretary of the Army for Civil Works, the U.S. Fish and Wildlife Service, the Florida Game and Fresh Water Fish Commission, the Florida Department of Natural Resources, and the Corps met to provide the sponsor with as much assurance as possible about the Army position of the study recommendations, to facilitate Federal agency review, and to obtain Washington-level commitment to the recommendations.

11.3 CONTINUING COORDINATION

Continuing coordination has been maintained in two special areas of the study. First, frequent communication has been maintained with the SFWMD, as the study's non-Federal cost sharing partner, on day-to-day progress and general questions concerning the previous restoration study. The sponsor has generously provided assistance in attending meetings, writing draft materials, and other activities in accordance with the Feasibility Cost Sharing Agreement (FCSA).

Second, continuing coordination was maintained with various experts in biological sciences representing interested environmental agencies, including the SFWMD, the Florida Game and Fresh Water Fish Commission, the Florida Department of Environmental Regulation, the U.S. Fish and Wildlife Service, and the Corps in conducting environmental studies, such as the habitat evaluation procedures analysis and forecasting future environmental conditions. Coordination has occurred over a series of meetings and through frequent exchanges of correspondence and conversations among the involved experts. Results of this coordination are documented in the Fish and Wildlife Coordination Act Report in Annex E and the record of environmental outputs in Annex G.

11.4 SCOPING

Scoping was accomplished in accordance with the requirements of the Council on Environmental Quality's regulations implementing the procedural provisions of the National Environmental Policy Act (NEPA) of 1969, as amended (40 CFR 1501.7). A scoping notice was published in the April 4, 1991 *Federal Register*, and a scoping letter was sent to interested parties on April 25, 1991.

In response to these scoping requests, comments were received from the Florida State Clearinghouse (Office of the Governor) by letter of June 18, 1991; a copy of the letter is in Annex A. The Clearinghouse noted the need for a coastal zone consistency determination; the requested determination is included in Annex C. Comments attached to the Clearinghouse letter included:

* Florida State Historic Preservation Officer (letter of June 12, 1991) - Potential effects on cultural resources were noted by the SHPO; the Corps is developing a detailed plan for further cultural resource studies and will conduct detailed investigations during the later preconstruction engineering and design stage.

* Florida Department of Environmental Regulation (letter of June 11, 1991) - The Department expressed support for the "innovative restoration project". By letter of July 22, 1991, the Department stated that no unresolvable obstacles to permitting the project are evident at this time, provided the selected plan is designed to minimize adverse effects on existing wetlands, and that the Headwaters Revitalization Project is permitted and in place before the permit application for the Lower Basin works is completed. The Recommended Plan has been designed to minimize adverse effects on wetlands; effects are described in the Section 404(b)(1) evaluation (see Annex B) and throughout this report. With regard to scheduling, we recognize that it is critical to have the Headwaters Revitalization Project in place prior to completing the first phase of backfilling construction of the Lower Basin to realize the restoration benefits.

* Florida Department of Transportation (letter of May 24, 1991) - Potential effects on transportation routes were noted. This report addresses temporary relocations of transportation routes during construction; continuing coordination will be maintained with the Department.

* Florida Game and Fresh Water Fish Commission (letter of May 20, 1991) - The Commission noted its role in the study.

11.5 OTHER REQUIRED COORDINATION

In addition to the scoping required by NEPA, coordination required by other Federal laws and regulations has been conducted with the following agencies:

* U.S. Fish and Wildlife Service - A final Fish and Wildlife Coordination Act Report has been prepared and is included at Annex E. Recommendations in the final report, and responses, were as follows:

a. The Service endorsed and supported the Recommended Plan, with the addition of several other measures.

b. The Service recommended the addition of Paradise Run to the Recommended Plan. Although the Corps considered the addition of Paradise Run improvements, there is no non-Federal sponsor for this feature at this time (see Section 9). Therefore, Paradise Run was not included in the plan.

c. The Service recommended flow-through marsh and pool stage manipulation in Pool A. The Recommended Plan includes shallowing in Pool A and upper Pool B and gated weirs to divert flows into original

river channels as a locally preferred feature; see Section 10. These measures will promote wetland inundation in Pool A as intended by the Service's recommendation.

d. The Service recommended monitoring of endangered species during construction and for ten years after construction. As described in Section 10, the Recommended Plan includes an extensive ecological monitoring program which is continuing to be developed and refined by experts in the Corps, the SFWMD, and other responsible agencies and interests. The Corps will participate in monitoring before and during construction that is necessary to support decisions about further design modifications that could be made to improve the project. The SFWMD recommends continuing monitoring beyond the construction period.

e. The Service recommended development of a wildlife management plan which considers prescribed burning and cattle grazing in the flood plain. Land management practices, including prescribed burning and limited livestock grazing, will be necessary as described in Section 10.

* Florida Game and Fresh Water Fish Commission - Commission representatives participated with the U.S. Fish and Wildlife Service in preparing the Coordination Act Report.

* Florida State Historic Officer (SHPO) - Coordination has been ongoing with the SHPO in accordance with the Advisory Council on Historic Preservation's procedures.

11.6 REVIEW OF THE DRAFT INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT

The draft integrated feasibility report and environmental impact statement was sent to numerous local, State and Federal agencies and private interest groups for review and comment in accordance with the Council on Environmental Quality's NEPA regulations and related Corps guidance. Comments received during the review were considered in preparing the final study documents, and will be considered by subsequent reviewers and decision makers in the Washington level Federal review process.

11.6.1 Report and EIS Recipients

The following agencies, groups and individuals were sent copies of the integrated feasibility report and EIS.

Federal Agencies

Department of Agriculture
Department of the Air Force
U.S. Department of Commerce
Department of Energy
Department of Health and Human Services
Department of Housing and Urban Development
Department of the Interior
Environmental Protection Agency
Federal Emergency Management Agency
Federal Maritime Commission
Advisory Council on Historic Preservation

State and Local Government

Governor of Florida
Executive Office of the Governor
The Florida Legislature
Florida State Clearinghouse
Florida Office of Planning and Budgeting
Florida Division of Historical Resources - SHPO
Florida Department of Environmental Regulation
Florida Department of Natural Resources
Florida Department of Transportation
Florida Game and Fresh Water Fish Commission
South Florida Water Management District
Okeechobee County
Highlands County

Groups

Miccosukee Tribe of Indians of Florida
Dairy Farmers, Inc.
State Wetland Managers Association
National Audubon Society
Florida Audubon Society
Environmental Defense Fund
Izaak Walton League of America, Inc.
Florida Wildlife Federation
Florida Defenders of the Environment
The Wilderness Society
Sierra Club, Florida Chapter
1000 Friends of Florida
Nature Conservancy, Florida Chapter

Florida Lake Management Society
Okeechobee Homeowners Association
River Acres Homeowners Association
Chain of Lakes Property Owners, Inc.

Individuals

A list of individuals who received the draft integrated feasibility report and EIS is on file in the Jacksonville District at the address shown on the cover page of this document.

11.6.2 Comments and Responses

The draft integrated feasibility report and EIS were distributed for a 45-day public review on 27 September 1991. Review comments were received from the following:

Federal Agencies

Department of the Air Force
Department of Health and Human Services
Department of Housing and Urban Development
Department of the Interior
Environmental Protection Agency

State of Florida

Governor of Florida
Department of Environmental Regulation
Department of Natural Resources
Department of State (State Historic Preservation Officer)
Department of Transportation
Game and Fresh Water Fish Commission
South Florida Water Management District

Local Government Agencies

Highlands County, Board of County Commissioners
Manatee County, Environmental Action Commission

Groups

Audubon Society of the Everglades
Florida Bi-Partisans Civic Affairs Group
Florida Farm Bureau Federation
Florida Wildlife Federation

Hidden Acres Estates
Ridge Audubon Society
Sierra Club, Broward County
Sierra Club, Central Florida Group
Sierra Club, The Florida Chapter
Sierra Club, Manatee-Sarasota Group
Sierra Club, Southeast Office
Sierra Club, Turtle Coast Group

Individuals

About five hundred individuals responded in letters, post cards and petitions.

Comments received during the draft report review, and the responses to these comments are included in Annex A of this report. The major themes expressed in the comments were:

* Support for Restoration - Many agencies, interest groups and individuals expressed support for restoration of the Kissimmee River, noting that it would produce a variety of beneficial environmental effects, including improvements to Lake Okeechobee and the Everglades. Prompt action to implement the Recommended Plan was encouraged.

* Concerns of Residents - Many residents whose homes may be acquired expressed concerns about the need for the project, priorities other than environmental restoration for government funding, and fair compensation for their property. The Corps and the SFWMD are aware of these concerns and will continue to work with affected residents to ensure that they are fully informed and involved in further development of the project.

* Cost Sharing - The Governor and several State agencies, groups and individuals endorsed using the established Corps cost sharing policy for fish and wildlife restoration, which would require a non-Federal contribution of 25% of the project's cost, as the basis for sharing project costs. While this traditional policy would apply in many cases, in other cases where modification of an existing water resources development requires removal of one or more project features which would adversely impact authorized project purposes or outputs (such as the Recommended Plan for Kissimmee River restoration), Corps policy requires that the non-Federal sponsor pay for: all lands, easements, rights-of-way, relocations, and disposal areas; 50% of the project's construction cost; and all future costs for project operation, maintenance, repair, replacement and rehabilitation.

* Avon Park Air Force Range - The Department of the Air Force noted several concerns about potential project effects on operations at Avon Park Air Force Range, including bird-aircraft strike hazards, security, public safety, target maintenance, and cattle grazing. The Corps and SFWMD are continuing to work with Air Force representatives to resolve these concerns.

* Additional Restoration Features - The Department of the Interior and the Florida Department of Environmental Regulation suggested that additional restoration features be added to the Recommended Plan, including Paradise Run, shallowing in the Lake Kissimmee Outlet Reach, and marsh development adjacent to the Lake Kissimmee Outlet Reach. While restoration of Paradise Run and marsh development along the Outlet Reach are not included due to lack of a local sponsor, shallowing of the Outlet Reach is included in the Recommended Plan as a locally preferred feature.

* Technical Corrections - Several agencies provided comments on technical questions related to water quality, wetlands, waterfowl, and historic sites. Specific comments and responses are discussed in Annex A, and appropriate corrections have been made in the integrated feasibility report and EIS.

11.7 PUBLIC MEETINGS

Three public meetings were conducted during the draft report review period to provide all members of the public with an opportunity to better understand and discuss the results of the Corps' feasibility study. These meetings were held as follows:

October 1, 1991, at the Okeechobee Civic Center.

October 2, 1991, at the Kissimmee City Hall.

October 3, 1991, at the Sebring City Hall.

Each of the public meetings was videotaped by the South Florida Water Management District. From these videotapes, a transcript was made which serves as the official record of each meeting. At each public meeting, background information on the study was presented and the recommended plan was described in detail. The public was then provided the opportunity to express their views on the feasibility study and to ask questions.

The meeting in Okeechobee was attended by over 200 people. Many of the speakers were landowners whose homes, farms, or businesses would be impacted as part of the recommended plan and they expressed their opposition to the project. Residents of the Hidden Acres and River Acres communities

were opposed to their communities being acquired either partially or fully. Representatives and owners of dairy farms were concerned that their businesses would be adversely affected. Many of the speakers expressed concern about adverse effects on the local economy such as jobs which would be lost. There was also concern about the large amount of land that would be removed from the tax rolls and the adverse effect that would have. The Okeechobee County manager presented a resolution from the County Board of Commissioners opposing the project. A number of speakers also were concerned about the cost of the project. Representatives of environmental groups expressed support for the recommended plan.

The meeting in Kissimmee was attended by about 60 people. Many of the speakers expressed concern about the Headwaters Revitalization project and its effect on flood control and navigation. Specifically, there was concern about the results of regulation schedules for the Kissimmee group of lakes and the backfilling in the Lower Basin and the affect to the existing level of flood control. Navigation interests were opposed to the project due to the possible impact to navigation. There was also a concern that some of the larger boats would not be able to navigate the meandering river. A number of speakers also expressed concern about the cost of the recommended plan. Representatives of environmental groups expressed support for the recommended plan.

The meeting in Sebring was attended by about 45 people. Many of the speakers were concerned about the effect on property owners. Specifically, they feel properties needed for the Recommended Plan would be acquired at a token of their values, and the State may claim properties without compensation. Agricultural representatives were concerned about the effects on agriculture in the study area. A number of speakers were concerned about the cost of the project. Navigation interests were opposed to the project due to the possible impact on navigation. A concern was expressed that the regulation schedules for the Kissimmee group of lakes would adversely effect the existing level of flood protection. Fishermen spoke out against the project stating that since the demonstration project, the fishing resources has declined substantially. Individuals from surrounding communities expressed support for the recommended plan.

In addition to the three public meetings, the SFWMD Governing Board workshop on October 9, 1991, provided the public with information concerning this study and afforded the public the opportunity to speak.

As a result of public comment at the three meetings, social and agricultural impact studies were completed. Conclusions from these studies are to fully implement flood proofing measures where feasible to minimize impacts to property owners and agricultural businesses.

SECTION 12

RECOMMENDATIONS

I recommend that the Central and Southern Florida Project be modified to allow for the environmental restoration of the Kissimmee River; and that the modified Level II Backfilling plan for restoration of the Kissimmee River, described in the chapter of this report entitled "The Recommended Plan", be implemented as a Federal project with such modifications thereof as in the discretion of the Commander, HQUSACE, may be advisable. The total estimated cost of the recommended plan is $422,677,000. The estimated Federal cost is $127,147,500 and the estimated non-Federal cost is $295,519,500.

I also recommend that the non-Federal sponsor be authorized credit for 75% of the value of lands, easements, rights-of-way, relocations and disposal areas provided for Headwaters Revitalization improvements under Section 1135 of the Water Resources Development Act of 1986, as amended, which are necessary to achieve the benefits of the Kissimmee River restoration project.

The above recommendations are made with the provision that prior to project implementation, the non-Federal sponsor shall enter into a binding agreement with the Secretary of the Army to perform the following items of local cooperation:

a. Provide all lands, easements, rights-of-way, relocations and suitable borrow and dredged material disposal areas;

b. Provide during the period of construction a cash contribution of 50 percent of the construction cost of the project;

c. Pay during the period of construction all costs for locally preferred features of the recommended plan;

d. Hold and save the United States free from damages due to the construction, operation, or maintenance of the project except those damages due to the fault or negligence of the United States or its contractors;

e. Operate, maintain, repair, replace, and rehabilitate the completed project in accordance with regulations prescribed by the Secretary of the Army;

f. Ensure that lands acquired for environmental restoration are not used for purposes incompatible with such restoration and prevent future

encroachment or modifications which might interfere with proper functioning of the project;

g. Participate in the National Flood Insurance Program and other applicable Federal flood plain management programs;

h. Provide guidance and leadership to prevent unwise future development in the flood plain;

i. Assume financial responsibility for all costs incurred in cleanup of hazardous materials located on project lands covered under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), for which no cost sharing credit shall be given, and operate, maintain, repair, replace, and rehabilitate the project in a manner so that liability will not arise under CERCLA.

The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the sponsor, the States, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

TERRENCE C. SALT
Colonel, Corps of Engineers
Commanding

SECTION 13

LIST OF PREPARERS

The people who were primarily responsible for contributing to preparing this Environmental Impact Statement are listed in Table 40.

TABLE 40

KISSIMMEE RIVER RESTORATION
LIST OF PREPARERS

NAME	DISCIPLINE/ EXPERTISE	EXPERIENCE	ROLE IN PREPARING DOCUMENT
Stuart J. Appelbaum	Civil Engineer	14 years water resources planning, Corps of Engineers	Report-EIS preparation; review and supervision
Gerald L. Atmar	Biology	15 years environmental impact assessment, Corps of Engineers	Report-EIS preparation; review and supervision
Arnold Banner	Fish and Wildlife	USFWS, Vero Beach	Fish and Wildlife coordination Act Report, Planning partners
Rea N. Boothby	Biology	17 years environmental impact assessment, Corps of Engineers	EIS preparation
Annon I. Bozeman, Jr	Outdoor Recreation Planner	12 years recreation design, construction and development	Aesthetics and Recreation
Joseph Carroll	Biology	USFWS, Vero Beach	Fish and Wildlife coordination Act Report, Planning partners
John B. Cruce	Water Resources Planning	11 years water resources planning, Corps of Engineers	Report-EIS preparation
William J. Lang, Jr.	Biology	12 years fish and wildlife biology, USFWS and Corps of Engineers	Report-EIS preparation
Richard A. Macomber	Biology	30 years fish and wildlife biology, USFWS and Corps of Engineers	Effects on fish and wildlife
James McAdams	Environmental Engineer	10 years water resources planning, Corps of Engineers	Water quality assessment
David L. McCullough	Archeology	10 years environmental and cultural resources assessment	Cultural Resources evaluation, coordination
Kenneth D. Orth	Water Resources Planning	18 years water resources planning, Corps of Engineers	Report-EIS preparation
Russell V. Reed	Civil Engineer	2 years water resources planning, Corps of Engineers	Report-EIS preparation; study manager
Patricia Sculley	Civil Engineer	South Florida Water Management District	Project Management
Louis A. Toth	Aquatic Ecology	South Florida Water Management District	Ecosystem effects of restoration alternatives

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ANNEX A

PUBLIC VIEWS AND RESPONSES

South Florida Water Management District

3301 Gun Club Road • P.O. Box 24680 • West Palm Beach, FL 33416-4680 • (407) 686-8800 • FL WATS 1-800-432-2045

PRO KRR RF: 92039

November 19, 1991

Colonel Terrence C. Salt
District Engineer, Jacksonville District
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville FL 32232-0019

Dear Colonel Salt:

Restoration of the Kissimmee River, headwaters of the unique Kissimmee-Okeechobee-Everglades system, has been a major environmental priority for the State of Florida since the mid-1970's. Since 1984 the South Florida Water Management District (SFWMD) has taken the lead role and has invested more than $4 million in a series of studies designed to provide a comprehensive planning approach for the Kissimmee River Restoration. We have spent more than $35 million to buy land in the flood plain. The State's and this agency's performance to date in support of the Kissimmee River Restoration Project clearly demonstrates the financial commitment to completing this project.

We strongly support the U.S.A.C.O.E. recommended plan for restoration of the Kissimmee River and the Upper Basin works. This plan provides an effective solution to meet fish and wildlife restoration objectives with no significant impacts to the original project's purposes. This agency and the State are committed to continuing the development of a partnership with the Federal Government which will foster the restoration of the Kissimmee River as a critical component of the unparalleled Everglades system.

However, the recommendation that the local sponsor provide all land interest plus 50% of construction cost is not equitable and in keeping with past Federal policy. We believe that a 75 percent Federal to 25 percent non-Federal cost sharing of the total project cost is in line with the Federal law and policies addressing fish and wildlife restoration.

I would appreciate your help in arranging further discussions with the Assistant Secretary of the Army to see what can be done to limit the total project costs and develop a cost sharing formula that is acceptable to the State of Florida and the Federal Government.

Sincerely,

Tilford C. Creel
Executive Director

c: Governor Lawton Chiles
Senator Bob Graham
Senator Connie Mack
Nancy Dorn, ASA (CW)
Carol Browner, Secretary, DER
Florida Delegation of the U.S. Congress

Governing Board
Allan Milledge, Chairman - Miami
Valerie Boyd, Vice Chairman - Naples
Ken Adams - West Palm Beach
James E. Nall - Fort Lauderdale
Annie Betancourt - Miami
Franklin B. Mann - Fort Myers
Leah G. Schad - West Palm Beach
Frank Williamson, Jr. - Okeechobee
Eugene K. Pettis - Fort Lauderdale
Tilford C. Creel, Executive Director
Thomas K. MacVicar, Deputy Executive Director

STATE OF FLORIDA

Office of the Governor

THE CAPITOL
TALLAHASSEE, FLORIDA 32399-0001

LAWTON CHILES
GOVERNOR

June 18, 1991

Mr. A. J. Salem, Chief
Planning Division
Department of the Army
Jacksonville Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

RE: Draft Environmental Impact Statement - Kissimmee River Restoration Study in Polk, Osceola, Highlands and Okeechobee Counties, Florida

SAI: FL9104291481C

Dear Mr. Salem:

The Florida State Clearinghouse, pursuant to Presidential Executive Order 12372, Gubernatorial Executive Order 83-150, the Coastal Zone Management Act Reauthorization Amendments of 1990 and the National Environmental Policy Act, has coordinated a review of the above referenced project.

Pursuant to Presidential Executive Order 12372, the project will be in accord with State plans, programs, procedures and objectives when consideration is given to and action taken on the enclosed comments and requirements of our reviewing agencies.

The federal agency did not provide a federal consistency determination for this project in accordance with 15 CFR 930, subpart C. However, the State has completed a review of the project information available at this time. Based on this information, the project at this stage is consistent with the Florida Coastal Management Program. Although the State does not object to the proposed work, we have identified several issues which must be resolved as the project progresses through later stages of planning, design and funding. As required by 15 CFR 930.34 and .37, at each major point of decision-making the federal agency is required to submit a consistency determination for the State's review. The format and content of the determination are described in 15 CFR 930.34 - .39. The State's continued agreement with this project will be based, in part, on adequate reconciliation of previously identified concerns.

This letter reflects your compliance with Presidential Executive Order 12372.

Sincerely,

Janice L. Alcott

Janice L. Alcott, Director
State Clearinghouse

JLA/rt

Enclosure(s)

cc: Department of State
Department of Environmental Regulation
Department of Transportation
Game and Fresh Water Fish Commission

FLORIDA DEPARTMENT OF STATE
Jim Smith
Secretary of State
DIVISION OF HISTORICAL RESOURCES
R.A. Gray Building
500 South Bronough
Tallahassee, Florida 32399-0250
Director's Office (904) 488-1480
Telecopier Number (FAX) (904) 488-3353

RECEIVED
JUN 17 1991
STATE CLEARINGHOUSE

June 12, 1991

Ms. Janice L. Alcott, Director
State Planning and Development
Clearinghouse
Office of Planning and Budgeting
The Capitol
Tallahassee, Florida 32399-0001

In Reply Refer To:
Susan Hammersten
Historic Sites
Specialist
(904) 487-2333
Project File No. 911218

RE: Cultural Resource Assessment Request
SAI# FL9104291481C
U.S. Army Corps of Engineers, Planning Division,
Environmental Resources Branch
Kissimmee River Restoration Study, Draft EIS
Polk, Osceola, Highlands, and Okeechobee Counties, Florida

Dear Ms. Alcott:

In accordance with the procedures contained in 36 C.F.R., Part 800 ("Protection of Historic Properties"), we have reviewed the above referenced project for possible impacts to archaeological and historical sites or properties listed, or eligible for listing, in the National Register of Historic Places. The authority for this procedure is the National Historic Preservation Act of 1966 (Public Law 89-665), as amended.

We have reviewed the information concerning the Level II Backfilling Plan provided to us by the Army Corps of Engineers via your letter dated May 3, 1991. Because the plan is still in the feasibility and Draft Environmental Impact Statement phases, and due to the general nature of the information concerning the plan, we cannot comment specifically as to its potential impacts on historical resources at this time. We can, however, comment on the nature of the activities involved in the Backfilling Plan. It is the opinion of this agency that the majority of the work outlined in the Backfilling Plan has the potential to adversely affect potentially significant historical resources.

As outlined in your letter, the Plan includes six different activities in the backfilling phase of the project.

1) Backfilling 25-30 miles of Canal 38
   It is our opinion that this activity is unlikely to affect any potentially significant historical resources.

2) Removal of spillways, boat locks and auxiliary structures
   It is our understanding that the infrastructure of these structures will be left in the ground intact. Based on this information, it is our opinion that this activity is unlikely to affect any significant historical resources.

3) Creation of new river channels as needed
   Because it involves ground disturbance, this activity has the potential to disturb known and previously unrecorded archaeological and historic sites.

4) Modification of bridges
   Because this activity may involve ground disturbance as well as the possible relocation of existing rights-of-way, it may adversely affect known or undiscovered archaeological and historic sites.

5) Maintenance of navigation along restored river
   Depending upon the areas to be dredged and the placement of the spoil, this activity may adversely affect historical resources.

6) Increasing water storage capacity and release capability in the headwaters above S-65
   More information is needed as to exactly how this activity will be accomplished. However, any increase in water storage in the river channel has the potential to flood existing sites and any decrease in water storage has the potential to expose previously flooded sites thus damaging any historical material remains contained in the site.

In order to avoid these potential effects, this office will be working closely with Corps personnel as this project develops. As we receive more detailed information about this project, we will be able to comment in a more specific manner as to each activity in the Backfilling Plan.

If you have any questions concerning our comments, please do not hesitate to contact us. Your interest in protecting Florida's archaeological and historic resources is appreciated.

Sincerely,

Suzanne P. Walker

for George W. Percy, Director
Division of Historical Resources
and
State Historic Preservation Officer

GWP/slh

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

June 11, 1991

Janice L. Alcott
Director, State Clearinghouse
Office of Planning and Budgeting
Budget Management and Planning Policy Unit
Executive Office of the Governor
The Capitol
Tallahassee, Florida 32399-0001

RECEIVED
JUN 14 1991
STATE CLEARINGHOUSE

RE: COE, Kissimmee River Restoration, Level II Backfilling
SAI: FL9104291481C

Dear Ms. Alcott:

We are very pleased with the decision of the Army Corps of Engineers (ACOE) to initiate the Feasibility Study and Draft Environmental Impact Statement (DEIS) for the Kissimmee River Restoration. The preferred alternative, "Level II Backfilling" was chosen, which will provide the highest level of flood plain and original river channel restoration. The South Florida Water Management District, who has been working very closely with the ACOE, is very pleased with the ACOE's progress toward the Feasibility Study and DEIS. We fully support this innovative restoration project.

Sincerely,

Stephen Brooker

Stephen Brooker
Environmental Specialist II
Intergovernmental Coordination Section
Division of Water Management

TSB/tsb

Recycled Paper

FLORIDA DEPARTMENT OF TRANSPORTATION
BOB MARTINEZ
GOVERNOR
BEN G. WATTS
SECRETARY

Project Development
P.O. Box 1249
Bartow, FL 33830

May 24, 1991

Director, State Clearinghouse
Office of Planning and Budgeting
Executive Office of the Governor
The Capitol
Tallahassee, FL 32399-0001

RE: SAI # FL 9104291481C
Kissimmee River Restoration

Dear Sir:

The FDOT has reviewed the Notification for the referenced project and offers the following comments.

1. The SR 70 Corridor is being defined as part of the Florida Intrastate Highway System. This is in recognition of the need for an improved east-west route across the state. Specific alignments can only be defined once a corridor-level PD&E study is undertaken. This improvement would likely necessitate the eventual construction of another two-lane bridge structure over the Kissimmee River. Improvements to the existing structure would probably also be needed.

2. It should also be noted that the CSX Railroad crosses the river approximately two miles south of US 98. The Florida Transportation Plan (FTP) references this line as one of only two in the state providing "interstate/intrastate passenger rail service".

3. It is unclear whether the SR 60 bridge structure in southeastern Polk County would be affected by the project. The scale of the map provided does not allow us to determine the location of the SR 60 crossing relative to the proposed project.

4. The project may also impact the US 98 bridge structure. Any modifications to this and other bridges across the project should be coordinated with Mr. Tim Polk, District Drainage Engineer.

Questions regarding future transportation plans should be directed to Mr. Larry Slayback, FDOT Liaison for non-urbanized areas. He can be contacted at (813)-278-7120. Thank you for the opportunity to comment on this project.

Sincerely,

Caron S. Becker

Caron S. Becker
Environmental Specialist

cc: Larry Slayback
Tim Polk

FLORIDA GAME AND FRESH WATER FISH COMMISSION

WILLIAM G. BOSTICK, JR. Winter Haven
DON WRIGHT Orlando
THOMAS L. HIRES, SR. Lake Wales
MRS. GILBERT W. HUMPHREY Miccosukee
JOE MARLIN HILLIARD Clewiston

ROBERT M. BRANTLY, Executive Director
ALLAN L. EGBERT, Ph.D., Assistant Executive Director

FARRIS BRYANT BUILDING
620 South Meridian Street
Tallahassee, Florida 32399-1600
(904) 488-1960

May 20, 1991

RECEIVED
MAY 22 1991
STATE CLEARINGHOUSE

Ms. Janice L. Alcott, Director
Florida State Clearinghouse
Executive Office of the Governor
Office of Planning and Budgeting
The Capitol
Tallahassee, Florida 32399-0001

Re: SAI #FL9104291481C, Polk, Osceola, Highlands, and Okeechobee Counties, Kissimmee River Restoration Study Draft Environmental Impact Statement, U.S. Army Corps of Engineers

Dear Ms. Alcott:

The Florida Game and Fresh Water Fish Commission is working with the U.S. Army Corps of Engineers in the review of fish and wildlife resource data pertinent to the referenced Draft Environmental Impact Statement. We are currently participating on a Habitat Evaluation Procedures (HEP) team that is reevaluating the existing condition of Canal 38 (C-38) and the anticipated habitat values of the Kissimmee River restored under the Level II Backfilling Plan. As stalwart advocates of Kissimmee River restoration, we will maintain an active role in the planning and implementation of this extraordinary project.

Sincerely,

Bradley J. Hartman

Bradley J. Hartman, Director
Office of Environmental Services

BJH/BSB/rs
ENV 1-3-2

Florida Department of Environmental Regulation

Twin Towers Office Bldg. ● 2600 Blair Stone Road ● Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

July 22, 1991

Mr. A. J. Salem
Planning Division
Jacksonville District, Corps of Engineers
P. O. Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Salem:

I am pleased to have the opportunity to comment on the Preliminary Design Report for the Kissimmee River Restoration. The report summarizes and synthesizes numerous studies and will serve us as an excellent reference document. Of the alternatives evaluated, we agree that the Level II Backfill plan best meets the five stated objectives of the project and therefore the Department supports further development of this plan.

We realize that the design of the Level II Backfill plan is in a preliminary stage and sufficient information to identify or address all potential permitting concerns is not yet available. While we did not identify any "fatal flaws" with respect to permitting, we did identify two preliminary concerns which we ask that you keep in mind as project planning progresses.

1. The report stated that 35 square miles of river ecosystem and 24,000 acres of flood plain would be restored by the Level II Backfilling Plan and that this plan minimizes certain ecological problems, such as erosion. However, the report did not specifically address the acreage of wetlands that will be adversely affected by the project (or the alternatives) or steps to be taken to minimize damage of existing wetlands. While the acreage of wetlands to be restored is significant and of primary importance, the Department needs to ensure that impacts associated with obtaining the desired restoration are minimized.

2. The success of the selected plan is dependent upon revitalization of the headwaters of the river and a permit application for this work will be sought separately from that for the Level II Backfill. By the time the permit application for backfill is complete, the Department will want assurance that the headwaters revitalization has been successfully accomplished.

Recycled Paper

Thank you, once again, for the opportunity to comment the alternatives assessment. We look forward to working with you on this project in the future.

Sincerely,

Mark Latch
Director
Division of Water Management

ML/MKS/cdw

cc: Bart Bibler, DER
Gail Sloan, DER
Louis Toth, SFWMD

United States Department of Agriculture
Soil Conservation Service
401 SE 1st Avenue
Room 248
Gainesville, FL 32601

Date: August 29, 1991

William J. Lang Jr.
Planning Division, COE
400 West Bay Street
Jacksonville Fl 32232-0019

Dear Mr. Lang:

Re: Kissimmee River Restoration, Level II Backfilling Plan.

Proposed activities on the Kissimmee River will not adversely effect prime farmland or unique farmland.

Prior to beginning activities and if federal funds are to be utilized for this project, Parts I and III of the enclosed form AD-1006 should be completed by the federal agency providing the funds and sent to my attention for further processing.

If you need more information, please let me know.

Sincerely,

G. Wade Hurt

G. Wade Hurt
State Soil Scientist

a-1

DEPARTMENT OF THE AIR FORCE
56TH COMBAT SUPPORT SQUADRON (TAC)
AVON PARK AIR FORCE RANGE FL 33825-5000

REPLY TO ATTN OF: DEN

3 September 1991

SUBJECT: Kissimmee River Restoration Project

TO: Department of the Army
Jacksonville District Corps of Engineers
Planning Division
Environmental Resources Branch
P O Box 4970
Jacksonville, FL 32232-0019

The U.S. Air Force is extremely interested in the Kissimmee River Restoration
1 Plan. We operate a 106,000 acre air-to-ground gunnery range adjacent to the
Kissimmee River, and the proposed project would have a direct impact on our
2 lands and our operations. Approximately 3,500 acres of our lands would be
flooded under the proposed plan. The backfill construction and resultant
3 flooding will create conditions that could effect waterfowl and wading bird
populations on our lands (potentially increasing bird-aircraft strike
4 hazards), reduce security on our lands (by removal of the spoil bank), change
ground conditions on our targets, and create difficulties for control of
cattle utilizing our property. We would like to see these subjects addressed
in the feasibility study and Draft Environmental Impact Study. We would also
like to have the opportunity to meet with you to discuss the current proposed
activities on our lands and explore possible alternatives. Our point of
contact is Paul Ebersbach, phone (813) 452-4119.

JAMES E. RODGERS, Lt Col, USAF
Commander

cc: TAC/DEV
USAF BASH Team
56 CSG/DEV

Readiness is our Profession

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 56TH TACTICAL TRAINING WING (TAC)
MACDILL AIR FORCE BASE FL 33608-5000

REPLY TO ATTN OF: SE

20 Sep 91

SUBJECT: Kissimmee River Restoration Project

TO: Department of the Army
Jacksonville District Corps of Engineers
Planning Division
Environmental Resources Branch

MacDill Air Force Base is very concerned over the potential impact of the
Kissimmee River Restoration Plan. Any significant increase in bird population
1 and activity around Avon Park Air Force Range poses serious hazards to our
pilots and aircraft. Severe bird-aircraft strikes in and around Avon Park are
already a common occurrence. Additional flooding of lands could cause a
significant increase in the number of waterfowl and wading birds in this area.
The result could be a greater number of catastrophic bird strikes and
potential loss of life resulting from an aircraft crash. Please address this
issue in the feasibility study and draft environmental impact study. We would
also like to be included in any discussions with Avon Park officials. Please
contact MSgt Dan Simpson at (813) 830-2380, 2480 if further assistance or
input is needed.

STEPHEN E. BOZARTH, Lt Col, USAF
Chief, Safety Division

cc: HQ TAC/DEV
AFESC/DEMM
56 CSG/DEV

Readiness is our Profession

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 56TH TACTICAL TRAINING WING (TAC)
MACDILL AIR FORCE BASE FL 33608

REPLY TO ATTN OF: CC

22 OCT 1991

SUBJECT: Comments on Proposed Kissimmee River Restoration Project

TO: District Engineer
Attn: CESAJ-PD-PF
Jacksonville District
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

1. The following comments on the proposed project and its potential effects on the Air Force's operations on the Avon Park Air Force Range are provided for your consideration. Our ability to continue supporting Department of Defense mission operations should be completely considered before continuing on with your recommendations for restoration as proposed.

5 a. The recommended plan proposes the acquisition of lands up to the five-year flood line and flowage easements on lands between the five-year and the 100-year flood lines. This action could potentially effect approximately 3500 acres of land on the Avon Park Air Force Range. Because of the proximity of our air-to-ground target areas to these lands and the concerns we have for protecting public safety, it would not be possible for the Air Force to surrender control of this property.

2 b. The recommended plan identifies sections of the existing canal that would be backfilled. The northern extent of this portion of the project starts along the Avon Park Air Force Range. If the spoil banks that are currently adjacent to the project area are utilized to fill the channel, the Air Force will no longer have a secure boundary in this area. The lack of a secure boundary could also present a hazard to public safety by allowing uncontrolled access to our targets and impact area.

4 c. Although the planning documents recognize the importance of cattle grazing as a land-use activity, there is no discussion on the effects of cattle, nor is there any mention of the impact of the proposed plan on present grazing use. We feel that the effects of cattle on the project area are extremely important and have attached additional information for your consideration (Atch 1). All of the Air Force lands effected by this plan are currently grazed under leases with local cattlemen. What will be the effect on these leases?

1 d. The recommended plan anticipates increased levels of waterfowl activity as the project area is restored. We are concerned that such increases could cause hazardous conditions for low-flying jet aircraft using the installation. There already is a potential for bird-aircraft strikes over the flood plain and additional flooding could increase the hazard. The planning documents do not discuss this potential problem. We feel this impact should be reviewed and methods to minimize bird-aircraft-strike hazards, such as bird frightening techniques, be investigated.

6 e. A portion of the Florida National Scenic Trail (FNST) passes through lands controlled by the U.S. Air Force and the South Florida Water Management District (SFWMD). A section of the trail is located on an earthen dike surrounding an impoundment on SFWMD lands known as the "Boney Marsh." If the recommended plan calls for the removal of that dike, the FNST will no longer be available for public use, resulting in a negative impact on public recreation on Air Force and SFWMD lands. Either the dike should be retained or adjacent uplands be acquired for public access.

3 f. The recommended plan does not discuss the impact on water tables in uplands adjacent to the flood plain. Our target complex requires continuous maintenance to maximize target visibility for training effectiveness and target identification, which is critical for safety of our ground personnel. Any increase in surface or ground water levels could impede our maintenance activities.

2. The Air Force supports your actions to restore this valuable resource; however, any plans you present for Congressional consideration should include discussion of these potential impacts and include provisions for accommodating our concerns. Please contact Mr. Paul Ebersbach, 813-462-4110, if you have any questions.

BEN NELSON, JR., Brig Gen, USAF
Commander

1 Atch
Grazing Impacts on the Kissimmee River Basin

Readiness is our Profession

Grazing Impacts on the Kissimmee River Basin

R. Scott Penfield, Range Conservationist
Avon Park Air Force Range, Florida

Introduction

The recent draft of the Integrated Feasibility Report (IFR) and Environmental Impact Statement (EIS) for the Environmental Restoration of the Kissimmee River, Florida, provide for the restoration of the Kissimmee River through the modification of the present channelized system. The project proposal assumes that by re-establishing fluctuating water levels "this restored area will be driven by the same forces that formed and maintained the pre-channelization river/floodplain..." and thus "the affected (restored) ecosystem can be expected to reorganize with an ecological structure which provides the same environmental values and supports a similar complement of species as the original Kissimmee River ecosystem." Although these documents provide extensive information about the benefits of the proposed action and reference numerous studies conducted in the river basin, there is no consideration of the effects of cattle on the river basin ecosystem, either past or present. Adequate consideration to the 200 to possibly 300 years of domestic livestock herbivory on this system must be included in the EIS. Herbivory had to be a force impacting the plant communities in the basin. Further, the combined impact of lack of hydroperiod and the increased access by livestock onto the marshland system must also be addressed in the EIS. As a result of these considerations a land management strategy needs to be developed if the aforementioned goal is going to be achieved. Without considering this additional force upon the system, the proposed action may not yield the expected results.

Background

In the state of Florida, the natural science community, with the exception of range ecologists, have paid little attention to herbivorous impacts on natural ecosystems by domestic livestock (primarily cattle) since the Spanish successfully introduced cattle in 1655 (Yarlett 1985). Although other influences, such as deforestation, citrus cultivation, and dewatering are recognized as forces adversely impacting natural systems (Myers & Ewel eds. 1991), researchers generally have not considered cattle's effect. Where they do recognize its influence, they have given very little significance to its impact on the ecosystem. L.D. White provided the only investigation of grazing influences on a marsh ecosystem (White 1975). He said grazing was as significant as fire and hydroperiod as influences upon the natural marsh plant community.

Throughout the settlement of Florida there is documentation of cattle denuding natural areas. Devane (1983) cites an early homesteader on the Air Force Air Force Range (located in Polk and Highlands Counties, Fla.) as having moved to the property from the upper Myakka River in 1883 when the Myakka prairie grasslands had been worn out from overgrazing. He also notes that during the Civil War the confederate army was fed from large herds of cattle that were rounded-up from Kissimmee Island (which is now known as KICCO). In 1919 it was estimated that 25,000 animals were owned by the Kissimmee Island Cattle Company (KICCO) and were grazing the Kissimmee Island. If those numbers are correct, they exceed current numbers by a significant amount. The entire 106,110 acres of the Air Force Range, which represents a major portion of "Kissimmee Island", currently only supports approximately 3,500 animals. Range ecologists have studied the effects of cattle on native ecosystems in Florida. Citing as an example of some of this work Kalmbacher et.al. (1985,1986) believes that heavy concentrations of cattle on fresh burned areas create a cumulative force on the palatable components of the native plant community. He verified this when burned creeping bluestem (Schizachyrium stoloniferum) was found to be in such a stressed condition during June and July following a winter burn, that it was susceptible to obliteration from the system when grazed during that time period (Kalmbacher et. al. 1986).

The Soil Conservation Service (SCS), has developed Twenty-Six Ecological Communities of Florida (1989) that identifies what plant communities would be like in ideal natural conditions without adverse grazing by cattle. Generally, these desired plant community types are representative of true natural or native plant communities found in Florida before the introduction of domestic livestock grazing. These ecological communities differ with Ecosystems of Florida (Myers & Ewel,1991). The SCS community descriptions indicated more diversity, more grasses and legumes as co-dominate components rather than domination by shrubs and unpalatable plant species.

Ecologists have done world-wide research on the impacts of domestic grazing, principally on arid regions of the world. Sheridan (1981) treated the subject in depth for all arid regions in the United States. Subtropical Florida, with rainfall in excess of 66 inches annually, has not been subjected to desertification, however, because of overgrazing, plants that cattle will not eat simply take the place of the grazed plants in the community structure. With heavy domestic herbivory in the Kissimmee River Basin for the last 200 years, any seeds from these grazed plants would have had an opportunity to germinate and grow and be grazed, possibly to extirpation. Sheridan's bibliography on the effects of livestock grazing on soils, vegetation, and wildlife, even though published in 1981, is an excellent place to start to reconsider the grazing impacts on the Kissimmee River Basin. Friedal (1991) introduces an even more disturbing assessment of grazing impact by introducing the concepts of threshold jumps and suggests that in arid climates plant communities experiencing severe impacts, such as heavy grazing for long periods of time, shift across a threshold into a new ecosystem and into an entirely new domain. This kind of event has probably happened in Florida but has gone undetected primarily because of the subtropical climate and little attention by the natural sciences community to historical grazing impacts. If the goal of the restoration project is to truly re-establish plant communities as they occurred prior to channelization, consideration must be given to the role cattle play in those communities and if that channelization has resulted in threshold community shifts.

Kissimmee River Basin Studies

South Florida Water Management District (SFWMD) Technical Publication 80-7 "Plant Communities of the Kissimmee River Valley" (Millesun et al. 1980) is cited in the IFR and EIS as well as by other documents cited in the reports. Most of the key plants and the broad vegetation communities

identified in that study are plants cattle do not consume. The dominant plant species found throughout each type are non-palatable to cattle. Maidencane (Panicum hemitomon) and cutgrass (Leersia hexandra), two species preferred by cattle, generally were found in wet sites where cattle had limited or no access. Two broad community types used in this report, improved and unimproved pasture, stand out as not being components of a natural ecosystem. These terms, which are really land use identifiers, have been adopted by many authors and are used in the U.S. Fish and Wildlife Service report on the EIS in the context on plant community condition indicators. The unimproved pasture has been targeted as the principal community that will change with restoration of hydroperiod, since it is assumed that hydroperiod was the principal cause of these sites. If cattle were not present in this ecosystem would it look like it did in 1980? Toth (1991) and the U.S. Fish and Wildlife Service report (Annex E EIS,1991) cite this document as the benchmark that will used to measure the success of the ecological restoration project.

Although there is no improved pasture on the Avon Park Air Force Range, Milleson et al. (1980) assigned a third of the property this classification. He also identified unimproved pasture which is in reality native maidencane marsh or wet transitional zone prairie. Plant community typing on Air Force property is as much 50% in error. The technical report states "species composition of a plant community depends on a variety of environmental factors .....(including) amount of cattle grazing.....". In 1980 the SFWMD recognized cattle grazing as an impact but it is no longer considered a factor in 1991.

Montalbono et al. (1979) examined frequency of occurrence of plant species in a variety of vegetation communities. Plants that are palatable to cattle, when they occurred, were found on areas in varying states of inundation. These were probably remnant plant communities of the palatable species that were saved by inundation.

Recommendation

A further literature review to examine research conducted done in the basin should be considered. Three papers done by range ecologists that were never cited in the EIS and are offered as an alternative opinion of grazing impacts on the Kissimmee River Basin (Hunter 1980, Tanner et al.1981, Tanner et al. 1982.).

Discussion

There are three possible solutions for consideration of domestic grazing in restoration of the Kissimmee River Basin ecosystem. They are: (1) total exclusion, (2) Inclusion without control, or (3) controlled grazing with holistic plant community dynamic objectives dictating domestic utilization. The following expands upon these alternatives.

1. Total Exclusion

The purpose of L.D. White's Ecosystem Analysis of Paynes Prairie was to forecast the impacts of removal of domestic livestock from the Paynes Praire ecosystem. The study more than adequately foresaw the changes that have occurred to this system with the removal of livestock. The large invasions of shrubs throughout the system; the shift away from open water to thick mats of marsh plants; the dramatic drops in wildlife populations - all these things were predicted and have occurred. The State of Florida first introduced buffalo into the system to reintroduce natural herbivory into the system. This was largely unsuccessful. Recently, they are introducing "piney woods spanish cattle" to the system in another attempt to have some sort of herbivory in the system. White had suggested frequent fire be used on the marshes to maintain some of components of the marsh system. Experiences at Avon Park show that, because of the inherent water component of a marsh system fire can not be introduced with enough frequency and therefore does not appear to be a significant component in maintaining most marsh systems.

Exclosures have been placed on a number of marshes either on the Kissimmee River basin or on marshes similar to the river system. The majority of these exclosures become overgrown with shrubs in a very short period of time. They shade out all understory species completely changing the open marshlands in to high shrub thickets very similar to the Paynes Prairie experience.

In conclusion, more study of the exclusion alternative should be conducted. However the evidence on studies to date indicates exclusion of livestock will cause dramatic community changes far greater than hydroperiod impacts foreseen by the studies cited in the EIS.

2. Inclusion Without Control

Since this is the proposed alternative it is imperative that consideration be given to the combined impacts of reintroducing hydroperiod and the continued effects of herbivory on the plant community. On those sites where the spoil will be removed to an exposed soil base, herbivory during critical re-establishment periods will obliterate many natural components of the plant community. On those sites that have been stressed due to continuous herbivory for the last 20 years, the added impact of flooding can be expected to severely impact any species of plant that were subjected to grazing. It is suggested that, at a minimum, studies be designed to monitor the impacts of this action. Serious consideration needs to be given to combined force effects and threshold jumps of the ecosystem that will probably occur because of this action.

3. Controlled Grazing - The Air Force Experience

The Avon Park Air Force Range has been utilized by domestic cattle since the 1600's, when abandoned or stolen Spanish cattle were introduced by Indians. In 1902 the property was purchased by a large cattle company which grazed sheep and cattle (Devane 1983). Originally forested, the land was thoroughly clear-cut between 1915-1925. Frequent burning after clearcutting contributed to keeping the property unforested, since cattle producers had learned from the Indians that fire was a useful tool to freshen decadent tropical forage during the winter months. In 1941 the Government purchased the installation for a pilot training base. Uncontrolled cattle grazing continued on the installation almost continuously until March of 1978. Cattle utilization dominated all natural resource management on the property until 1978. In 1975, Air Force natural resource managers, range ecologists from the University of Florida, and SCS range conservationists decided that burning and heavy

grazing had dramatically altered the native plant communities and that these effects were detrimental to these communities. These effects were especially apparent on much of the installation's upland grasses.

In 1978 a stewardship grazing management program to reduce conflicts and start improving the rangeland condition was started. This program called for a planned grazing strategy that reduced individual lease acreages; established smaller pastures within each lease; and planned restoration of native grasslands through control of livestock with scheduled cattle rotation and pasture rest. Through periodic resting of the grasslands, particularly during the growing season, those plants that cattle preferred would once again re-establish themselves in all of the plant communities found on the property. In some cases this could mean a frequency of occurrence increase in a particular plant species, in other situations it could mean recolonization in an area that no longer had the palatable species present. The overall goal was very similar that cited by Toth in the EIS, the difference being that all of the forces affecting the system were identified and conscious efforts were made to understand interconnection of these forces as they influenced the grassland ecosystems. The three principle forces felt to adversely influence the plant community system were (1) over-grazing of domestic livestock, (2) biannual headfiring of the property, and (3) lack of hydroperiod on all of the remnant marshes.

All three forces were attacked simultaneously with varying results. In the 14 years after implementation of this program, we have modified how we use fire in an effort to better integrate this natural phenomenon. Hydroperiod on the Kissimmee River marsh was actively managed (based upon a natural hydroperiod cycle) until the demonstration project was implemented and control of water levels were constrained by the study design. Our observations indicate that these "demonstration" water levels adversely affected our wetlands because the resultant hydroperiod was less than what we were using. The initial grazing strategy has been refined over the years but the basic premise that cattle adversely impacted the native plant community still is held to be true. Success of the program is largely attributable to cooperation with the cattle producers leasing the property. Still the program is a radical departure from accepted native grazing management practiced throughout Florida, since most producers are more concerned about short-term financial gains than long-term affects of grazing resource. Our long-term stewardship goals will probably always be divergent from cattle lessees' short-term financial goals.

Grassland Monitoring Data Collected 1976-1991.

Starting in 1976 the Air Force set up permanent line transect plots throughout the installation. There are three permanent monitoring transect plots on every large native pasture throughout the installation and one monitoring plot on each of the three small native pastures for a total of 87 active monitoring plots. Step-point transects have been taken on each of these plots in 1976-1981, 1983, 1985 and 1987. All plots are monitored at the same time and with the same frequency.

The purpose of the transects is to determine frequency of occurrence of plant species in order to establish current range conditions and trends for each pasture. Because of the large number of transects, data is collected bi-annually. With the exception of 1976 all data collection and analysis has been done by one person. Approximately one hundred step points are taken at each plot on the established line. For the purposes of this paper only plots on the Kissimmee River marsh ecosystem were considered. Two plots, numbers 23 and 24 were installed in 1976. Plots 80, 81, and 82 were placed in 1983 and 92 and 93 were placed in 1989.

The consideration of grazing impacts can be divided up into three areas. First there is the consideration of the number of livestock that utilize a given area (stocking rate). Grazing utilization has fluctuated through the years. The data that was readily available shows that pasture plots 24 and 80 are located in an area stocked at a cow to 14.7 acres during the 1986-87 growing season (growing season defined as 1 March until 28 February of the following year); a cow to 12 acres during the 1987-88 growing season and a cow to 10 acres during the 1988-89 growing season. The pasture plots 81 and 82 is located in was stocked a cow to 27.2 acres during 1986-87 growing season, a cow to 18 acres during 1987-88 growing season and a cow to 20 acres during the 1988-89 growing season. The pasture plots 23, 92 and 93 are located in was stocked to a cow to 18.6 acres during the 1986-87 growing, a cow to 66 acres during the 1987-88 growing season, and a cow to 46 acres during the 1988-89 growing season.

The second consideration of grazing impact is the time of year the grazing occurs. Grazing a system during dormancy has a different impact then grazing during the peak growing season. Although the data has been collected to consider this event time simply does not allow an analysis for the purposes of document. This impact is addressed as matter of information for further consideration.

The third impact is the actual number of days livestock graze the area irrespective of the number of livestock. Some grazing impact is occuring somewhere within an area when any livestock are present on an area. Therefore, another impact to measure is the amount of time livestock are present within an area. Although the data has been collected to consider this event time simply does not allow an analysis for the purposes of document. This impact is addressed as matter of information for further consideration.

Results

It is very difficult to draw conclusions from only transects that can logically be related to the river basin. Plot 24 is located in the impoundment on the lower portion of the marsh on Air Force property (Fig. 1). Because of almost year round inundation it was not subject to heavy grazing prior to 1976. The data collected indicates very little change in the last 14 years save for the appearance of more torpedo grass and cutgrass since 1983 (Fig. 2) This plot was not adversely impacted by cattle prior to the 1976 and the controlled grazing approach has not altered the community composition. Plot number 80 is also in the impoundment area located between plot no. 24 and the south boundary (fig. 3). This plot is similar to plot 24 and it also shows an increase in palatable grasses such as torpedograss (Panicum repens) and cutgrass (fig.

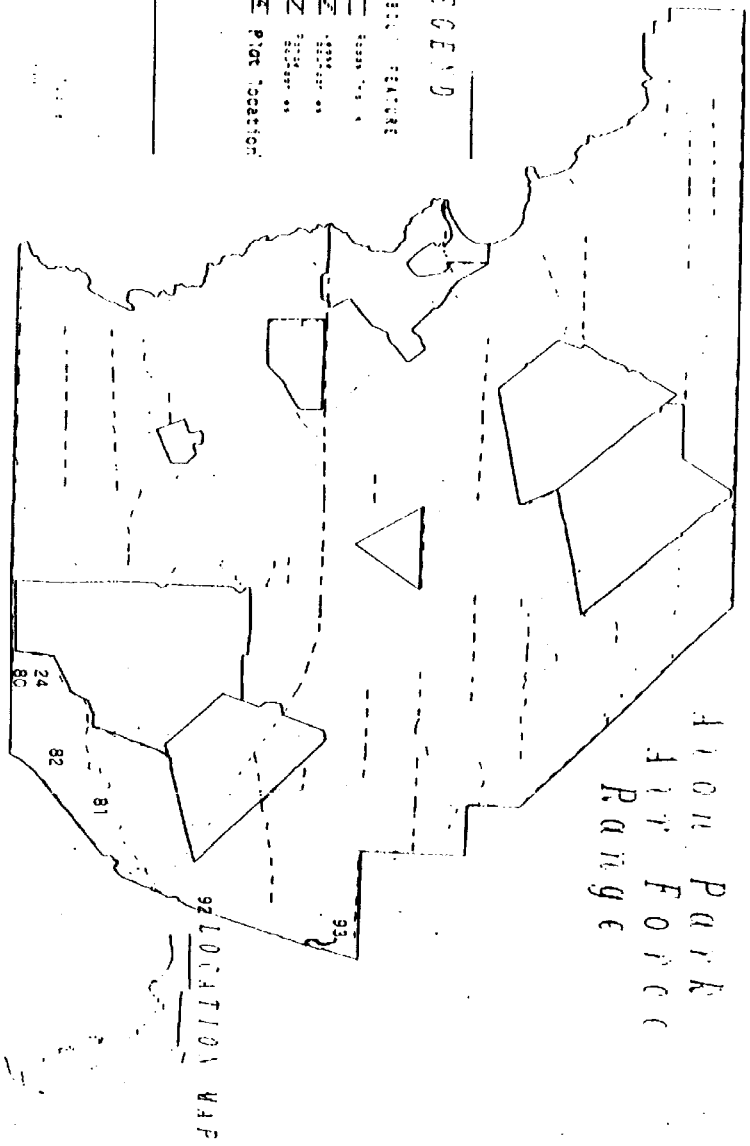
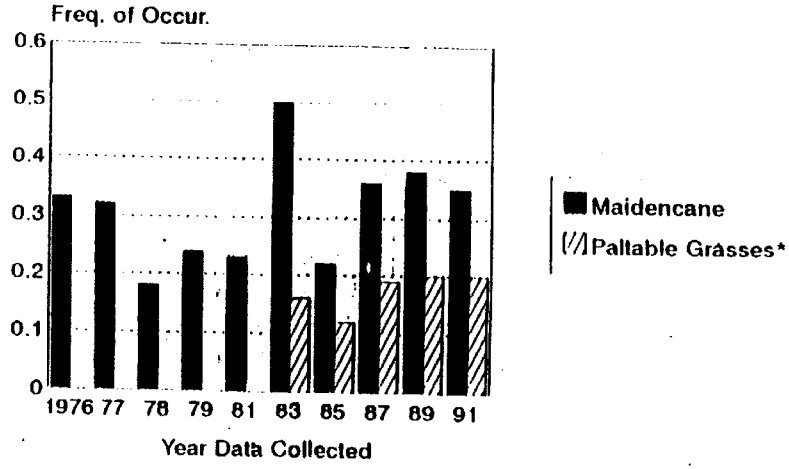


FIGURE No. 1

Plot 24 1976-1991

Cattle preferred species



plants not preferred by cattle

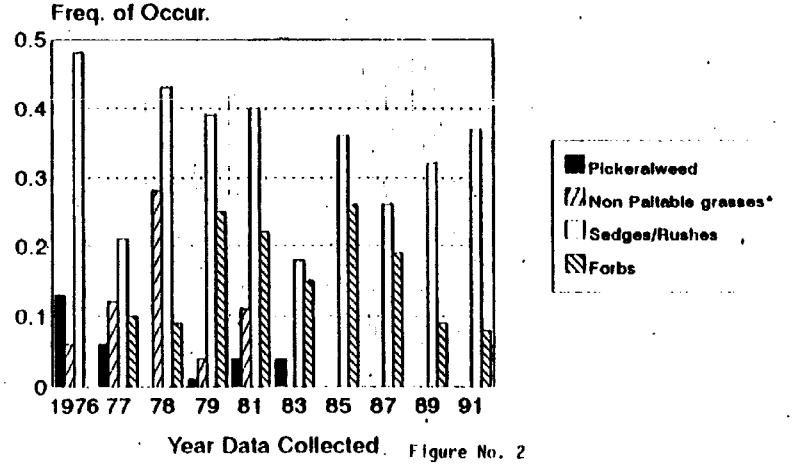


Figure No. 2

3). Both of these plots have been subjected to identical grazing pressures since they are in the same grazing pasture.

Plots 81 and 82 are in areas identified by Millenon (1980) as unimproved pasture (Fig. 1) and are in the same grazing pasture therefore subject to similar grazing pressure. Plot 81, which is closer to the oak hammock, has shown an increase in wet prairie type grasses such as chalky bluestem since 1987 (Fig.4). Its maidencane population was very low in 1987 but has appeared to stabilize at around 30% of the community. Other palatable grasses have fluctuated throughout the period. Forbs made a big jump in composition in 1991. The frequency of occurrence for individual species within plots has changed over time. Plot 82 which is in a wetter site has been stable since it was first established in 1983 (Fig.5). Of significant on this plot is the colony of redtopped panicum (Panicum rigidulum) which first appeared in 1987 and has become a significant component of this plot. For both plots it is significant that cattle palatable grasses, since 1985, make up more than 50% of the community.

Plots 23, 92, and 93 are above Fort Kissimmee are in one grazing pasture and have been subjected to the same grazing pressures (Fig.1). Generally this area had not been subject to flooding until the demonstration project and this has only impacted plot 23 and 93. Plot 23 showed its most dramatic changes from 1976 until 1981 with the maidencane community moving from less than 10% frequency of occurrence to more than 50% occurrence (Fig.6). Plots 92 and 93 have not been established long enough to draw any conclusions other than they appear to represent a marsh and wet prairie plant community largely composed of grasses cattle consume (Figs.7 & 8). Starting in 1983 cutgrass appeared and is becoming a major component of the community.

Overall in 1991 on all plots it should noted that cattle preferred grasses make up in excess of 50% of the plant communities. In the late 1970's cattle preferred grasses werd not this major of a component. The plots do represent a trend in direction towards cattle preferred species over non preferred species. Even with this limited data there is obvious evidence that cattle have impacted the plant communities on the Kissimmee River Basin. Proper sensitivity to cattle impacts subsequently dictate grazing strategies that protect and benefit the overall community. This sensitivity can result in dramatic changes back towards balanced communities that are primarily composed of low structure grass species.

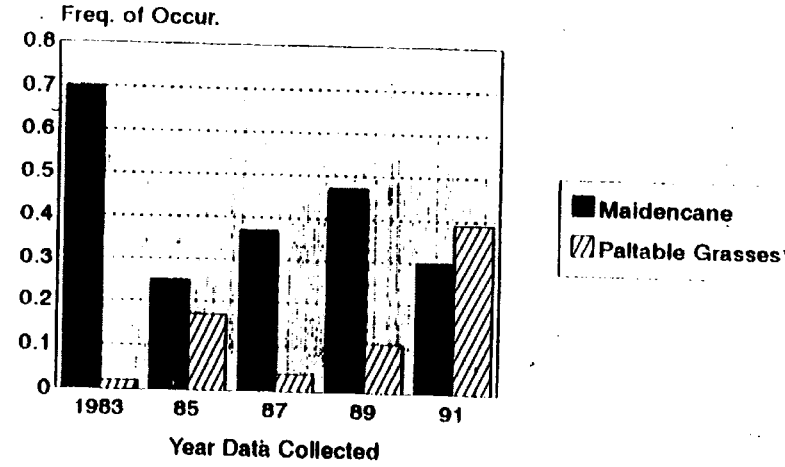
Overall Conclusions

1. There is a need for the EIS to recognize that cattle are in fact an integral component of the ecosystem.

2. The EIS need to address the force of grazing upon the system and the Air Force feels that provisions to continue controlled grazing towards holistic plant community goals should be a component of the restoration process.

Plot 80 1983-1991

Cattle preferred species



Plants not preferred by cattle

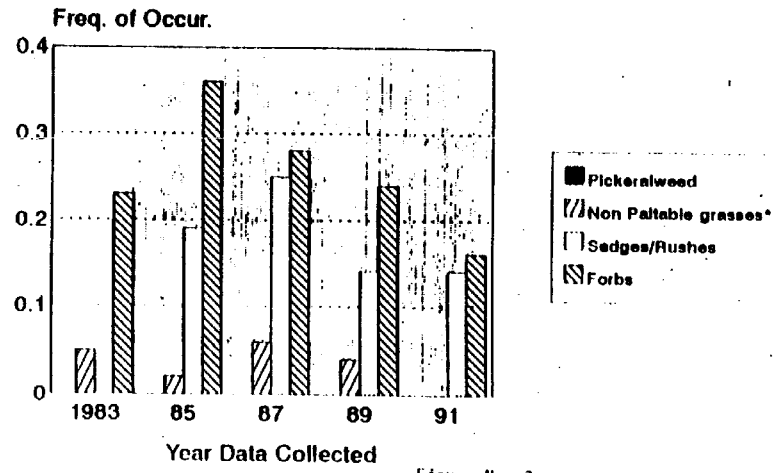
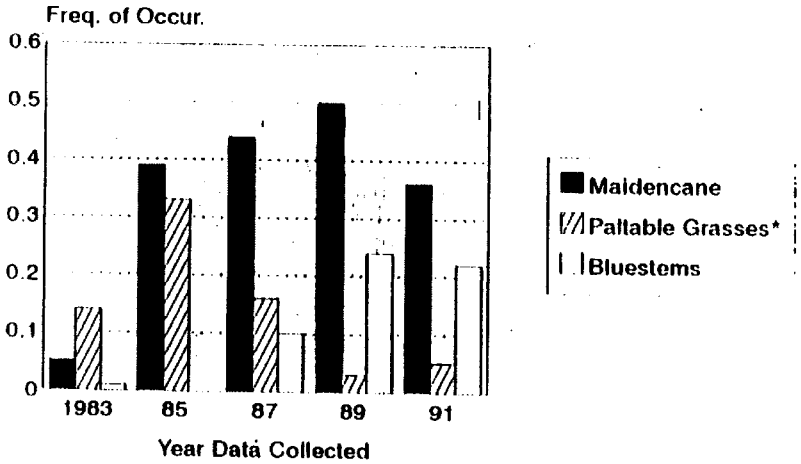


Figure No. 3

Plot 81 1983-1991

Cattle preferred species



Plants not preferred by cattle

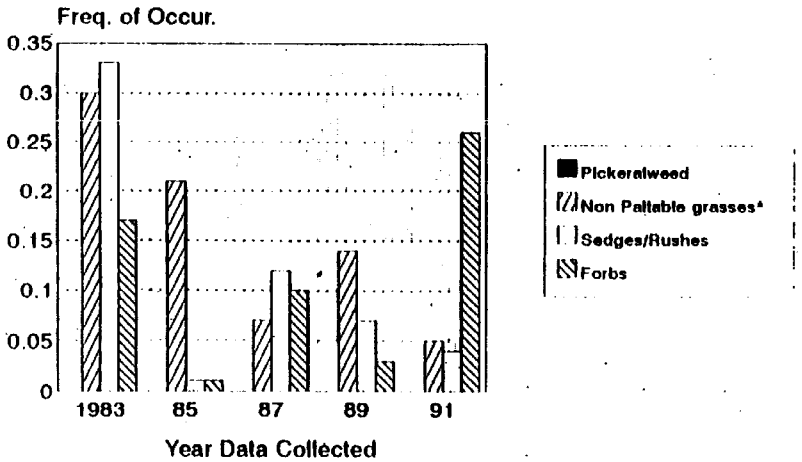
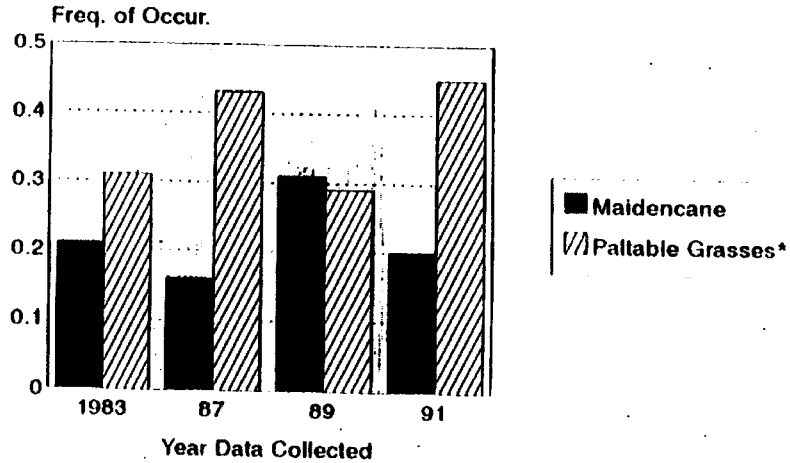


Figure No. 4

Plot 82 1983-1991

Cattle preferred species



Plants not preferred by cattle

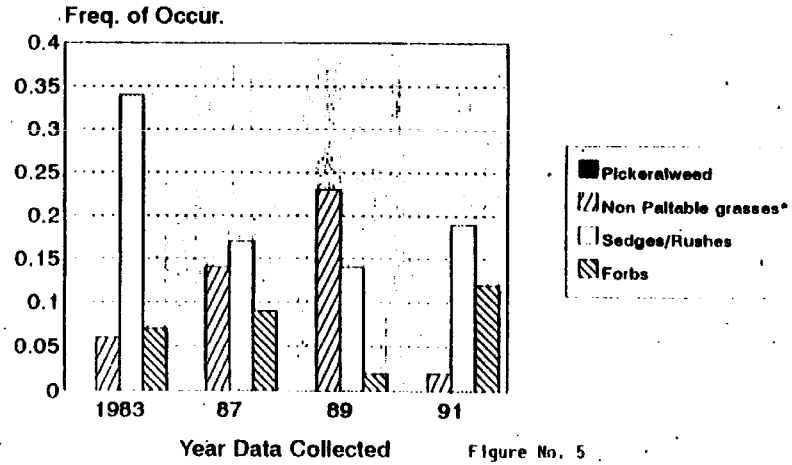
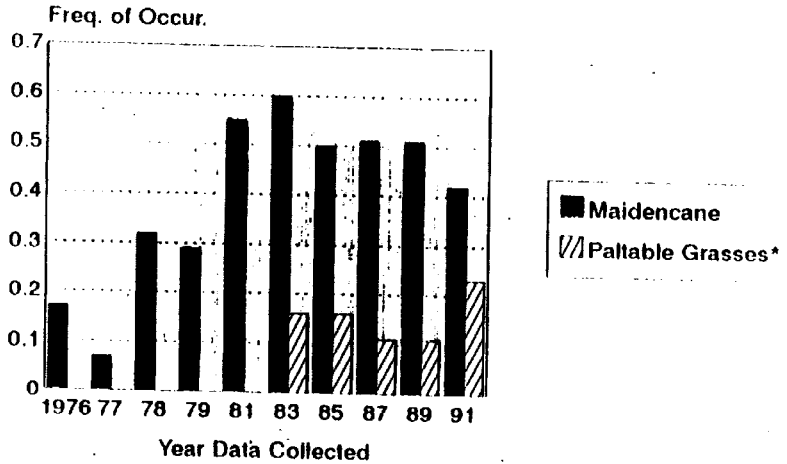


Figure No. 5

Plot 23 1976-1991

Cattle preferred species



plants not consumed by cattle

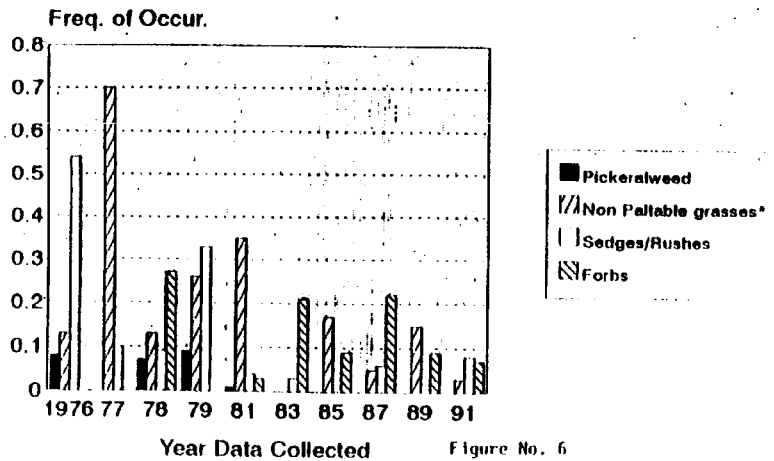
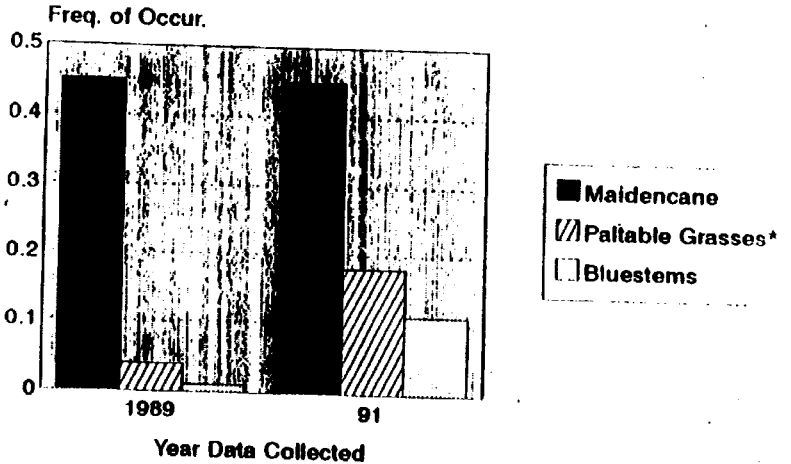


Figure No. 6

Plot 92 1989-1991

Cattle preferred species



Plants not preferred by cattle

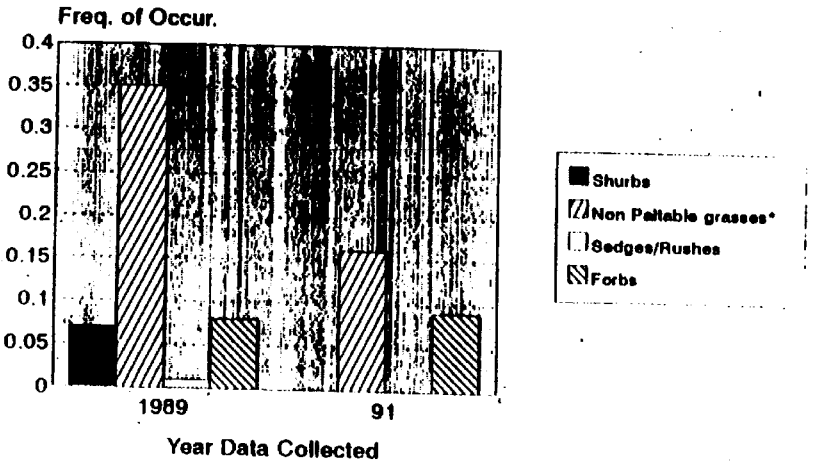
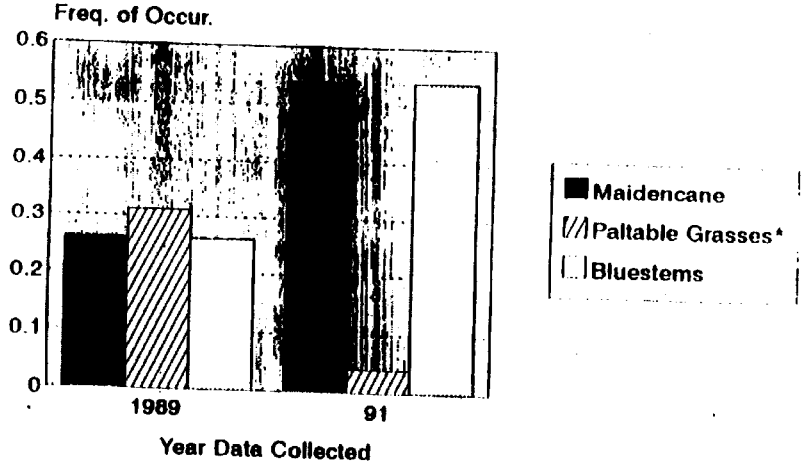


Figure No. 7

Plot 93 1989-1991

Cattle preferred species



Plants not preferred by cattle

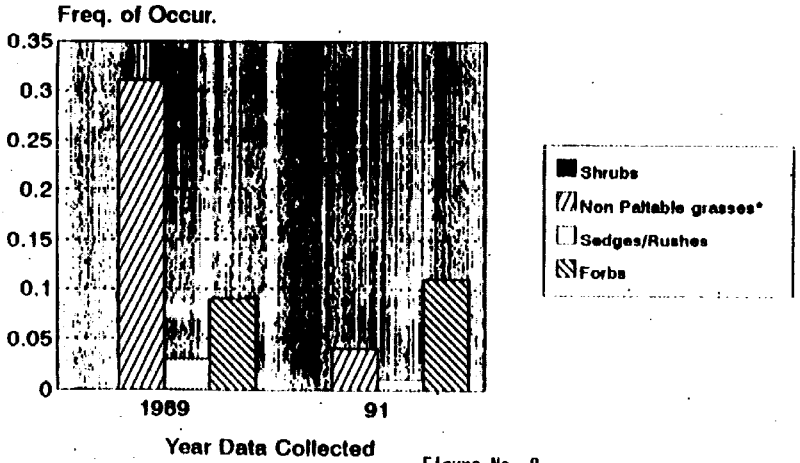


Figure No. 8

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS TACTICAL AIR COMMAND
LANGLEY AIR FORCE BASE VA 23665

REPLY TO ATTN OF: DERE

28 OCT 1991

SUBJECT: Environmental Restoration Kissimmee River, Avon Park AFR FL

TO: U.S. Army Engineers District
Attn: Mr Russell V. Reed
P. O. Box 4970
Jacksonville FL 32232-0019

1. We have reviewed the Draft Integrated Feasibility Report and Environmental Impact Statement on the subject project. The following are our real estate comments and concerns:

a. The draft report indicates the property will be purchased in fee simple. It is unlikely the Air Force would recommend selling the property, but would grant an easement to the South Florida Water Management District for use of the property. Selling the property would mean the Air Force would lose control of a large portion of the area required to restrict public access and could jeopardize the operation of the range.

5 b. There is an existing easement to the South Florida Water Management District for the current channel, which may allow for the restoration of the river. This easement would have to be revised to include the additional land required and to exclude those lands no longer needed. Revision of this easement or any new easement requires Secretary of the Air Force (SAF/MII) approval.

c. The area required for flood control must be presented formally through Air Force channels. Land use restrictions must be addressed, including, but
4 not limited to our ongoing grazing operation that appears to be in jeopardy if the current study is to be adopted. Our annual income from grazing is more than $100,000.

d. There are operational concerns of the effects of restoring the Kissimmee River relating to increased bird habitation and the associated
1 possible increase in bird strikes, impacts to target placements, boundary restrictions and access, and the run-in to Echo Range. These issues must be explored and resolved with the range operators at Avon Park.

2. The point of contact at this headquarters is Mr Dickson, DSN 574-3685.

CHARLES F. LITTLE
Chief, Real Estate Division

Readiness is our Profession

8-11

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
Atlanta GA 30333
October 30, 1991

Mr. Russell V. Reed
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Reed:

We have completed our review of the Draft Integrated Feasibility Report and Environmental Impact Statement (DEIS) for Central and Southern Florida Project Environmental Restoration of the Kissimmee River, Florida. We are responding on behalf of the U.S. Public Health Service.

We have reviewed the Draft EIS for potential adverse impacts on human health. Although we do not anticipate adverse public health impacts to result from the proposed project, we do have a concern regarding the large number of potential
7 displacement of homes and the related potential social impacts. We note that relocation assistance has been adequately addressed with regard to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. However, we also noted that further analysis is planned during preconstruction engineering and design "to determine if structural solutions consistent with restoration, such as ring levees, would be more cost effective than real estate acquisition and relocation assistance" (page 175). We recommend that affected families and homeowners, or their representatives, be consulted regarding these options for mitigation. We believe every consideration, not only cost effectiveness, be given to appropriate mitigation to help ensure that families are not unnecessarily displaced from their dwellings.

Thank you for the opportunity to review and comment on this document. Please ensure that we are included on your mailing list to receive a copy of the Final EIS, and future EIS's which may indicate potential public health impact and are developed under the National Environmental Policy Act (NEPA).

Sincerely yours,

Kenneth W. Holt, M.S.E.H.
Special Programs Group (F29)
National Center for Environmental
Health and Injury Control

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Affairs
Richard B. Russell Federal Building
75 Spring Street, S.W.
Atlanta, Georgia 30303

OCT 30 1991

ER 91/887

Colonel Terrence C. Salt
District Engineer
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Attn: Planning Division

Dear Colonel Salt:

The Department of the Interior (Department) has reviewed the Draft Feasibility Report and Environmental Impact Statement for Restoration of the Kissimmee River, Florida, and have the following comments. We note that the U.S. Fish and Wildlife Service (Service) has participated fully in your planning process for this project and that a Draft Fish and Wildlife Coordination Act Report and accompanying Habitat Evaluation Procedure update are contained within the draft document. In addition, a Biological Opinion was prepared pursuant to the Endangered Species Act of 1973, as amended.

General Comments

The Department concurs with your findings that the Level II Backfilling Plan is the best solution for restoration of the Kissimmee River and its
8 floodplain. The Department also recommends that restoration of Paradise Run and Construction of flow-through marsh facilities in Pool A be added to the project, to enable as much restoration of the floodplain wetlands as possible without harming the flood control capacity.

This environmental project will benefit Department of the Interior Trust Resources, including assisting in the recovery of several endangered species, and benefitting waterfowl in a fashion consistent with the North American Waterfowl Plan. Therefore, we believe that there is a Federal Interest in restoring the Kissimmee River, and Federal participation should be at the maximum extent allowable by law.

Specific Comments

Page 7. The document quotes the Fish and Wildlife Service as determining the Kissimmee River flood plain is 49,000 acres. This should be qualified to the
9 extent that the floodplain acreage between Lake Kissimmee and the end of the proposed project (bottom of Pool E) constitutes this acreage. There was an additional extensive acreage of floodplain in the more than 20-mile long area downstream to Lake Okeechobee which includes the Paradise Run area of floodplain.

10 Page 145, Table 23; Page 186, Table 30; Page 188, Table 31; The HEP units in these tables should be footnoted to show which values came from the HEP update and which were estimated.

11 Page 213. Endangered Species should be added as a category for monitoring studies.

12 Page 251. The 1986 Fish and Wildlife Coordination Act Report on the Kissimmee River Restoration plans should be mentioned here.

Thank you for the opportunity to comment on these reports.

Sincerely yours,

James H. Lee

James H. Lee
Regional Environmental Officer

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, NE
ATLANTA, GEORGIA 30365

NOV 12 1991

Colonel Terrance R. Salt
District Engineer, Jacksonville
P.O. Box 4970
Jacksonville, Florida 32232
Attention: Russell Reed

SUBJECT: Draft Integrated Feasibility Report and Environmental Impact Statement for the Environmental Restoration of the Kissimmee River, Florida

Dear Colonel Salt:

Pursuant to Section 309 of the Clean Air Act and Section 102(2)(C) of the National Environmental Policy Act, we have reviewed the subject document which describes the proposal to restore the Kissimmee River and enhance and restore over 25,000 acres of its floodplain wetlands. Overall, we feel the document provides a thorough evaluation of a very complex issue. The project was well developed and had significant public input. We generally support the findings and modifications presented in the document. The restoration plan is a unique integration of engineering and environmental technology and is very desirable environmentally .

Our detailed comments concerning historical, cultural, archeological, and recreational boating interests are appended. Mr. Duncan Powell of our Wetland Regulatory South Unit should be contacted at 404/347-2126 (FTS 257-2126) concerning questions on detailed technical issues.

Based on the information provided in the document, we rate the Draft Environmental Impact Statement as EC-2. That is, the review has identified certain environmental impacts/consequences that will need to be examined further in the course of the detailed design studies. This additional information is needed to adequately assess the long-term impacts of the proposed action(s). Any NEPA procedural questions should be addressed to Dr. Gerald Miller at 404/347-3776 (FTS 257-3776).

Sincerely,

Heinz J. Mueller, Chief
Environmental Policy Section
Federal Activities Branch

attachment

a-13

DRAFT
INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT FOR ENVIRONMENTAL RESTORATION KISSIMMEE RIVER, FLORIDA

SEPTEMBER, 1991

There are only a couple comments regarding the referenced draft which warrant comment. These include water quality, navigation and historical (archeological).

13 Water quality throughout the document appears to reflect the 1985 Corps Feasibility Report's statement that, generally, the water in the C-38 canal and oxbows meet State standards (page 26, 55, 86 and Table 18). The nutrients are almost disregarded because of the low concentration of phosphorus and nitrogen in the river water entering Lake Okeechobee, other tributaries with more significant nutrient concentrations and implementation of Best Management Practices within the water shed. Table 18 reflects this position by indicating only a moderate water pollution effect for the Existing and No Action categories. Nutrients and dissolved oxygen are discussed separately as two different issues. Dissolved oxygen is related to nutrients by the enhanced growth of macrophytic and microphytic plants which produce oxygen with adequate light, but significantly increase the respiration during cloudy days and by increasing organic accumulation, thus increasing the biochemical oxygen demand. The report adequately depicts a lethal condition for aquatic life due to the lack of dissolved oxygen (Page 49 and Figure 9). For these reasons Table 18 should change the Existing and No Action Condition Water Pollution Category from Moderate to High. Additionally, the disregard of nutrient input into the lake as an issue from Kissimmee River inflow seems to reduce the importance of a potentially significant load reduction by an apparent slight concentration reduction from the inflow of the Kissimmee River to Lake Okeechobee.

14 Navigation is discussed with relatively shallow data bases. Only one specific user, Kissimmee River Boat-Arcade, is used with general statements about 80 percent of the vessels using C 38 the require at least a three-foot channel. The concern that less than ten per cent of the time low flows may reduce the navigation because of four locations being less than three feet deep may be over stated and creating a non-issue. The majority of the fishing boats in the river have outboard motors with a significant number including hydraulic motor tilts. These fishing boats will have very little difficulty using waters two to three feet deep. Trolling motors are extremely common for boats observed in the C-38 and oxbows could navigate through shallow waters with the outboard in the up position.

15 Historical impacts are also discussed with relatively shallow data bases. Very few indian sites were identified from an apparent

literature search with a statement that more may be found in the vicinity with anticipated adverse effects from the project. The original river course during the recent history (1950's) would have had the same effects had the C-38 never been constructed. The placement of fill material on top of the anticipated unrecorded sites may have protected the site from erosion and human disturbance, but the re-exposure should not be considered adverse unless they would be greater had the C-38 project never been completed.

16 Finally, Figures 18 and 20 need to have a Y-axis and identification of the flow. This would clarify the effect of channelization and altered flow regime.

The staff responsible for this document should be commended for the excellent work and talent it took to create this document. This has been a very high profile project with environmental, farming and water quality issues. The document is relatively easy to read and follow which should enhance the review of the project by non-professional scientists and engineers.

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
ATLANTA REGIONAL OFFICE, REGION IV
Richard B. Russell Federal Building
75 Spring Street, S.W.
Atlanta, Georgia 30303-3388

November 18, 1991

Mr. A. J. Salem
Chief Planning Division
U. S. Army Engineer District
Attention: CESAJ-PD-PF
P. O. Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Salem:

This refers to your letter dated September 23, 1991, transmitting the draft integrated feasibility report Environmental Impact Statement (EIS) on the Environmental Restoration of the Kissimmee River in Florida.

Our review indicates there will be no significant adverse impact on any HUD programs as a result of this project.

Thank you for the opportunity to review and comment on your proposed project.

Very sincerely yours,

James P. Bitting

James P. Bitting
Director,
Program Support Division
Regional Environmental
Clearance Officer

STATE OF FLORIDA

Office of the Governor

THE CAPITOL
TALLAHASSEE, FLORIDA 32399-0001

LAWTON CHILES
GOVERNOR

November 18, 1991

Colonel Terrence Salt
Chief Engineer
Jacksonville District Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

RE: Kissimmee River Restoration, Draft Integrated Feasibility Report and Draft Environmental Impact Statement:
SAI: FL9109240461C

Dear Colonel Salt:

The State of Florida has completed a review of the referenced document and we support the findings of the report. The report is thorough and of very high quality.

Our State agencies have evaluated the report pursuant to Presidential Executive Order 12372, the National Environmental Policy Act, the Coastal Zone Act Reauthorization Amendments of 1990 and the Florida Coastal Management Program. Agency comments are attached for your consideration.

For more than a decade, Florida has worked toward the restoration of the Kissimmee River. Restoration has the strong support of Florida's Governor and Cabinet, its Congressional Delegation and the vast majority of our citizens. Restoration of the Kissimmee also has the strong support of the Everglades Coalition which is comprised of more than 20 major national and Florida conservation organizations.

The Kissimmee does not simply symbolize our commitment to protecting and restoring the Everglades ecological system and the environment, restoration is a major and substantive step in that direction. Restoration of over 25,000 acres of wetlands as a function of the project, standing alone, will be a massive feat. Protection of the floodplain against development through public ownership and management will be an equally impressive feature of the project.

17 While the feasibility study indicates a 75 percent federal share of project costs, your November 6 letter to Tilford Creel states that the final report will only include a 50 percent federal cost share. I find this shift of position to be highly irregular of the Corps of Engineers, an organization known for consistency. For more than two years the Corps has highlighted its interest and readiness to join Florida in this historic effort. It is not a showing of good faith to, at this critical point, back away and demand that the local sponsor shoulder the cost of all lands, easements, rights-of-way, relocation, dredged material disposal areas, plus 50 percent of the construction costs. Nowhere else in Florida or throughout the history of our state/federal relationship has the Corps of Engineers taken such an arbitrary position on a federal public works project.

We are committed to restoring the Kissimmee River to a condition more like nature made it. This project is a part of the "Save Our Everglades" program, among Florida's highest environmental priorities.

I cannot overemphasize the importance of this effort, nor the importance of the Corps' commitment to funding 75 percent of the project costs.

Once again, I congratulate your staff for its excellent and professional work in preparing this draft report.

With kind regards, I am

Sincerely,

Lawton Chiles

LAWTON CHILES

LC/djd
Enclosure

cc: Colonel Robert Brantly, Game and Fresh Water Fish Commission
Carol Browner, Department of Environmental Regulation
Honorable Bob Crawford, Department of Agriculture and Consumer Services
Tilford Creel, South Florida Water Management District
Bill Sadowski, Department of Community Affairs
Ben Watts, Department of Transportation
Virginia Wetherell, Department of Natural Resources
Estus Whitfield, Governor's Office, Environmental Unit

FLORIDA DEPARTMENT OF NATURAL RESOURCES

Tom Gardner, Executive Director

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399

Lawton Chiles
Governor

Jim Smith
Secretary of State

Bob Butterworth
Attorney General

Gerald Lewis
State Comptroller

Tom Gallagher
State Treasurer

Bob Crawford
Commissioner of Agriculture

Betty Castor
Commissioner of Education

NOV 7 1991

STATE CLEARINGHOUSE

November 4, 1991

Ms. Janice Alcott
State Clearinghouse
Executive Office of the Governor
The Capitol
Tallahassee, Florida 32301

Dear Ms. Alcott:

We have reviewed the Corps of Engineers Draft Integrated Feasibility Report and Environmental Impact Statement (SAI# FL9109240461C). Enclosed are comments we submitted on the August draft of the report.

We applaud the South Florida Water Management District and the Corps of Engineers on the work they have done to develop this plan to restore the Kissimmee River. The Department of Natural Resources fully supports restoration of the Kissimmee. We were, therefore, very disappointed that the August draft was revised to delete the conclusion that there is a Federal interest in implementing the preferred alternative, the modified Level II Backfilling Plan, and that Federal cost-sharing is not set forth.

There is clearly a Federal interest in restoring the Kissimmee, as is stated in the August draft of the Corps document. The Corps was a partner with the State in channelizing the River and should participate just as fully in its environmental restoration. The significant environmental benefits associated with the river and wetlands restoration are clearly in the Federal interest.

17 We urge the Corps of Engineers to continue to work with the State of Florida and the South Florida Water Management District to work out a cost sharing agreement that incorporates significant Federal financial support.

Sincerely,

Don E. Duden
Acting Executive Director

DED/mgp
Attachment

FLORIDA GAME AND FRESH WATER FISH COMMISSION

DON WRIGHT Orlando | QUINTON E. HEDGEPETH DDS Miami | MRS. GILBERT W. HUMPHREY Miccosukee | JOE MARLIN HILLIARD Clewiston | BEN ROWE Gainesville

ROBERT M. BRANTLY, Executive Director
ALLAN L. EGBERT, Ph. D., Assistant Executive Director

FARRIS BRYANT BUILDING
620 South Meridian Street
Tallahassee, Florida 32399-1600
(904) 487-1960

November 12, 1991

NOV 14 1991

STATE CLEARINGHOUSE

Ms. Janice L. Alcott, Director
Florida State Clearinghouse
Executive Office of the Governor
Office of Planning and Budgeting
The Capitol
Tallahassee, Florida 32399-0001

RE: SAI FL9109240461C, Environmental Restoration of the Kissimmee River, Draft Integrated Feasibility Report and Environmental Impact Statement, U.S. Army Corps of Engineers

Dear Ms. Alcott:

The Office of Environmental Services and the Division of Fisheries of the Florida Game and Fresh Water Fish Commission have reviewed the referenced document and offer the following comments.

The Florida Game and Fresh Water Fish Commission (GFC) enthusiastically endorses the Kissimmee River restoration and concurs with the United States Fish and Wildlife Service in recommending that Canal 38 be backfilled to the fullest extent possible. The Selected Plan will facilitate restoration of 52 miles of river and approximately 33,000 acres of floodplain. The GFC also continues to endorse development of facilities to allow river flow through the Paradise Run tract at the south end of the project area.

18

The Feasibility Report is comprehensive, but provides some data generated and contributed by GFC biologists that are incorrect or

misinterpreted. In order to resolve these areas of concern, we provide the enclosed analysis.

Sincerely,

Bradley J. Hartman

Bradley J. Hartman, Director
Office of Environmental Services

BJH/BT/rs
ENV 1-3-2
Enclosures

SPECIFIC COMMENTS ON THE U.S. ARMY CORPS OF ENGINEERS

DRAFT INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT

I. SECTION 3: EXISTING CONDITION/AFFECTED ENVIRONMENTAL; 3.4 Water Quality.

GFC water chemistry samples, recorded from 1980 through 1990 by quarterly water quality sampling, do not depict trends similar to those reported on page 25.

1. Total nitrogen levels on Lake Tohopekaliga increased from north to south from 1980 through 1982, 1988, and 1989, but decreased from north to south 1983 through 1985, 1987, and 1990.

2. Recent water quality data for lakes Tohopekaliga, East Lake Tohopekaliga, Cypress, Hatchineha, and Kissimmee do not demonstrate a substantial enrichment for total phosphorus, total nitrogen, or chlorophyll a when compared to estimates documented in the early 1980's.

3. Total phosphorus levels recorded in lakes Cypress, Hatchineha, and Kissimmee were lower in 1990 than 1981.

4. In 1990, chlorophyll a was not higher in lakes Hatchineha and Kissimmee when compared to annual mean values for 1981.

II. SECTION 3: EXISTING CONDITION/AFFECTED ENVIRONMENT; 3.5 Environmental Resources.

In the first paragraph at the top of page 28, the present waterfowl population estimate of 140 in the Lower Basin is attributed to Toland (1991). This is a misinterpretation of relative density data, and Toland (pers. comm.) has provided a population estimate (extrapolated from his aerial surveys) of 875 ± 100 ducks.

III. SECTION 4: FUTURE "WITHOUT PROJECT" CONDITION; 4.2 Headwaters Revitalization Project.

The USCOE uses a staff gauge located upstream of structure S-65 on Lake Kissimmee to record the daily lake levels for lakes Cypress, Hatchineha, and Kissimmee. GFC believes that the readings collected at this gauge do not accurately reflect lake levels during:

1. Periods of high discharge when the lakes are below elevation 52.0 feet msl.

2. Windtides of several days duration with wind direction from the north or northeast.

3. Long-term discharge events that create discrepancies between lake levels on lakes Cypress, Hatchineha, and Kissimmee.

Data collected by the South Florida Water Management District in late spring and early summer 1991 demonstrate this problem (Figure 1). For about eight weeks in April, May, and June, lake levels recorded at Kissimmee River State Park and at Structure S-65 Headwater differed from 0.1 to 1.1 ft. Again, during mid-July through mid-September, significant deviations where noted between lake levels recorded at these two stations. Considering the importance of monitoring lake levels as part of the Headwater Revitalization Project and determining flow rates from Lake Kissimmee to the Kissimmee River, the USCOE should add additional water level recording stations around all three lakes to provide an accurate, daily mean water level for each lake.

The Lake Restoration section plans to continue the management of aquatic habitat by use of extreme drawdowns on the Kissimmee Chain of Lakes. The USCOE should make allowances for schedule changes in flow rate from the upper Kissimmee Basin Lakes to the Kissimmee River during lake restoration projects.

The land purchasing program for the Headwaters Revitalization Project will significantly increase aquatic resources in the upper Kissimmee Basin. If only this part of the overall project is implemented, long-term positive benefits are expected for water quality, aquatic habitat, and fish and wildlife populations.

IV. SECTION 5: PROBLEMS AND OPPORTUNITIES; 5.2 Ecological degradation.

Figure 9, page 57, is a misrepresentation of the vertical stratification of rough and game fish species within the C-38 and remnant river channel. The figure attempts to present a distributional relationship between the vertical stratification of dissolved oxygen levels, and the dissolved oxygen requirements of game and rough fish species. Under present conditions, most fish species are concentrated within the upper few feet of the water column. Gar and bowfin are capable of withstanding depressed dissolved oxygen concentrations similar to levels found in the deeper waters of the C-38; however, this should not be construed as to indicate where these fish species are usually located within the water column. In fact, gar and bowfin are usually located near the surface as this is where their prey items are concentrated.

Figure 9 is adequate for the graphic presentation of the observed vertical stratification of dissolved oxygen in the C-38 and remnant river channel. A separate line graph should be employed to present the dissolved oxygen requirements of fish species found in the Kissimmee River.

V. SECTION 9: FORMULATION OF ALTERNATIVE PLANS: SECOND FEDERAL FEASIBILITY STUDY; 9.3 Evaluation of Alternative Plans.

Table 23 on page 145 contains several incorrect bird population estimates and erroneous conversions cited from Toland (1991). Again, the estimate of 140 ducks is incorrect and should be 875 (Toland, pers. comm.). Based on estimated available wetland acres, Toland (pers. comm.) has provided estimates of 1,060 and 1,875 ducks for the Weirs and Plugging Plans/Level I Backfilling Plan and Level II Backfilling Plan, respectively. Using the same criteria, estimates of 4,200 and 7,500 wading birds (excluding cattle egrets) were calculated by Toland for the Weirs and Plugging Plans/Level I Backfilling Plan and Level II Backfilling Plan, respectively (Toland, pers. comm.). There

is no explanation in the Corps report for how the wading bird numbers are predicted to increase by a greater percentage between the existing condition and Level I Backfilling (net increase of 3,000 acres) than between Level I Backfilling and Level II Backfilling (net increase of 12,000 acres). Finally, why is the population estimate of waders higher for the Recommended Plan than the Level II Backfilling Plan when the available wetland acres are the same? Waterfowl and wading bird estimates derived from Toland's work are again incorrectly stated on page 151. The corrected statements, according to Toland (pers. comm.), should read:

> "Waterfowl - based on the results of the Demonstration Project, waterfowl densities are projected to increase to a mean day winter population of 1,060 ducks with the Weir, Plugging, and Level I Plans, and 1,875 ducks with the Level II Plan.
>
> Wading Birds - A mean daily population of 4,200 birds would be expected with the Weir, Plugging, and Level I Plans. An estimated 7,500 birds would be expected with the Level II Backfilling Plan."

The same corrections need to be made for waterfowl and wading bird numbers provided on pages 167 and 182, as well as in Table 30 on page 186.

In Table 31 on page 188, the percentages of modern historic fish and wildlife numbers restored should be revised as follows:

> Waterfowl (individuals in winter population) changed from 1%, 4%, 4%, 4%, 4%, and 100% to 7%, 8.5%, 8.5%, 8.5%, 8.5%, and 15%, respectively. Wading Birds (individuals in population) changed from 19%, 56%, 56%, 56%, 56%, and 89% to 19%, 34%, 34%, 34%, 34%, and 42%, respectively. These revisions should also be inserted into calculations in Table 32 on page 189.

VI. 9.7.6 Evaluation of Options.

Table 20, page 141, indicated recreation (navigation) user days of 134,000 under existing conditions, 199,000 "without project", and 162,000 with the recommended plan. What is the source for these values and projections, and why are they inconsistent with those presented in Appendix E?

VII. SECTION 10: RECOMMENDED PLAN: 10.3.1 Fish and Wildlife Monitoring: Fish Community Analysis.

Using the "Index of Biological Integrity" (Karr et al 1986) to assess the biological integrity of south Florida streams would produce results of questionable applicability and accuracy. The IBI was developed in midwestern cobble-bottomed streams with high degrees of habitat diversity. The fish communities of these streams are among the most species rich of the Nearctic region due to abundance of niche types. The IBI has been modified by several state and private concerns for use in geographical areas having streams with habitat characteristics differing from the Illinois system where the index was developed. However, none of the modifications were done in systems with habitat characteristics as extreme as those found in south Florida. These extremes include: little habitat diversity (most are sand-bottomed only), low instream flow velocities, high temperatures (range 20°C to 32°C), and chronic low dissolved oxygen levels. The fish assemblages inhabiting south Florida streams are characterized by low diversity and an abundance of species tolerant of severe environmental conditions. IBI parameters which would be unsuitable for use in these streams include:

1. Species Richness and Composition
   - a. Number and identity of darter species
   - b. Number and identity of sucker species
   - c. Number and identity of tolerant species
   - d. Proportion of green sunfish
2. Trophic Composition
   - a. Proportion of insectivorous cyprinids

These parameters represent 42 percent (5 of 12) of those originally included in the index.

The IBI does have potential for use in south Florida streams, providing the parameters are modified substantially. This would entail identification of "benchmark" sites inhabited by species characteristic of pristine conditions in south Florida.

VIII. ANNEX D: ECOSYSTEM PERSPECTIVE ON RESTORATION BENEFITS

Table 1 on page d-5 includes limpkin and sandhill crane with 15 species of wading birds (Ciconiiformes). Cranes and limpkins are classified in the order Gruiformes, are not closely related to wading birds, and should not be lumped with them. The genus of the yellow-crowned night heron should be changed to *Nycticorax*.

Table 2 on page d-6 lists waterfowl likely to occur in the restored Kissimmee River ecosystem. It also includes 7 species of Gruiformes, including the rails, sora, coot, moorhen, and purple gallinule. These should be placed in a separate table with sandhill crane and limpkin.

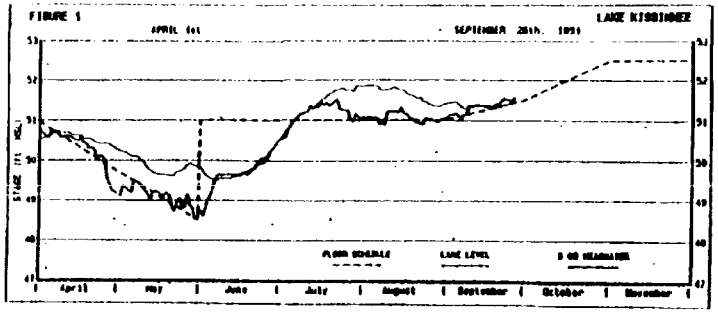
On the bottom of page g-6, duck numbers referenced to Toland are actually his wading bird estimates. The 4,200 and 7,500 numbers should be changed to 1,060 and 1,875 if Toland's work is to be cited. The GFC has provided data that justifies the restoration project, but does not predict the magnitude of population recovery of wading birds and waterfowl currently presented in the Feasibility Report. At best, the restoration project will result in 78% of the pre-channelization wetland acres, while Florida's wading bird populations continue to decline and the Continental duck population plummets.

IX. APPENDIX E: NAVIGATION AND RECREATION

Many of the data presented within this section lack quantification and are inconsistent with values presented in other areas of the report. Table E-6 estimates the 1991 user days for the various pools of the Kissimmee River. These values seem inflated based on local knowledge of the area. A system-wide estimate of 166,600 fishing days annually is exaggerated. This is an average of 456 anglers per day on the Kissimmee River. For comparison,

statistically valid creel surveys indicate Lake Okeechobee supports approximately 311,532 fishing user days annually, which is a daily average of 853 anglers. In addition, the estimated current annual user days fishing as presented in Table E-6 is higher by 540% over the current fishing estimate of 26,000 angler days as determined by the Fish and Wildlife Resources Planning Peer Group and presented in Table 23, page 145. Also, current fishing days in Table E-10 and Table E-11 are estimated at 95,000. These discrepancies should be resolved.

Table E-13 presents a value for Specialized Fishing and Hunting activities. Largemouth bass fishing tournaments would fall under this category. The report (page E-6) recognizes the prominence of tournaments and Boat-A-Cade activities on the river, especially in association with S-65 and S-65E. While much attention is given to Boat-A-Cade activities, the report fails to recognize the economic value of bass tournaments on the river (User Day Boating Values, page E-15). Table E-13 assigns the highest economic value to specialized fishing activities such as bass tournaments.



FLORIDA DEPARTMENT OF STATE
Jim Smith
Secretary of State

DIVISION OF HISTORICAL RESOURCES
R.A. Gray Building
500 South Bronough
Tallahassee, Florida 32399-0250
Director's Office (904) 488-1480
Telecopier Number (FAX) (904) 488-3353

October 16, 1991

Mr. A.J. Salem
Planning Division
Jacksonville District
US Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

In Reply Refer To:
Susan Hammersten
Historic Sites Specialist
(904) 487-2333
Project File No. 912670

Re: Cultural Resource Assessment Review Request
Draft Integrated Feasibility Report and Environmental Impact Statement for the Environmental Restoration of the Kissimmee River, Florida. September 1991

Dear Mr. Salem:

In accordance with the procedures contained in 36 C.F.R., Part 800 ("Protection of Historic Properties"), we have reviewed the referenced Draft Environmental Impact Statement Summary, Annex F and Existing Conditions sections and find that they adequately address this agency's recommendations concerning cultural resources. The inclusion of those same recommendations and agency concerns in the final Environmental Impact Statement will satisfy this agency's considerations.

If you have any questions concerning our comments, please do not hesitate to contact us. Your interest in protecting Florida's archaeological and historic resources is appreciated.

Sincerely,

Suzanne P. Walker
for George W. Percy, Director
Division of Historical Resources
and
State Historic Preservation Officer

GWP/Hsh

Florida Department of Environmental Regulation
Twin Towers Office Bldg • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400
Lawton Chiles, Governor
Carol M. Browner, Secretary

November 8, 1991

RECEIVED
NOV 14 1991
STATE CLEARINGHOUSE

Janice L. Alcott
Director, State Clearinghouse
Office of Planning and Budgeting
Budget Management and Planning Policy Unit
Executive Office of the Governor
The Capitol
Tallahassee, Florida 32399-0001

RE: Draft Integrated Feasibility Report and Environmental Impact Statement, "Environmental Restoration Kissimmee River, Florida"
SAI: FL9109240461C

Dear Ms. Alcott:

We are pleased with the U. S. Army Corps of Engineers' progress in completing the draft Integrated Feasibility Report and Environmental Impact Statement (DEIS), "Environmental Restoration Kissimmee River, Florida". We concur with the selection of the Modified Level II Backfilling Plan as the Recommended Plan for the restoration of the ecological integrity of the Lower Kissimmee River Basin. As stated in our July 22, 1991, letter we realize that the design of the Modified Level II Backfilling Plan is in a preliminary stage. No "fatal flaws," with respect to permitting have been identified in the DEIS. Our review has identified some preliminary concerns and suggestions which should be addressed as project planning progresses.

19 The South Florida Water Management District's plan, that the upper un-backfilled section of C-38 (from S-65 to the downstream limit of C-38 backfilling in Pool B), be tapered or "shallowed," should be included in the Recommended Plan.
8 Additionally, impounded marshes should be created within the floodplain of Pool A and upper Pool B to maximize benefits for wildlife, water quality, and dry-season water supply to

the River. Although dismissed due to lack of support, the Paradise Run Plan should continue to be considered. This 10,000-acre area, west of C-35 and south of S-65E, could easily be enhanced. The Paradise Run Plan would reflood 4,100 to 5,000 acres of floodplain.

20 Two containment levee projects are included to reduce real estate acquisition costs. The first will provide 100-year flood protection adjacent to Chandler Slough and Yates Marsh, while the second will prevent backflowing of the Kissimmee River into Lake Istokpoga. Location and construction of the proposed containment levees and associated borrow canals in Pool C, D, and E must be done with care and coordination. There is the potential for wetland impacts from direct filling, lowering of water tables, and diversion of existing water movements in the form of overland flow, groundwater flow and stream flow. Additional information is required for the proper design of these levees.

21 The successful restoration of the Kissimmee River depends on the completion of two projects, the Headwaters Revitalization Project in the Upper Basin and the Modified Level II Backfilling in the Lower Basin. The current schedule for Headwater Revitalization includes completion of NEPA documentation by 1994. Assuming that the project is approved for construction, completion is scheduled for 1997. This completion date is before the scheduled 1998 start of the backfilling project. In our letter of July 22, 1991, we stated that since the success of the River restoration is dependent on headwaters revitalization, we would want assurances that the restoration would be successfully accomplished by the time of permit issuance for the Lower Basin restoration. Subsequent verbal communication with the Corps of Engineers indicates this would not be possible. We do not want to place any undue burden on any agency involved in planning this project, given its benefits, but we do need assurances that the revitalization will be completed in a timely fashion. To that end, we may request mutually acceptable permit conditions to ensure that the headwater revitalization will be completed expeditiously. Alternatively, we may request reasonable assurance that the headwater revitalization will be conducted during the processing of the restoration permit application.

22 The Recommended Plan will restore the essential physical and hydrologic characteristics of the Lower Kissimmee River Basin, which includes 56 miles of restored river and about 29,000 acres of restored wetlands. However, it is unclear how much wetlands area will be disturbed or eliminated to create the project. The Department will require, as part of the permit application, the number acres of existing wetlands affected and a demonstration that impacts have been minimized to the greatest extent practicable.

23 We are concerned about the plans to excavate material from the surrounding floodplain (creating "potholes") if the quantity of backfill material in existing spoil mounds is insufficient. This practice seems inappropriate, especially if the adjacent floodplain is of good or high quality. In addition, it seems unlikely that the historic floodplain contained similar topographic features. Consideration should be given to using additional material from the closest unused spoil mounds.

The Department supports the recommendations found in Section 12 (pp. 239-240) of the DEIS and additionally recommends that the authorization of credit for 75% of the Lands, Easements, Rights-of-Way, Relocations and Damages (LERRD) costs to the non-Federal sponsor for the Headwaters Revitalization Project be extended to include the Recommended Plan (i.e., LERRD costs for the total project).

24 The State of Florida is committed to obtaining all interests in land necessary to achieve the benefits of the Kissimmee River restoration project within the planned time frame. Although policy questions have arisen at the State level regarding the needed extent and costs of these interests, such review should not be construed as a lessening of the State's commitment to this project. The State also has the responsibility to safeguard the public trust by ensuring the efficient use of public funds. Future changes to the current method of acquiring land interests in the Kissimmee Basin, if deemed necessary, will be implemented with a keen awareness of the Corps' time schedule. However, the State cannot justify inappropriate fiscal decisions on the basis of a perceived lack of time for review.

We appreciate the opportunity to comment on this important restoration project. Adoption of the Recommended Plan with the suggested provisions is strongly encouraged, and implementation should begin as soon as possible. If you have any questions regarding this letter please call Stephen Brooker at 904/488-0130.

Sincerely,

Mark Latch

Mark Latch, Director
Division of Water Management

ML/tsb

c: Carol Browner, DER
Tilford C. Creel, SFWMD
Gail Sloan, DER
Louis Toth, SFWMD
Herb Zebeth, DER

Form 281-10

MEMORANDUM

State of Florida Department of Transportation

DATE November1, 1991

TO Cearon Becker, Project Development

FROM T. A. Polk, District Drainage Engineer

COPIES TO

SUBJECT Environmental Restoration
Kissimmee River, Florida
US Army Corps of Engineers
Jacksonville District
South Atlantic Division

RECEIVED
NOV 5 1991
PROJECT DEVELOPMENT

I have reviewed the above document as to the drainage impacts of the project on the Florida Department of Transportation.

The restoration project assumes that an additional 440 foot span bridge structure on US 98 (SR 700) will be constructed to the east of the existing structure across C-38. A berm is to be constructed upstream to allow sheet flow under the new structure. A new river channel is to be excavated upstream and downstream, and the existing C-38 channel is to be partially backfilled to EL 20. Their analysis shows that the 5 yr and 100 year flood plain will be increased by approximately five feet in this area. At the confluence with Chandler Slough the base flood EL is around 38.3.

I have not reviewed profile grades in this area except for approaches to Chandler Slough, which is presently in the Design Phase. The existing PG EL is around EL 37.4. The proposed PG EL with the new bridges is EL 42. The profile grade of US 98 will need to be evaluated during the design of the 440 foot bridge structure. Although the PG of the roadway does not necessarily need to be above the 100 year base flood plain, it probably should be above the 10 year and 50 year flood plain. The estimated cost of the 440 foot US 98 bridge was around 2.6 million dollars.

If there are any questions, please contact me.

tap/fj

If response is required please use reverse side

MANATEE COUNTY GOVERNMENT

November 5, 1991

Mr. Russ Reed
Study Manager
U.S. Army Corps of Engineers
Box 4970
Jacksonville, FL 32232-0019

Attn: CESAJ-PD-F

Dear Mr. Reed:

I understand that the Corps is now evaluating the restoration of the Kissimmee River to its historic flow patterns and surrounding natural conditions. It is very important that this project be completed, in order to restore the Everglades to some semblance of their former vitality.

Changes in the Everglades over time, much of which are directly attributable to the man-made alterations in the path of the Kissimmee River, have had widespread negative effects on water quality and quantity, vegetative communities, and habitats for native animals (many of which are now endangered or threatened species). Perhaps more subtle but equally alarming are the changes in the State's climate that may have resulted from changes in the Kissimmee and the Everglades. Recent years have seen dryer winters and shorter "rainy seasons." The water shortages that Florida has experienced over the past decade are likely to grow more and more severe, unless the Everglades are restored.

<u>Please forge ahead with restoration of the Kissimmee River.</u> Accept the Modified Level II Backfilling Plan as the course of action. Failure to restore the Kissimmee River in response to localized, special interests would be extremely short-sighted and irresponsible. The Kissimmee River, Lake Okeechobee and the Everglades belong to all the citizens of Florida, not just the residents of developments that were inappropriately allowed to encroach on these irreplaceable resources, or the sugar cane growers!

Thank you for your assistance in this crucial matter.

Sincerely,

ENVIRONMENTAL ACTION COMMISSION
OF MANATEE COUNTY, FLORIDA

Karen M. Collin Director

RESOLUTION 91-64

A RESOLUTION OF THE BOARD OF COUNTY COMMISSIONERS OF HIGHLANDS COUNTY, FLORIDA CONCERNING THE KISSIMMEE RIVER RESTORATION PROJECT, REQUESTING THAT THE U.S. CORPS OF ENGINEERS AND SOUTH FLORIDA WATER MANAGEMENT DISTRICT ACKNOWLEDGE, UNDERSTAND AND TAKE APPROPRIATE POSITIVE ACTION TO PREVENT ECONOMIC DESTRUCTION IN AND TO HIGHLANDS COUNTY AND ITS RESIDENTS.

WHEREAS, Highlands County, Florida, is already burdened with numerous, substantial costs attributable to programs mandated by State Government; and

WHEREAS, Highlands County is facing additional substantial costs and reduced tax revenues due to requirements of the Department of Community Affairs in the Comprehensive Plan approval process; and

WHEREAS, Highlands County does not have the financial resources to participate in the Kissimmee River Restoration Project; and

WHEREAS, the damages to the Kissimmee River, Lake Istokpoga, and other related bodies of water which that Restoration Project seeks to mend were caused by the State of Florida and the United States of America; and

WHEREAS, Highlands County and its residents well remember the glowing promises of a better future with little environmental damage which were made by those same agencies which today represent the Kissimmee River channelization as an evil which must be eliminated; and

WHEREAS, it appears that much of the environmental damage caused by channelization of the Kissimmee River has been healed, resulting in an abundance of fish and other wildlife; and

WHEREAS, channelization of the Kissimmee River has provided an effective water control facility for flood and drought prevention which has been of great benefit to Highlands County.

NOW THEREFORE, be it resolved by the Board of County Commissioners of Highlands County, Florida, in regular session; duly assembled:

25 1. That the State of Florida and the United States of America and their many agencies, including among them the South Florida Water Management District and the Corps of Engineers take no action

CERTIFIED
TO BE A TRUE COPY
EARL RICH, CLERK
By D. Graham D.C.

on the Kissimmee River Restoration Project until a comprehensive study of all those rivers, streams, marshes, lakes, and other water bodies which supply it has been completed to evaluate (a) the changes that have occurred as the surrounding areas have developed since channelization was completed and the effect those changes may have upon the viability of a restored Kissimmee River, (b) the loss of drought prevention upon the viability of a restored Kissimmee River, (c) the flooding of adjacent property, (d) the long term environmental damage attributable to an extended restoration project, (e) the costs to benefits of the restoration project, (f) all alternatives, and (g) all other relevant factors; and

2. That the State and Federal Governments recognize that the property owners along the Kissimmee River are being significantly damaged as the supposed experts channelized and now dechannelize the Kissimmee River; and

26 3. That the State and Federal Governments take all possible steps to eliminate these damages through their study and planning process and by fully and fairly compensating all property owners who will be adversely affected, without the necessity, cost and anguish of extended court battles; and

4. That the State and Federal Governments commit to and commence the Kissimmee River Restoration Project only after fully funding all direct and indirect costs associated with all aspects
27 of the restoration plan so as to prevent a nonfunctioning, partially completed project or a long term, when funds are available project, either of which would cause enormous financial and environmental damage to this area; and

5. That no restoration project be commenced until it has been
28 established that the restored Kissimmee River will have the same measure of water control for flood and drought prevention as exist today on the Kissimmee River.

PASSED AND ADOPTED, this 22nd day of October, 1991.

BOARD OF COUNTY COMMISSIONERS
HIGHLANDS COUNTY, FLORIDA

By: Claude D. Boring
Claude D. Boring, Chairman

ATTEST:

Earl Rich, Clerk

resol.208

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EARL RICH, CLERK
By D. Graham D.C.

AUDUBON SOCIETY
OF THE EVERGLADES
P. O. BOX 6762, WEST PALM BEACH, FLORIDA 33405 PHONE (407) 588 6908

November 5, 1991

RE: Support for
KISSIMMEE RIVER RESTORATION

Mr Russ Reed, Study Manager
U.S. Corps of Engineers, CESAJ-PD-F
Box 4970, Jacksonville, Fl 32232-0019

Dear Sir,

At the urging and direction of this Audubon Chapter membership (over 1500) this letter is to express strong support for the restoration of the KISSIMMEE RIVER, particularly for the "Modified Level II Backfilling plan".

The restored functioning of this River and its flood plain is very vital to the survival of the Everglades National Park. As intervenors in the lawsuit on the side of the U.S. Gov't you can see how strongly we feel about the actions necessary to restore this ecosystem upon which this Nationally important Park depends.

Please heed the majority's wishes and advise Congress to fund the Level II plan.

Sincerely yours,
Blanche Gotter, ASF

cc to Sen, Reps, Water Mg. Dist

FLORIDA BI-PARTISANS CIVIC AFFAIRS GROUP
For Continuing Education, Public Health & Responsible Govt.
Founded in 1960

11/8/91

Mr. Russ Reed, COE Study Manager
Attention - CESAJ-PD-F
Box 4970, 32232-0019

Dear Mr. Reed;

Our organization is strongly in support of Level II Backfilling Plan for restoration of the Kissimmee River.

We are familiar with the steady increase in understanding of the importance that restoration will provide for the health and welfare of Florida citizens - present and future.

There will always be those who choose not to admit this because it may interfere with their private interests.

We wish to be kept informed beginning now from your Jacksonville office of upcoming progress on restoration of the Kissimmee. Please put us on your mailing list.

Thank you. Sincerely yours,
M.A. Jernigan

Please reply to - M.A. Jernigan
9402 Cat Track Trail
Lake Wales, Fl 33853

FLORIDA FARM BUREAU FEDERATION

P. O. Box 147030, Gainesville, Florida 32614-7030 Telephone (904) 378-1321

October 16, 1991

U. S. Corps of Engineers
400 West Bay Street
Jacksonville, FL 32202

Gentlemen:

As Chairman of the Florida Farm Bureau Kissimmee River Advisory Committee, I write to offer input regarding the proposed restoration of the Kissimmee River. Please include these remarks on the record for comment purposes.

The Florida Farm Bureau Federation is a private, non-profit membership association made up of 80,000 member families representing all phases of Florida agriculture. As farmers and ranchers, many of our members are owners of lands along the Kissimmee River.

Consequently, Florida Farm Bureau formed the Kissimmee River Advisory Committee several years ago. The committee is made up of knowledgeable landowners who have participated in and made a careful study of the many proposals generated in recent years regarding the Kissimmee River Basin and Lake Okeechobee. This committee has solicited input from many members of the scientific community on technical questions. It is our firm belief that the implementation of the restoration of the river will materially impact operations and ownership rights along the river. With this in mind, we urge the following be considered.

Florida Farm Bureau's grassroots policy process has developed policy on the Kissimmee River as set forth below:

Based on the findings of the Army Corps of Engineers' study, we oppose the restoration of the Kissimmee River to its natural state for the following reasons:

29 A. The Army Corps of Engineers' study indicates "that the overall quality of water from the C-38 System entering Lake Okeechobee generally meets state water quality standards. There is no indication that any of the canal modification alternatives will significantly improve water quality in C-38 or the Kissimmee River." Further, we are concerned that removal of water control structures could result in major environmental, flood, drought and water quality damage.

30 B. The Corps study indicates that restoration will have no economic benefit.

Any programs proposed should be based on scientific data, a cost/benefit ratio and should be considered before implementation.

As an organization of private citizen-taxpayers, we also vehemently object to the proposed expenditure of funds for the dechannelization project at a time when the Federal budget is in shambles. The Corps' own Syllabus Summary points out that the project has provided the navigation and flood control which it was designed to provide. To spend half a billion dollars of taxpayers money to undo a project which benefits not only the property owners, but also the commerce, safety and recreational opportunities of all our state's citizens is completely irresponsible.

Dechannelization was original touted as a water quality improvement necessity. As more and more questions have arisen about the validity of this assertion, dechannelization proponents have shifted to creation of wildlife habitat as their theme. All dechannelization debates have been carried out during a period of years in which rainfall was normal. We are now seeing in 1991, with heavier than normal rainfall conditions, that Florida can indeed have flood problems; the very sort of problems which this project was originally conceived to alleviate 40 years ago.

The citizens and the state have benefitted from this. Taxpayers' monies, especially in times of trillion dollar deficits, should not now be wasted to meet the political agendas of environmental activists.

Thank you for your consideration.

Sincerely,

Edgar Stokes

Edgar Stokes, Chairman
Kissimmee River Advisory Committee

FLORIDA WILDLIFE FEDERATION

Affiliated With National Wildlife Federation

STREET ADDRESS: 2545 BLAIRSTONE PINES DRIVE
MAILING ADDRESS: P O BOX 6870, TALLAHASSEE, FLORIDA 32314-6870
PHONE: 904 656-7113
FAX: 904 942 4431

MANLEY K FULLER, III
President

November 12, 1991

Mr. Russ Reed
U.S. Army Corps of Engineers
Attn: CESAJ-PD-F
Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Reed,

The Florida Wildlife Federation supports the option for Modified Level II Backfilling Plan as the best restoration option for the Kissimmee River.

Since the 1970's the Florida Wildlife Federation has strongly supported the dechannelization of the Kissimmee River and supported a joint federal state partnership in this regard. We believe this project is vital to restoring the functional ecological integrity of the Kissimmee. Restoration will result in a dramatic increase of viable wetlands habitat in the Kissimmee River Valley.

We believe that a host of ecological and recreational benefits will come to the public as a result of this project.

31 However, we share the concerns expressed to you in a letter dated November 7 by Theresa Woody, Southeast Field Representative, Sierra Club, concerning the need to re-examine the cost estimate of the report. We believe that work in the lower basin should begin
32 earlier than 1998. We also disagree that it is necessary to complete all of the upper basin work before beginning the lower basin project.

Kissimmee River restoration is a nationally significant project and represents an opportunity for us to demonstrate that past environmental mistakes can be corrected.

Sincerely,

Manley K. Fuller, III

Manley K Fuller, III
President, FWF

Hidden Acres Estates

RESOLUTION

ON THIS, THE 17th DAY OF OCTOBER, IN THE YEAR OF OUR LORD 19[illegible] THE BOARD OF DIRECTORS OF HIDDEN ACRES ESTATES, INC. ADDRESS THE POWERS [illegible] BE, COUNTY, STATE AND FEDERAL GOVERNMENT OFFICIALS ALONG WITH ALL INTERESTED PARTIES. THIS IS A FORMAL STATEMENT OF OPINION, DETERMINATION AND RESOLV[illegible] THEREFORE:

BE IT RESOLVED....

WHERE AS...FAMILIES FROM FLORIDA AND STATES ACROSS THIS COUNTRY HAVE CHOS[illegible] AND FOUND A SHARED LOVE IN CREATING A COMMUNITY OF PEOPLE KNOWN HIDDEN ACRES ESTATES LOCATED ON THE BANKS OF THE OLD KISSIMMEE RIVER, SECTION 17, TOWNSHIP 36, RANGE 33 OF HIGHLANDS COUNTY, FLORIDA, THUS FORMING HIDDEN ACRES ESTATES, INC., A NON-PROFIT CORPORATION FOR THE INCLUSIVE GOOD OF ALL IT'S SHAREHOLDERS, AN[illegible]

WHERE AS...HIDDEN ACRES ESTATES, INC. CHARTERED AND LICENSED UNDER THE APPROPRIATE STATUES OF THE STATE OF FLORIDA ON APRIL 11, 1979, HAS BECOME A VIABLE, TAX PAYING COMMUNITY OF ONE HUNDRED, NINE[illegible] TWO (192) HOMESITES, TO DATE ONE HUNDRED, SEVENTEEN FAMILIES, AN[illegible]

33 WHERE AS...THE SHAREHOLDERS / LOT OWNERS OF HIDDEN ACRES ESTATES, INC. FIND THEMSELVES PLACED IN IMMEDIATE FINANCIAL JEOPARDY BY THE SOUTH FLORIDA WATER MANAGEMENT AND THE UNITED STATES ARMY CORP OF ENGINEERS' KISSIMMEE RIVER RESTORATION PROPOSAL, SAME TO BE SUBMITTED TO THE UNITED STATES CONGRESS FOR IT'S APPROVAL, AND

34 WHERE AS...THE PUBLIC AWARENESS OF SAID PROPOSAL PLACES AN EMINENT CLOUD OVER ANY SALES OF NEW LOTS OR RESALE OR RESALE HOMES IN THE COMMUNITY OF HIDDEN ACRES ESTATES DUE TO THE UNCERTAINTY OF BUY-OUT, CONDEMNATION AND FLOODING OF ANY OR ALL PROPERTIES IN HIDDEN ACRES ESTATES IF AND WHEN THE PROPOSAL IS ACCEPTED AND PASSED BY THE UNITED STATES CONGRESS, AND

WHERE AS...THE PROPOSAL CALLS FOR ALL NECESSARY PROPERTIES TO BE ACQUIRED IN OUR LOCATION (POOL "D") BY APRIL OF 1996, AT A TOKEN OF IT'S VALUE, AND

WHERE AS...NO HEALTHY COMMUNITY SHOULD HAVE TO BEAR THIS BURDEN FOR THE FISCAL HEALTH OF HIDDEN ACRES ESTATES, AS THIS CLOUD HAS RENDERED OUR BEAUTIFUL NEW HOME SITES UN-SALABLE, AS WELL AS PARALYSING ANY RE-SALE HOMES FOR YEARS TO COME, AND

WHERE AS...A DRAMATIC, DEVASTATING ERROR WAS COMMITTED PRIOR TO 1961 WHEN THE DECISION WAS MADE BY THE UNITED STATES CONGRESS TO ALLOW THE UNITED STATES ARMY CORP OF ENGINEERS AND IT'S MILITARY MACHINE TO BUILD THE STRAIGHT CANAL. THUS ENSUED TEN LONG YEARS OF HORRENDOUS RAPE AND DESTRUCTION TO OUR ECOLOGICAL ENVIRONMENT AT THE COST OF MILLIONS OF DOLLARS PAID BY TAX PAYERS MONIES AND

RESOLUTION PAGE TWO OF TWO

35 TWENTY YEARS AFTER IT'S COMPLETION IN 1971 THE ECO SYSTEMS HAVE HEALED THOUGH SCARS REMAIN TO REMIND US OF THIS TERRIBLE TRAVESTY, AND

WHERE AS...COMES THE UNITED STATES ARMY CORP OF ENGINEERS BEFORE US, YET AGAIN, TO PROPOSE A CORRECTING RESTORATION WHICH IS TO INVOLVE FIFTEEN LONG YEARS OF CONSTRUCTION / RAPE, YET AGAIN, MILLIONS OF
36 TAX PAYERS DOLLARS WILL BE ALLOCATED WITH NO GUARANTEE OF RESULTS OTHER THAN DEATH AND DESTRUCTION LEFT IN THE WAKE OF EARTH MOVING EQUIPMENT, YET AGAIN, TWENTY MORE YEARS OF HEALING, AND

WHERE AS...WE ARE GREATLY CONCERNED WITH THE PROPOSALS CALCULATIONS OF THE FIVE YEAR AND ONE HUNDRED YEAR FLOOD PLAIN AS TO IT'S ACCURACY AND POSSIBLE INCREASE IN TOPOGRAPHICAL MEASUREMENT FROM HISTORIC
37 MEASUREMENT, AS THIS WOULD CREATE THE POSSIBILITY OF "INDUCED FLOODING", A TOTALLY ILLEGAL MANEUVER ON THE CORP'S PART, IF TRUE, AND

WHERE AS...THE GROUNDS OF HIDDEN ACRES ESTATES ARE SHADED BY IN EXCESS OF FOUR HUNDRED CENTURIES OLD LIVE OAK TREES THAT DO NOT GROW ON LAND
38 THAT FLOODS, ALL OF WHICH WOULD BE DESTROYED BY INDUCED FLOODING, AND

WHERE AS...WE HAVE WITNESSED IN EXCAVATION WHAT WE BELIEVE TO BE THE BURIED REMAINS OF THE MAIN OUTER STOCKADE WALL OF FORT BASINGER (BASSINGER / BASSENGER) BUILT IN 1837, DURING THE SEMINOLE WARS AS WELL AS INDIAN MOUNDS, ON HIDDEN ACRES PROPERTY, ALL OF WHICH NEEDS TO BE FURTHER INVESTIGATED FOR REGISTRATION AND PRESERVATION, AND

WHERE AS...HIDDEN ACRES ESTATES, INC IS AS ONE IN OPINION, DETERMINATION AND RESOLVE, LET IT BE KNOWN TO ALL MEN,

HIDDEN ACRE ESTATES, INC. RESOLVES TO DO ALL IN IT'S POWER TO FIGHT FOR AND CONTINUE, LIFE, LIBERTY AND THE PURSUIT OF HAPPINESS, ON IT'S OWN LAND.

BOARD OF DIRECTORS
HIDDEN ACRES ESTATES, INC.
964 COUNTY ROAD 721, LORIDA, FLORIDA 33857

Barbara Williams
BARBARA WILLIAMS, CHAIRMAN

Charles A. Zimmerman
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George Koncir
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CAROL DERR

Carl Nickel
CARL NICKEL

Ridge Audubon Society
INCORPORATED
Post Office Box 148
BABSON PARK, FLORIDA 33827
(813) 638-1355
Associated with the Florida Audubon Society and the National Audubon Society

November 6, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Attn: CESAJ-PD-F
Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Reed:

We wish to advise you that the Ridge Audubon Society, representing more than 300 members and supporters along Polk County's Ridge, is now and has been solidly in back of restoration of the Kissimmee River for a long period of years. We favor the Level II Backfilling Plan.

Most of our members have written many letters in the past regarding the desirability of restoring the Kissimmee. They were under the impression that the only question now is how and when the restoration will take place.

Therefore, we were shocked to learn that various opponents of restoration, having failed to convince the general public of the merits of their case are now appealing to various groups on the basis of unjustified fears of what restoration will do.

These tactics suggest desperation and we believe they will not succeed in the light of overwhelming evidence of the need of restoration of the Kissimmee River. As studies have shown, restoration will improve water quality in Lake Okeechobee, with resultant benefits not only to the lake and its users but to the whole Everglades system. Also, to restore some 30,000 acres of marshes will benefit wildlife greatly and may have a salutary effect on the hydrological cycle.

Please note that our 300+ members are enthusiastic backers of what will be the greatest wetlands restoration project in our history. We request prompt action to restore the Kissimmee!

Sincerely yours

Helen & Ken Morrison
Helen & Ken Morrison
Co-chairmen for Conservation
RIDGE AUDUBON SOCIETY

Mr Kenneth B Morrison
1351 Hollister Rd
Babson Park FL
33827-9631

SIERRA CLUB

BROWARD COUNTY GROUP

November 5, 1991

Larry Marvet
Acting Conservation Committee Chairman
9437 NW 45th Street
Sunrise, Florida 33351

Mr. Russel V. Reed
U.S. Army Corps of Engineers
Attn: CESAJ-PD-F
P.O. Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Reed,

On behalf of the members of Sierra Club's Broward County Group, Florida Chapter, please make this letter part of the public record as our official comments on the Kissimmee River Restoration plan as presented at the October 1991 public meetings.

We strongly support the restoration of the Kissimmee River through implementation of the Level II Backfilling Plan proposed by the U.S. Army Corps of Engineers. A rejuvenated Kissimmee River is essential, not only to Central Florida where the loss of vital wetlands has been staggering, but to South Florida as well. The Kissimmee, as an integral part of the Everglades-Lake Okeechobee-Kissimmee River system, cannot be degraded without affecting this entire system and, consequently, Broward County. Broward County and all of South Florida's counties depend on the Kissimmee River because we rely on the Everglades for many vital aspects of our lives– drinking water, flood protection, and wildlife habitat are increasingly threatened by the decline of the Everglades. Recent flooding (October 1991) and water shortages (Summer 1991) grimly remind us of our strong dependance on the "River of Grass".

It is no coincidence that the Everglades' deterioration has occurred concurrently with the channelization/destruction of the Kissimmee River. The waters of the Kissimmee flow into Lake Okeechobee and then into the Everglades. Without the natural filtration of the Kissimmee's wetlands, the burgeoning Central Florida population has

SIERRA CLUB

BROWARD COUNTY GROUP

unwittingly dumped uncounted tons of toxic waste and other pollution into the system. Furthermore, with the increase of farm and ranch lands made possible by draining the Kissimmee Basin, fertilizer and animal excrement have increased dramatically in our waters.

The effects of this "flood control project" are an outrage: over 40,000 acres of wetlands destroyed; ninety percent of the waterfowl population lost; the fish population decimated; Lake Okeechobee in constant danger from extreme nutrient loading; and, again, the Everglades, the heart of Broward County's water supply system, is dying.

With this backdrop, we are excited about your proposal which promises to reestablish 52 contiguous miles of flowing Kissimmee River, to restore 30,000 acres of Kissimmee River wetlands, and to enhance many other plant and wildlife habitats. These renovated lands will help sustain the endangered wood stork, bald eagle, caracara, snail kite, and many other types of wading birds, waterfowl, raptors, perching birds, shore birds, and diving birds. Our Florida panther is gravely endangered and will be provided with additional habitat through this plan. River otters, alligators, turtles–the list of animals helped by your restoration is long and satisfying.

The Broward County Group of Sierra Club agrees with your decision to follow the Level II Backfilling Plan. The Weir, Plugging, and Level I Backfilling Plans are unacceptable because we believe that these other plans would not restore the ecology of the Kissimmee River ecosystem. We also feel that those inconvenienced or displaced by the restoration project should be fully and fairly compensated. Yet restoration of the Kissimmee is too important to South and Central Florida to choose a flawed plan. We need to get it right this time!

Sincerely,

Larry Marvet

Larry Marvet
Acting Conservation Committee Chairman

Sierra Club
Central Florida Group
P.O. Box 941692 • Maitland, Florida 32794 1692

November 5, 1991

Mr. Russ Reed
Study Manager
U. S. Army Corps of Engineers
ATTN: CESAJ-PD-F
Box 4970
Jacksonville, FL 32232-0019

Re: Restoration of the Kissimmee River

Dear Mr. Reed:

Representing more than 1500 members of the Central Florida Group of the Sierra Club, I wish to convey to you our firm support for the "Modified Level II Backfilling Plan" for the restoration of the Kissimmee River.

Within our Group's area are the headwaters of the Kissimmee River. We have fought long and hard to protect these waters so that the entire river system would benefit. We have taken steps to ensure that wetlands which have been degraded over the years are enhanced and improved as part of mitigation plans for development in the area. We sometimes feel that a lot of what we do has very little effect on the health of the river because of the run-off and degradation of the water downstream.

The Everglades, which is the beneficiary of whatever happens upstream, has been seriously degraded because of the effects of this runoff. The restoration project will return the river to its original channel, thus improving the water quality for both the Everglades and Lake Okeechobee. By allowing the wetlands in the original channel to do their job, we gain both better water quality for the Everglades and enhanced habitat for the bald eagle, the wood stork and the snail kite. It would restore a portion of the Atlantic Flyway wintering grounds and increase recreational fishing.

These benefits far outweigh the concerns of a few citizens who stand to lose a portion of their property as the river regains its original pathway. There is only one Everglades, and it is a national and a state treasure that is worth saving. We believe that it is time for the Corps of Engineers to restore the River to its original channel. It is time to reverse the trend of the past couple of decades where we have lost more

When we try to pick out anything by itself, we find it hitched to everything else in the universe. John Muir
Print on recycled paper

than 50 percent of our wetlands. This can be the premiere wetlands restoration project in the nation and improve both our water quality and habitat capabilities at the same time.

We thank you for your desire to restore the Kissimmee and hope that you will move forward quickly to do so.

Sincerely,

Sharon L. Carveth

Sharon L. Carveth
Chair

SIERRA CLUB The Florida Chapter

2205 Croydon Rd.
Tallahassee, FL 32303
5 November 1991

US Army Corps of Engineers
Box 4970
Jacksonville, FL 32231-0019

Dear Mr. Reed:

I would like to express my support of the Modified Level II Backfill plan for the restoration of the Kissimmee River, and I encourage the Corps to proceed as quickly as possible with the project.

As you are aware, the Kissimmee is the headwater of the Everglades ecosystem. Successful restoration of the river is a key component in improving the viability of watershed, especially Lake Okeechobee. Restoration will make it more feasible to duplicate historical floodplain hydroperiods and to enhance water quality, both of which will contribute to improved conditions downstream.

The channelization of the Kissimmee, now a Federal waterway, greatly increased some individuals' property rights to the major detriment of public resources such as wildlife and recreation which are enjoyed by all. The Kissimmee restoration represents an important opportunity to demonstrate the Corps' committment to Federal "no net loss" policy and to correct conditions which have led to the listing of several endangered species. I believe strongly that it is in the public's best interests that restoration be accomplished.

Last, I encourage your office to take whatever measures are needed to assure longterm Federal commitment to funding this project.

Sincerely,

Craig Diamond
Everglades Chair

"When we try to pick out anything by itself, we find it hitched to everything else in the universe." *John Muir*

SIERRA CLUB The Florida Chapter

11-10-91

U.S. Army District
Attn: CESAJ-PD-PF
P.O. Box 4970
Jacksonville, Fl.
32232-0019

Dear Colonel Salt:

In the decade of the sixties, the Kissimmee Valley was channelized ostensibly for flood control. The channelization destroyed or degraded most of the fish and wildlife habitat and the everglades hydroperiod once provided by the river and its floodplain wetlands.

Studies conducted over the last two decades have shown both a need for restoration and that restoration of the original ecosystem is possible.

Present cost estimates which exceed $500 million contain two
39 major uncertainties - earthmoving and land acquisition. Both of these uncertainties have been estimated so as to create unneces-sary concern for the cost of this project.

Those excessive cost estimates have been followed by the most aggravating suggestions for cost sharing. 50/50 cost sharing for restoration of a system destroyed by a project whose cost sharing was 75/25 with the federal share at 75%. As if this shabby treatment by the "New Environmentally Sensitive Corps", was
17 not irritating enough, now the Corps, for the first time in any federal/state project, suggests that certain state monies (SWIM, CARL, Save Our Rivers funds) are not painful enough to the taxpayers of Florida to qualify for this project! Frankly, these new twists in this "cooperative" restoration feasibility study must cause us to reevaluate the Corps as a partner on this or any other project.

The Kissimmee Restoration Project presents the Bush Administration and Congress with timely environmental and budgetary issues which beg resolution. The movement to restore the Kissimmee River is over 20 years old with millions of dollars of technical studies to its claim. Congress will begin preparing the 1992 Water Resources Development Act in early spring of 1992 with adoption scheduled for the fall. Kissimmee River Restoration will be a nationally significant project/issue considered in the 1992 Act. The Administration is reviewing the project at this time and will be making its recommendations to Congress in the spring. Kissimmee River Restoration has been a landmark project for environmental restoration and will soon be the test case which will allow the federal government to define its policies for environmental restoration for the 1990s and the next century.

Sincerely

Roni Monteith, Conservation Chairman

"When we try to pick out anything by itself, we find it hitched to everything else in the universe." *John Muir*

Manatee-Sarasota Group of the **SIERRA CLUB**

P.O. Box 3485 Sarasota FL 34230 Hotline Number 366-1000

Mr. Russ Reed
Study Manager
U.S. Army Corps of Engineers
Attn. CESAJ-PD-F
Box 4970
Jacksonville, Fl. 32232-0019

To whom it may Concern:

Please, please vote to restore the Kissimmee River.

1. It is the headwaters of the Everglades – and there is only one Everglades.
2. this restoration will help insure the quality of water to Lake Okeechobee.
3. this project must not be let to fall by the wayside – it needs to be the premier restoration project in the world.

In summary, Please restore the Kissimmee River.

Sincerely,

Timothy P. Mooney
Chair, Manatee Sarasota Group

"When we try to pick out anything by itself, we find it hitched to everything else in the universe." *John Muir*

TURTLE COAST SIERRA CLUB GROUP

PO BOX 061887, PALM BAY, FL 32906-1887

SERVING BREVARD AND INDIAN RIVER COUNTIES

1/11/90

Governor Bob Martinez
Office of the Governor
Tallahassee, FL 32399-0001

Subject: Kissimmee River Restoration

Dear Governor Martinez,

The restoration of the Kissimmee River is a great concern of 18,000 Sierra club members in Florida, including about 900 in the Turtle Coast Group in Brevard and Indian River Counties. We request immediate action to fill in the ditch and restore the entire river and its floodplain to their natural conditions. It is very important to choose the most complete restoration option.

Restoring the Kissimmee River will restore immense benefits to public wildlife, water quality and recreation, which were destroyed by the tragically misguided actions of the Army Corps of Engineers. The improvements in fisheries, tourism and recreation will be valuable to the residents and economy of the Kissimmee River basin.

Seeing in person the beauty of the small section already restored has made me see how valuable a fully restored Kissimmee River will be to the people of Florida. I personally want to be able to lead canoe trips on a fully natural Kissimmee River.

Thank you.

P.S. RESTORING THE KISSIMMEE RIVER IS ESSENTIAL TO THE FUTURE OF LAKE OKEECHOBEE AND THE EVERGLADES.

Jack Maney 11/7/91

Sincerely,

Jack Maney

Jack Maney, Secretary
Turtle Coast Sierra Club Group
407-727-4755, 723-2480

SIERRA CLUB

SOUTHEAST OFFICE

1201 N. Federal Hwy., North Palm Beach, FL 33408
(407) 775-3846 • FAX (407) 627-0225

November 7, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Attn: CESAJ-PD-F
Box 4970
Jacksonville, Florida 32232-0019

Dear Study Manager Reed:

The Sierra Club strongly supports the Corps conclusion in its Draft Feasibility Study and Environmental Impact Statement on the Restoration of the Kissimmee River dated September, 1991, that the Modified Level II Backfilling Plan is the best restoration option for restoring the Kissimmee River. We commend you on meeting the tight deadline for completion of the report.

Floridians and others concerned about the Kissimmee-Okeechobee-Everglades system have been asking, since 1971, that the river be de-channelized and that the federal government join in partnership with the state to undertake this project. We have supported the provisions included in the Water Resources Development Acts of 1986, 1988, and 1990 that have given the Army Corps of Engineers the necessary authority to participate in this project.

The SAVE OUR EVERGLADES program initiated by Florida Governor, Bob Graham, in 1983, reaffirmed the state's position that restoring the Kissimmee River is a very important component of restoring the functional integrity of the Everglades. In the initial prospectus for SAVE OUR EVERGLADES, the Governor's office outlined how channelization harmed the system: construction of the canal resulted in the drainage of 45,000 acres of wetlands along the original river, and the loss of almost 200,000 acres of marsh and other wetlands in the entire river basin; water receded from the river valley up to 11 times faster than before channelization; and the increased cattle population along the river was degrading water quality flowing into Lake Okeechobee with its run-off.

Biologists from the Florida Game and Freshwater Fish commission and the U.S. Fish and Wildlife Services estimate that Kissimmee River wetland habitant has been reduced by 78%. In addition to wetland losses, fish and wildlife resources reductions have been compounded by the elimination of water level fluctuations and blockage of the old river channel. Bald eagle nesting in the floodplain has declined by 74% since channelization. Water Fowl populations have been reduced by about 90%. Six species of freshwater fish have been lost from the river and two exotic species have moved in since channelization.

The FLORIDA RIVERS ASSESSMENT conducted in 1989 by Florida State University, expressed concern that although the current water quality of the river is good, runoff rich in nutrients and with elevated biochemical oxygen demand from agricultural and pasture lands runs quickly through the river to Lake Okeechobee, exacerbating lake eutrophication problems. The marshes and wetlands that were once adjacent to the Kissimmee served as sponges to absorb and filter pollutants which now threaten Lake Okeechobee. Nutrient-rich runoff foster algae blooms which rob the water of oxygen, threatening fish and other creatures. The report further states that former wetlands which once teemed with waterfowl are now largely home to herds of cattle.

The Modified Level II Backfilling Plan proposed by the Corps can begin to reverse the damage caused by the channelization of this river 20 years ago. The river is the headwaters of the Everglades system, a wetland system of world-renown. Given the President's stated policy of NO NET LOSS OF WETLANDS, the restoration of the Kissimmee would provide tangible evidence of commitment to that goal. Finally, we can think of no other project in America that would provide the Corps of Engineers with a more exciting, highly visible opportunity to showcase its ability to restore wetlands than the restoration of the Kissimmee River. Corps Chief of Engineers General Henry Hatch has challenged the Corps to adopt a foundation of environmental ethics. This project has been recognized by General Hatch as an environmental challenge for the Corps.

31 We are concerned about the funding issues surrounding this project and ask that you revise the cost estimate in the report to more closely reflect the Water Management District's original figures of approximately $300 million. If the eventual cost of the project exceeds $300 million, the environmental community stands ready to join the Corps to seek
32 an additional authorization from Congress. We are also dismayed that work on the Lower basin will not begin until 1998! We disagree with Corps contention that all work in the Upper basin must be complete before any work in the Lower basin is started. Please re-examine that position.

We fully support the restoration of the Kissimmee River and commend the Corps for the Modified Level II Backfilling Plan.

Sincerely,

Theresa Woody
SE Associate Field Representative

November 9, 1991

U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Fl 32232-0019

Dear Sir,

I understand that opponents of the Kissimmee project have mounted a campaign against it's Restoration Plan. These are people who have vested interests in keeping the land for their private use, land that rightfully has been determined to belong to all of the people and the wildlife that is so dependent on the rewatering that will occur.

I have lived in Florida for just over a year but have noticed many changes in the ecology in that short period. Canals that once were home to many varieties of birds are gone. Vast acres have been leveled to make way for housing developments, shopping malls, golf courses, etc. And once pleasant roads have been widened into four lane divided highways. I wonder if the State can continue at this rate without destroying its real attraction which is valuable wet lands. And now the entire Everglades system is in danger. So, please, lets see if we can't save a little bit of what is left.

Thank you for your time.

Sincerely yours,

Ella May Ablahat &
Newton Ablahat
4464 Beechwood Lake Drive
Naples, Fl 33962

Mr Wes Reed
Study Manager
U.S. Army Corps of Engineers
Attention CESAS-PD-F
Box 4970
Jacksonville, Fl 32232-0019

Dear Mr. Reed

I am writing to express my concern that the Kissimmee River restoration is being questioned. It is essential that this restoration be completed. The Kissimmee River is the headwater of the Everglades, the only Everglades in the world. Restoration will help increase future water quality to Lake Okeechobee. The Army Corps of Engineers has a unique opportunity to be involved in a progressive wetland restoration project.

I urge you to support completion of this project.

Sincerely, Susan Adger
319 Broadway
Dunedin Fl 34698

November 5, 1991

Mr. Russell V. Reed
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Fl 32232-0019

Re: Environmental Restoration
Kissimmee River, Florida

Dear Sir:

Neither I nor any members of my family own lands, nor do we have any business interests in the Kissimmee River basin. The views that I express are those of a concerned citizen of the State of Florida.

It is my opinion to evaluate any proposal we must look at three major items. First, we must prove the need. Next, we must prove the remedy. Last, prove the benefit of the remedy will exceed the cost.

The draft plan points to the concern for two major items. The first is water quality, and the second, a loss of wading birds. These are a consideration and do need to be addressed.

The recommended plan will require the acquisition of 67,842 acres of land, an estimated 356 private homes, 5 farms, and 24 miscellaneous buildings. The total estimated cost as shown in Table 33 page 223 is between $422,667,000 and $683,000,000 based on July 1991 price levels.

In my opinion the cost to the taxpayers and the destruction of the quality of life for an estimated 360 families far exceeds the hoped for benefits. The Kissimmee River Basin can never be returned to its original state through any restoration project while there are people living in Florida. A workable compromise can and should be found at a price the taxpayers can afford.

Yours truly,

Joseph S. Agnoli
21 Silk Oak Street
Lake Placid, Fl 33852

25 Karefree Circle
Dade City, Florida
November 8, 1991

Mr. Russ Reed
Study Manager
U.S. Army Corps of Engineers
Jacksonville, Florida 32232

Dear Mr. Reed:

I am dismayed to learn that the Corps and other government agencies are facing opposition in their efforts to carry out one of the most important and far-reaching environmental reclamation projects in the history of our country: the Kissimmee River restoration. I am not surprised, however. "Property owners" are always quick to claim that their rights are being compromised. As I understand, "property owners" in this case include not only some people unfortunate enough to have bought homes where homes should never have been built in the first place, but farmers and ranchers who just happened to fall heir to what were actually public lands which became available as the water receded when the wetlands were drained.

All government agencies facing these "rights"-based challenges should consider that the clean water and air of Florida, the wildlife, and the irreplaceable natural resources that once were Lake Okeechobee, the Everglades, and Florida Bay were the property of the public, not of any single individual; as a citizen, I consider part ownership in these damaged resources part of my bundle of rights. No one consulted me when my share of the Everglades was destroyed, perhaps permanently, so a few sugar cane growers could get rich; no one asked me whether I wanted to see my birds and fish and panthers pushed to the edge of extinction; no one has asked me whether I want to breathe polluted air. Developers and industries have been taking these assets away from me wholesale, and the government has only just begun to take steps to stop them. Only recently have some aspects of government begun to realize that their duty is not to help a few landowners here and there to maximize profit, but to protect the health, safety, and welfare of all constituents.

Don't renege on this obligation. Move forward with the Kissimmee restoration now.

Expectantly,

Virginia Anderson
Florida citizen

Dear Mr. Reed:

Nov. 5, 1991

I am in favor of the restoration of the Kissimmee River.

The water quality of Florida's Lake Okeechobee needs to be improved. A return to our natural systems is the only way to do this for the long term outlook.

Sincerely,

Julie Andrews
Denison Jr. High

ANTUNEZ & ASSOCIATES, INC.

PROPERTY VALUATION CONSULTANT
LICENSED REAL ESTATE BROKER
CONSTRUCTION INSPECTIONS
8890 CORAL WAY, SUITE 202 • MIAMI, FLORIDA 33165
PHONE: Office (305) 223-7104

MLS

11-13-91

Mr. Russ Reed
Study Manager
U.S. Army Corps of Engineers
Attn: CESAJ-PD-F
Box 4970
Jacksonville, Fl. 32232-0019

Dear Sir,

The level II Backfilling Plan is the best option for restoring the Kissimee.

I urge you to do the right thing and implement this plan. There is only one Everglades in the world and <u>you</u> have the power to restore it to a semblance of its former beauty.

This project would be the premiere wetlands restoration project in the nation!

Thank You,
Juan C. Antunez

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970
Jacksonville, Florida 32232-0019

Attn: CESAJ-PO-F

Dear Mr. Reed:

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the head-waters of the Everglades. We must restore and protect the entire system.!!

Sincerely,

MICHAEL BACHMAN

Dear Mr. Reed,

I urge you to go forward with the U.S. Army Corps of Engineers' plan to restore the Kissimmee River. Restoring the Kissimmee River would not only insure the water quality of Lake Okeechobee, it would restore wildlife, fisheries, habitat, and provide recreation in the area for generations to come. The Kissimmee River is also the headwaters of the Everglades, and without its restoration, the consequences to the Everglades could be devastating. The Kissimmee River must be restored.

Sincerely,

Shawn Badgerow
6922 Wildberry Lane
Lakeland Fla 33813

Dear Mr. Reed.

I urge you to go forward with your plan to restore the Kissimmee River. We have come too far in restoration efforts to back down now. This project has already gained statewide attention for its success so far and would be the premiere wetlands restoration project in the nation if you continued with restoration plans.

I understand you are proposing what is known as the "Modified Level II Backfilling Plan" and I heartily endorse this plan. Restoring the acres of flood plain and rewatering acres of former wetlands, will help to insure future water quality to lake Okeechobee as well as maintaining the Everglades.

Sincerely,

DeNiese Barnette

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970
Jacksonville, Fl. 33232-0019
Attn: CESAJ - DO - F

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River. There is only one Everglades in the World and the Kissimmee River is the head waters of the Everglades. We must restore and protect the entire system.

Sincerely,

Dezso Bartha

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970
Jacksonville, Fl. 33232-0019
Attn: CESAJ - DO - F

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River. There is only one Everglades in the World and the Kissimmee River is the head waters of the Everglades. We must restore and protect the entire system.

Sincerely,

Diane Bartha

Diane Bartha

Re:Kissimmee River Restoration

25 years ago the River was changed money was wasted then, so why wasted money again.That is so well needed for our children's education and more prison vaculities to be build.What is more importa-nt a child's education and prisoner's to be kept to the maximum or you all to restore a river that was already messed with once.

35 Everything is just really adapting to the change that was once made.The wildlife is finally restored.It would kill alot of animals and alot of people would have to move out of their homes.Places where they have chosen to live and grow old.And wanting them to just pack up and move isn't right.Why are you all trying to make wetlands out of places that never were before.Very sick people are being turned away due to lack of funds.How many will die or be bedridden due to under treatment?My family has been Ranching in this area of the county for 5 generations.They were here before the river was channeled and alot areas your'e wanting to flood was never even underwater like you all are wanting to make it.

40 Attorney Governor Bob Butterworth wants lands on the river to be declared State lands and taken back under State ownership with no money compensations.Governor Butterworth pays no taxes on the land that you want to flood.He has no deed to the land.

He is not even a land owner here.It upsets me and my family members.All the people that want the river resored are people who have nothing to lose and everything to gain.For when and if the river is resored,and areas are flooded that you want flooded.

41 It would take away alot of tax dollars from Okeechobee and put alot of family business's out of operation.I don't think that it is right for you Politicians to get together and decided about the land my Great Grnandfather struggled to pay for and make something out of.Ranchers are the first and foremost best enviromentalist.They do not try to destory the land.

They try to preserve it,and make a living out of it at the same time.Enclosing I know that people thing tourism supports Okeechobee County but they are wrong and you know it.

As for water quality its been proven it would be no better. I think you should look long and hard at who feeds and clothes this Country.

Registered Democrat,

Clyde J. Bass Sr.

October 19, 1991

U.S. Army
Corps of Engineers
P.O. Box 4970
Jacksonville, Fla. 32232

Gentlemen:

Re: Kissimmee River Restoration

The current proposal for the environmental restoration of the Kissimmee River will create a devastating effect on Okeechobee County if it is completed.

41 The loss of residential homes, farms and ranches would take millions of dollars off the tax rolls of Okeechobee County. Not only would the proposed restoration cost the county in tax dollars, but also the loss of hundreds of jobs as agriculture related industries fold.

Okeechobee County is already unable to raise enough money to provide basic services for our people and we have a 10 mill cap on our taxes.

The idea to spend $683 million for the river restoration when funding has been cut for education, health and human services is out of reason. Furthermore, if you really search the reasons for the project, scientific and other, counting the benefits as well, you will find that most of the propaganda spread for restoration has no foundation.

We strongly urge you to consider disapproval of this project and leave the Kissimmee River alone.

Sincerely yours,

Elda Mae Bass

Elda MAe Bass
16525 Hwy. 98 N.
Okeechobee, Fla. 34972

November 7 1991

Dear Mr Reed

I am in favor of the restoration of the Kissimmee River.
There is only one Everglades in the world and the Kissimmee River is the headwaters of it. We must restore and protect the entire system.

Sincerely,

Elda Basso

U. S. Army Corps
of Engineers
P.O. Box 4970
Jacksonville, Fl. 32232

Mr. and Mrs. Elwyn Bass
20609 nw 176 Ave.
Okeechobee, Fl 32972

Ref: Kissimmee River Restoration Project

Dear Sir,

I am writing this letter because I strongly oppose the Kissimmee River Restoration Project. My Great-grandfather, Uriah Durrance, moved to Okeechobee county in 1898 and my grandfather, James Durrance, purchased the ranch on which I still live and own along with my brothers and sister, and their families. We have seen a lot of changes in this part of the country. Most of them have been for the better but there are a few that are not in the best interest of the people. And I am sorry to say that this is one of those times.

35 As many of us have heard or have read, the Kissimmee River was channelized by the Army Corp. of Engineers to provide drainage and flood protection for the center portion of the state. Since that time, the area along the banks of the Kissimmee river has changed. More people built homes in what was once the floodplain. The ecosystem that existed prior to the channelization for the river is gone. In its place another ecosystem has evolved. Now the government and the environmentalists not only want
40 to put it back the way it was, but to put it the way it might be, based on a computer simulation of probabilistic one in one-hunderd year rainfall and flood occurrence. This is expanding the wetlands above the 1845 Mean High Water line.

If the government is going to TAKE all land within the Mean High Water Line of 1845, what is the government going to do with the 3 million people of Western Palm Beach, Browrd and Dade countries? All were dredged and filled, diked off and drained to build those communities.

42 And what about the problem of flood control? The river was channelized for a reason. The storms of 1926, 1928 and 1947 all caused extensive flooding and great loss of lives. This is why the Project was first started.

I grant you that much of this land is in pasture and farm lands. But were are YOU going to get your food for your table? From other countries were they can and do use DDT to spray for insects, both on cattle and vegetables? And the cost will be greater because of the import fees and hauling expenses.

The farmers and Ranchers are the first environmentalists, they make their living from the land and do everything to take care of it. Most do not hunt for sport, they only control the wild game if they become overpopulated. They use Best Management Practices to take care of the land. They were taught to respect it, to use it wisely and it would always be there to take care of them and their children.

Lets look at the cost of this great feat. To begin with,
41 it will cost the taxpayers 600 million dollars off the top. And the hidden cost? Loss of lands on county tax rolls, higher food prices and increased maintenance requirements and cost, only to name a few.

With monies being cut for almost everything, such as education, health and human services, child welfare, why would you and the government even consider such a great waste on monies on something that is not necessary? This Project will not even improve the water in the Okeechobee Lake.

I hope you will reconsider and vote to disapprove any and all bills considering the Kissimmee River Restoration Project.

Thank You,
Elwyn Bass

Elwyn and Patricia Bass

November 4, 1991

Mr. Ru[illegible] Reed, Study Manager
US Army Corps of Engineers
Box 4970
Jacksonville, Florida 32232-0019

Attn: CE AT-PO-F

Dear Mr. Reed:

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely yours,

Scott R. Briggs

Scott R. Briggs

Gerald M. Boza, Jr., D.D.S.
2600 West Sligh Avenue
Tampa, Florida 33614
(813) 932-9178
(813) 932-3846

Mr. Russ Reed:

Please consider the "Modified Seal II B.O." & hopefully add its implementation. It makes good common sense. It will improve our Everglades & restore some of the Flora we natives have seen denigrated.

Sincerely

A. M. [illegible]

Dear Mr. Reed:

Nov. 7, 1991

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of it. We must restore and proted the entire system

Sincerely,

Kishia Basso

Mr Russ Read
U.S Army Corp of Engineers
Box 4970
Jacksonville, Florida 32232-0019

Dear Mr Read,

I support the move to restore the Kissimmee River which is the headwater of the Everglades. This area and its wildlife should be preserved.

Judith O Baxter

Nov. 2. 1991

U.S. Army Corps of Engineers
P.O.Box 4970
JACKSONVILLE, Fl. 32232-0019

Attn:RUSS REED

Dear Sir:

We understand that opponents of The Kissimmee have mounted a campaign against the Restoration Plan for the Kissimmee. These are people who have vested interests in keeping the land for their private use land that rightfully has been determined to belong to all of the people and the wildlife that is so dependent on the rewatering that will occur. We hope that you will take note that private landowners in Okeechobee County who have vowed to "do all that is in their power to fight for life, liberty, and the pursuit of happiness on THEIR own land" are maybe a bit short sighted. BECAUSE, in fact, this 29,000 acres of former wetlands and the reuniting of 49,000 acres of floodplain with the river will restore the river to only 70% of the original flood plain. This fight by private interests has been allowed to continue far to long and has caused the citizens of this country to pay for this land by least twice.
This plan was devised by the S. Fl. Water Management District and they have taken great pains over the years of planning to consider the rights of private interests. Many public hearings have been held and many citizens of the state have worked for years (decades) for the restoration of at least a part of this system on which the EVERGLADES is dependent.
It is anticipated that wading bird population will increase about six fold and there are three endangered species that will receive special benefit, bald eagle, snail kite, and the woodstork.

Recreational fishing is expected to increase four fold.

The cattle industry and sugar interests have come close to and indeed may have already destroyed the Glades. Let's proceed while we still have a chance to save a bit of what's left.

Please write to the Corps of Engineers P. O. Box 4970 Jacksonville , 32232-0019 asking that they go forward with the Modified Level II Backfilling Plan.

Sincerely,

W. [illegible] [illegible]
[illegible]
[illegible]

October 17, 1991

To Whom it May Concern:

I am a third generation Floridian and live on the Kissimmee River at Hidden Acres Estates.

During my lifetime I've seen many changes in our beautiful State, there is now a bearing citrus grove where, as a child I actually caught small fish and watched gators this happened because some government project (in the name of progress) dug a canal and drained my fishing hole. Having ben associated with agriculture all of my working career I have lived with and off of our land. In so doing I am very aware of the delicate ecological balance in our state.

35 In the late 50's and the 60's we with tears in our eyes and voices that went unheard cried and begged "LEAVE THE KISSIMMEE RIVER ALONE" the "DITCH" was dug. Now after many years the ecology of the Kissimmee River Valley is about balanced so once again with tears and voices we cry "LEAVE THE KISSIMMEE RIVER ALONE".

43 My observation and sincere belief is that opening a few obstructions and the use of weirs, on a much smaller scale than the ones now in use, would reactivate parts of the "old river" and help it to live again. To backfill as has been proposed is, in my opinion absurd. To do this now we are looking at yet another 20 years to balance our ecological system.

We have our retirement "paradise" in Hidden Acres on the Beautiful river and it is not for sale at any price and especially at the cost of destroying this Kissimmee River Valley Again.

Sincerely a Caring and Registered Voter,

Merle E Boone

November 4, 1991

Mr. Russ Reed, Study Manager.
U.S. Army Corps of Engineers
Box 4970 attn CESAJ-PO-F
Jacksonville, Florida 32232-0019

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River.

The water quality of Lake Okeechobee desperately needs to be improved. A return to our natural systems is the only way to do this for the long term.

Sincerely

Letha Braxton

1295 Park Drive
Casselberry, FL 32707-3505
November 3, 1991

Russ Reed, Study Manager
U.S. Army Corps of Engineers
Attn: CESAJ-PD-F
Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Reed:

As a long time resident of Florida, I am very pleased to know of the U.S. Army Corps of Engineers participation in the restoration of the Kissimmee River. I understand that you may be facing some opposition to this endeavor, but please understand there are many of us who wholeheartedly support this project.

As the headwaters of the Everglades, the Kissimmee River is a vital link in preserving a unique ecosystem that exists nowhere else in the world. I believe all Americans are probably knowledgeable of the decline of the Everglades, but here is an opportunity to turn things around and begin the recovery. We may not get another chance like this one.

Being an avid sport fisherman, I have also witnessed first-hand the terrible ills that Lake Okeechobee suffers from. After reading a variety of reports on this subject, I am convinced that returning the Kissimmee River to its original course will play a major role in re-establishing a life-support mechanism that Lake Okeechobee so desperately needs.

Finally, I would also like to point out that a project of this magnitude could easily become known as the premiere wetlands restoration project in the nation. Giving permanent proof that we can find the ways and means to truly live in harmony with our environment.

Thank you for considering my views on this critical subject.

Sincerely,

Lawrence W. Brooks

Dear Mr. Reed -

We are very much in favor of the Level 2 Restoration Plan - 70% of the Kissimmee River.

Mr. & Mrs. David Kimble
700 Sunset Dr.
Lake Worth, Fl 33461

Land O'Lakes, Fl.
11/5/91

From the desk of

MYRA JANE BROWN

Dear Mr. Reed,

As a Floridian Sierran, I want to have you seriously consider another YES vote for the Wetlands Restoration, particularly to have the KISSIMMEE RIVER restored in order to save the Everglades. There is only one EVERGLADES in the world. These wildlife areas are the only reason many Floridians came and many tourists come to FLORIDA.

H O W L
e u i i
l r l f
p d e

Sincerely,
Myra Jane Brown

John R. Brown
11c Liberty Lane
Land O Lakes, Fl 34639

November 5,1991

Mr. Hugh Reed
Study mgr. Army core of Engineers

Dear Sir:

By all means, restore as much as is possible the Kissimmee River to its original boundaries. The interests of the selfish few, represented by a homeowners association (Hidden Acres estates) in Okeechobee County, mustn't prevail over the best interests of thousands of other Florida residents, whose needs for increasing amounts of fresh water could be jeopardized by catering to short-sighted "dog in the manger" attitudes. Additionally, the restoration project would provide bonuses as a wildlife refuge and a recreational area of increasing value as time passes. Moreover, the project represents a golden opportunity to do penance for past short-sighted assults upon our long-suffering environment. This opportunity may never come again.... ahead of the time when ravaged nature turns against us with a vengence.

Sincerely,
John R. Brown

Nov. 6, 1991

Dear Mr. Reed,

I am most certainly in favor of the restoration of the Kissimmee River. We must restore and protect the entire system.

Sincerely,

Nov. 6, 1991

DEAR MR. REED

I AM IN FAVOR OF THE RESTORATION OF THE KISSIMMEE RIVER.

I FEEL IT IS IMPORTANT TO PROTECT THE RIVER SYSTEMS.

SINCERELY

November 4, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
BOX 4970 Attn: CESAJ-PD-F
Jacksonville, Florida 32232-0019

Dear Mr. Reed:

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely,

Jessica Buehl

MARION BUDLONG
11636 Oceanside Dr.
Port Richey, FL 34668-1039

Nov 2, 1991

Mr. Ries Reed, Study Mgr.
U.S. Corps of Engineers
Attn: CESAJ-PD-F

Dear Mr Reed:

As a homeowner in Florida, as a lover of the outdoors + as a canoeist, I wish to support the Corps' "Modified Level II Backfilling Plan on the restoration of the Kissimmee River".

This river is the headwaters of the Everglades, which is the only one in the world.

This restoration would help insure the much needed future water quality of Lake Okeechobee. And —

This project would be the premiere wetlands restoration project in the nation.

Sincerely —

Marion Budlong

Jim Burns

Dear Reed,

I am in favor of restoring the Kissimmee River.

There is only one Everglades in the World and the Kissimmee River is the head waters of the Everglades. We must protect & restore the Whole System.

Thanks,

John Butler

Mr. Russ Reed Study Manager
U.S. Army Corps of Engineers
Box 4970

Dear Mr. Reed,

I am in favor of restoring the Kissimmee River.

There is only one Everglades in the World & The Kissimmee River is the head waters of the Everglades. We must protect & restore the Whole System.

Thanks,

John Butler

Dear Mr. Reed,

I urge you to go forward with the U.S. Army Corps of Engineers' plan to restore the Kissimmee River. Restoring the Kissimmee River would not only insure the water quality of Lake Okeechobee, it would restore wildlife, fisheries, habitat, and provide recreation in the area for generations to come. The Kissimmee River is also the headwaters of the Everglades, and without its restoration, the consequences to the Everglades could be devastating. The Kissimmee River must be restored.

Sincerely,

Patricia Butler
301 Van Blvd
Auburndale, FL 33823

Dear Mr. Reed,

I urge you to go forward with the U.S. Army Corps of Engineers' plan to restore the Kissimmee River. Restoring the Kissimmee River would not only insure the water quality of Lake Okeechobee, it would restore wildlife, fisheries, habitat, and provide recreation in the area for generations to come. The Kissimmee River is also the headwaters of the Everglades, and without its restoration, the consequences to the Everglades could be devastating. The Kissimmee River must be restored.

Sincerely,

Thomas R. Butler
301 Van Blvd
Auburndale, FL
33823

Nov. 2. 1991

U.S. Army Corps of Engineers
P.O.Box 4970
JACKSONVILLE, Fl. 32232-0019

Attn:RUSS REED

Dear Sir:

We understand that opponents of The Kissimmee have mounted a campaign against the Restoration Plan for the Kissimmee. These are people who have vested interests in keeping the land for their private use land that rightfully has been determined to belong to all of the people and the wildlife that is so dependent on the rewatering that will occur. We hope that you will take note that private landowners in Okeechobee County who have vowed to "do all that is in their power to fight for life, liberty, and the pursuit of happiness on THEIR own land" are maybe a bit short sighted. BECAUSE, in fact, this 29,000 acres of former wetlands and the reuniting of 49,000 acres of floodplain with the river will restore the river to only 70% of the original flood plain. This fight by private interests has been allowed to continue far to long and has caused the citisens of this country to pay for this land by least twice.
This plan was devised by the S. Fl. Water Management District and they have taken great pains over the years of planning to consider the rights of private interests. Many public hearings have been held and many citisens of the state have worked for years (decades) for the restoration of at least a part of this system on which the EVERGLADES is dependent.
It is anticipated that wading bird population will increase about six fold and there are three endangered species that will receive special benefit, bald eagle, snail kite, and the woodstork.

Recreational fishing is expected to increase four fold.

The cattle industry and sugar interests have come close to and indeed may have already destroyed the Glades. Let's proceed while we still have a chance to save a bit of what's left.

Please write to the Corps of Engineers P. O. Box 4970 Jacksonville , 32232-0019 asking that they go forward with the Modified Level II Backfilling Plan.

Sincerely,

Albert Taylor
Cape Coral Fla.

Dear Mr. Reed:

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the head waters of the everglades. We must Restore and protect the entire system!

Please Listen and Read this Letter!

Sincerly (for the world)
Scott Chatham

Joseph & Wendy Chiarella
276 17th Avenue
Vero Beach, Fl 32962

To All Local, State & Federal Legislators Interested In
Honesty and Integrity
To All Media Representatives Interested In Exposing
Dishonesty and Lack of Integrity

The state of Florida is in crisis!! This is an undisputed fact, and possibly a fatal blow to the State as we have come to know and love it. Our elementary school children are being sacrificed on the alter of expediency; our college students are being denied access to higher education and relegated to the ranks of the unemployed (or worse, drugs and crime); our criminal Justice system is already overburdened and criminals are being released for lack of funds to build Jails; our civil courtrooms are looking at cutbacks and possible closings; the Federal government has refused to pass legislation to alleviate the struggles of the unemployed when unemployment on the Treasure Coast and Okeechobee and Highlands County threatens double digit.

Now the Federal Government, in conjunction with the South Florida Water Management District, has arrived at a proposal to save the fish and wildlife that they inadvertently attempted to destroy 20+ years ago, without success. The Kissimmee River Restoration project will be presented to Congress for approval within the next several months. This proposal, made without any sociological, economic, or human impact study whatsoever, is
33 estimated to cost the taxpayer over the next 15 years (allowing for cost increases and inflation) $883,000,000.00. Never mind that the fish and wildlife are evolving a new ecosystem and are only now returning to this area after the Army Corps of
34 Engineers raped this land on their last try; never mind that the proposal seeks to eliminate almost 400 homes at less than market value based upon the Corps' own acquisition figures; never mind that these people are mostly retired and on fixed incomes and
45 will NEVER be able to replace the quality of life they now enjoy; never mind that the new floodplain will require the closing of at least five additional dairies over and above the five accounted for in the feasibility study because they will no longer meet the strict environmental regulations necessary to
41 stay in business; never mind that 750 additional workers face unemployment as a result of all the dairy closings; never mind that a proposed $8 million dollar co-generation power plant
44 which would provide jobs and tax dollars to the area lie in the 5 year flood plain; but the totally obscene part of this entire plan is that the SFWMD did not know (or knew and did not care) about the devastation they were about to cause. Which is worse: ignorance or total disregard for the human condition?

36 Ask yourselves why it is necessary for SFWMD to increase the five and 100 year floodplains by over 38,000 acres above historic levels. Supposedly it is to provide a buffer region around the wetlands which SHOULD NOT BE NECESSARY if SFWMD were doing their jobs and were completely sure of the success of their project. Not only is there a question of the legality of
42 changing these historical values, it also sends fear into the hearts of those of us who question whether or not this project will even do what it is supposed to do. Anyone with any knowledge of the hurricane and flooding history of the entire South Florida region will shudder at the thought of removing the flood controls now in place and originally mandated by Congress when the so-called "ditch" was constructed in order to prevent mass destruction at the hands of Mother Nature.

Of the $883 million cost, at least 25% (with estimates as high as 50%) will be borne by the taxpayers of the State of Florida. How can I explain to my children that they cannot go to college so that one more alligator, mud fish, or gar can survive? Don't misunderstand, we all have great respect for the environment or we would not have chosen to live on the Kissimmee River; however, it is necessary in times such as these to prioritize our spending. If we, as the individual, must do so, we can ask no less of our elected representatives. At the time when we are hearing of the gross disregard of Congressmen for the ethics of their positions (i.e. bounced checks, unpaid lunch bills, private ambulances, etc.), do not disregard the strength of the voters in the Central Florida region to spread their outrage to the boundaries of Florida and beyond.

This is your chance to redeem yourselves; vote down the Kissimmee River Restoration when it is presented to you for approval. Expose the political substructure that is demanding a quick solution to Mr. Bush's embarrassment over the lack of environmental legislation during his administration. Do not attempt to ensure his reelection on the backs of the people of the State of Florida.

Sincerely,

Joseph R Chiarella
Wendy Chiarella

Joseph and Wendy Chiarella
owners
984 CR 721 Lot 11
Lorida, Fl 33857

River restoration would harm county

It seemed like a good idea at time.

Twenty-five years ago, the my Corps of Engineers ned a lazy, winding river into ast-running channel in the me of flood control.

Since that time, the area ng the banks of the Kissimee river has changed. More ople have moved into the a. Many have built homes in at was once the floodplain.

And now, the government d the environmentalists want put it back the way it was.

There are a few problems th that.

• For one thing, it can't be ne.

Yes, they can fill in the chanl and try to force the water ck into the old oxbows. They can turn land that has been dry for 25 years back into swamp. But it won't be the way it was.

The ecosystem that existed prior to the channelization of the river is gone. In its place another ecosystem has evolved. Filling in the channel will destroy the current ecosystem and a third system will eventually take its place.

• Another problem to consider is the cost. They've been talking about this project for years and the price tag keeps going up. Currently, the price of the Kissimmee River Restoration Project is estimated around $683 million. The federal government may pay part of that. We aren't sure how much. In this time of budget crises, they aren't so happy about paying any of it, so don't count on Uncle Sam to foot the lion's share of the bill.

That leaves the state government. Remember, this is the same state government that just cut funding for education, HRS and the courts.

Schools are facing massive teacher lay-offs. There will be so many kids in each classroom that they probably won't get a chance to ask a question, much less get the individual attention they need.

Those in desperate need of medical care are being turned away for lack of funding.

Criminals are being let out early because the state doesn't have enough money to build new prisons and the current facilities are overcrowded.

Given the current situation, how can state officials even consider spending money on a project like the river restoration?

• Then there's the problem of the people who happen to be living in the areas that would be flooded. More than 300 homes are in the projected floodplain. We don't think these folks are going to quietly move away without a fight. Landowners were deeded much of this land as pasture lands and have had the use of it to help put food on America's tables. They've been paying taxes on that land for a quarter of a century.

• And on the subject of taxes, there's also the matter of losing millions of dollars of property from the Okeechobee County tax rolls. The state and federal governments do not pay property taxes. So Okeechobee County will be left with even less money than we have now. Anyone who went to this year's budget hearings knows what a mess we are already in. The county commissioners had to take money out of the emergency reserve fund just to balance this year's budget. We already had the tax base shrivel with the closing of one-third of our dairies. What will they do if the tax base shrinks further?

• Proponents claim the project will improve the water of Lake Okeechobee. But the South Florida Water Management District's own data shows that the lake's problems are linked to the artificial raising and lowering of the lake level. Scientists Dan Canfield and Mike Messina proved that using the SFWMD data on phosphorus levels and algae blooms. According to these studies, excess nutrients entering the lake were not the primary cause of the problem. So instead of a Lake Kissimmee Restoration Project, why don't we have a Lake Okeechobee Hands Off project? If they would stop treating the lake as an incredibly inefficient reservoir, maybe the water quality would improve.

• And what about the problem of flood control? The river was channelized for a reason. Maybe those in Tallahassee and Washington have forgotten what it was like when the hurricanes hit South Florida in the 40s, but there are plenty of people here who will tell you we do need flood control, all the way from central Florida to the tip of the state. This project would make that control no longer efficient or sufficient.

Once again, we, the residents of Okeechobee County, are faced with a problem not of our making. What can we do? As citizens, we can complain. We can call and write our elected officials. We can keep it up until someone listens.

The names, addresses and phone numbers of our elected officials and the government agencies are on this page. Take a few minutes to write or call them. If you don't know what to say, add your name to the letter that appears on this page and send it along.

We may not win.

We have to try.

Commentary

By Katrina Elsken and Twila Valentine

An Open Letter to the U.S. Army Corps of Engineers and the South Florida Water Management District

The current proposal for the environmental restoration of the Kissimmee River would have a devastating effect on Okeechobee County.

The thousands of acres that would be flooded by this project as well as the loss of residential homes and farms would take millions of dollars off the tax rolls of Okeechobee County.

The proposed restoration project map also shows the site for a proposed $8 million co-generation power plant would lie within the five-year flood plain. The potential loss of this power plant would cost the county both in tax dollars and in hundreds of jobs.

The county is already at the 10 mil cap and unable to raise enough money to provide basic services to its residents. The loss of this property off the tax rolls would cripple an already stressed economic system, still reeling from the loss of one-third of the area's dairies due to the dairy buy-out.

Another five dairies lie in the proposed five-year floodplain, but are not listed for purchase.

A proposal to spend $683 million for the river restoration, at a time when funding has been cut for education, health and human services and the courts, is quite simply obscene.

We strongly urge you to reconsider disapproval of this proposal.

Katrina Elsken
Leonora R. Bohen
Joy H. Parrish
Kota Crowe
Ann Nicoll
Melvin Santos
Glenda Carver
Karmen Dorala
Twila C. Valentine
Judy Davis
Margie Green
Pamela Phillips
Robin Pfeiffer
Michelle L. Conklin
Tammy Jackson

Katrina Valentine

Nov. 2. 1991

U.S. Army Corps of Engineers
P.O.Box 4970
JACKSONVILLE, Fl. 32232-0019

Attn:RUSS REED

Dear Sir:

We understand that opponents of The Kissimmee have mounted a campaign against the Restoration Plan for the Kissimmee. These are people who have vested interests in keeping the land for their private use land that rightfully has been determined to belong to all of the people and the wildlife that is so dependent on the rewatering that will occur. We hope that you will take note that private landowners in Okeechobee County who have vowed to "do all that is in their power to fight for life, liberty, and the pursuit of happiness on THEIR own land" are maybe a bit short sighted. BECAUSE, in fact, this 29,000 acres of former wetlands and the reuniting of 49,000 acres of floodplain with the river will restore the river to only 70% of the original flood plain. This fight by private interests has been allowed to continue far to long and has caused the citizens of this country to pay for this land by least twice.

This plan was devised by the S. Fl. Water Management District and they have taken great pains over the years of planning to consider the rights of private interests. Many public hearings have been held and many citizens of the state have worked for years (decades) for the restoration of at least a part of this system on which the EVERGLADES is dependent.

It is anticipated that wading bird population will increase about six fold and there are three endangered species that will receive special benefit, bald eagle, snail kite, and the woodstork.

Recreational fishing is expected to increase four fold.

The cattle industry and sugar interests have come close to and indeed may have already destroyed the Glades. Let's proceed while we still have a chance to save a bit of what's left.

Sincerely,

Will B. Bond

James L. Clark, SCV
P. O. Box 885
Windemere, Fl 34786

October 8, 1991

U.S. Army Corps of Engineers
Jacksonville District
South Atlantic Division
P.O. Box 4970
Jacksonville, Florida 32232-0019

Attn: Colonel Terrence C. Salt

RE: Response to Feasibility and EIS Statement
Kissimmee River Environmental Restoration

Dear Colonel Salt:

My letter is in response to your request for comments on the above project together with my recommendation concerning alternatives to the Recommended Plan.

This combined report was one of the more concise and best documented reports that has emanated from your agency and all who worked on the report have my compliments for a job well done.

However, there are some significant issues raised in this report that have not been addressed and in addition, certain conclusions with which I disagree which need to be brought to your attention.

1. The first issue concerns the statement contained in the study that the Recommended Plan will not have any beneficial effect until the Headwaters Project is implemented. As such, the total costs for this project must be computed by adding the costs of both projects.

   My calculations are that the Full Funded Costs of these projects are:

Recommended Plan	$ 683,000,000.
Headwaters Project	98,136,750. (5% escl./yr/4yrs.)
Total	$ 781,136,750.

46 2. The study states that the water quality in the C-38 canal meets the State of Florida standards but is being degraded by runoff from agricultural canals south of S-65 C. As this project does not specifically address a solution to the agricultural runoff problem and provide for its elimination, the conclusion reached in Section 9.6.19 " Improvement of quality of Kissimmee River waters will benefit the cleanup of Lake Okeechobee " is not valid as it relates to this project.

47 3. In Table 31 the annual fishing days in the " Without Project Condition" shows a current level that is already 120% of the pre-channelized condition and, as such, any additional improvement to be provided by the Recommended Plan is welcome but should not be given substantial weight.

48 4. In section 9.6.9 Navigation, the study shows that between" 80 to 85 % of the vessels that currently use C-38 require at least a three-foot channel " so it is unreasonable to conclude that " the impact to current boating activity is not considered significant" given the fact that the Recommended Plan would result in four shallow areas that would impede such navigation in dry periods.

   Taken together with the statements that there would be no provision in the future for the clearing of silted over areas, it would seem that the intent of the Federally Authorized project in 1902 will be subverted by the present plan and, as such, would require deactivation of the 1902 project.

42 5. As this study correctly points out, Florida has not had a significant hurricane in this region since 1969 and the present flood control system has not been tested against a major flood event.

   Because of this, the implementation of such an aggressive plan of filling the previously permitted canals should only be considered after collection of irrefutable engineering data that will guarantee the protection of the upstream areas against catastrophic flooding such as that which occurred in 1960.

49 6. With the Henderson Act, the State of Florida has one of the most effective wetland laws in the nation and as a result, effectively all of the future growth of the state will be in upland areas. The Recommended Plan calls for the removal of over 18,000 acres of existing uplands and scrub habitat that, added to those current areas of upland that have emerged as a result of the channelization project that will be inundated by the proposed project, will produce a substantial reduction in actual and potential upland habitat.

   The study treats both the existing and created uplands as having little value in a state where the only future development pressure will be on our remaining uplands.

7. The study indicates that flowage easements are expected to cost no more than 10% of the
50 value of the fee interest of the property. In my opinion this is considerably optimistic.

8. Section 9.6.11 states that " None of the lands to be acquired are considered prime and
51 unique farmlands. I suggest that as there would be nearly eight hundred families displaced by both portions of the restoration project that they would probably not agree with this conclusion.

In summary, it does not appear that the two projects referred to in the document will, in any meaningful way, solve any of the significant water quality problems of this basin. If we do not reduce the vast nutrient loads being introduced into this water way Lake Okeechobee will continue to remain in it's eutrophic state.

The improvements in habitat value and extent that will be derived from this effort will sit in stark contrast to the disastrous conditions that will continue next door in Lake Okeechobee.

Recreational boating will be severely affected by this project and the loss of an otherwise excellent water navigation system that could support future commerce will be lost to the public along with the disruption and displacement of nearly eight hundred homes and several thousand men,women and children.

In this study your organization identified several projects such as the restoration of Paradise Run, implementation of agricultural pollution techniques and other measures that would have the effect of making a significant improvement on both the Kissimmee Basin's water quality and wildlife habitat that might be implemented at a fraction of the total costs of the presently proposed projects and which would have much less impact on the lives of thousands of Central Florida citizens.

I urge your reconsideration of the recommendation proposed by this report and trust that your organization will continue to search for a restoration program that is more responsive to the very urgent problems that confront us and one that provides much lower economic and social impacts.

Yours truly,

James L. Clark

James L. Clark

Nov. 7, 91

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely,

Cynthia E. Chilton

Cynthia E. Chilton

Save our mother
it's the only one
we have!

Lot 24, RIVER ACRES
19760 N.W. 80th Drive
Okeechobee, Florida
34972

U. S. Army Corps of Engineers
P. O. Box 4970
Jacksonville,
Florida 32232

RE:PROTESTING RESTORATION OF THE KISSIMMEE RIVER EXPERIMENT!

U. S. Army Corps of Engineers,

This letter is written in PROTEST to the State and Federal Governments, (our elected officals) South Florida Water Management District, and U.S. Army Corps of Engineers; wanting to spend $683 Million Dollars on the "RESTORATION OF THE KISSIMMEE RIVER EXPERIMENT" which has been proven by tests, WILL NOT improve the quality of the water in Lake Okeechobee.

46

With water so precious, why is so much money going to be spent on an experiment? Who is taking the Blame for all the money that was spent to make the Kissimmee River arrow Straight? Why can't someone come up with a REAL SOLUTION? Why can't the American people get a REAL SOLUTION that will guarantee purification of the water that runs off into Lake Okeechobee? Why can't the issue of the Kissimmee River such as the straighting, restoration and purification of the water, all been taken care of the first time? Why must the Tax Payers pay and pay and pay? Why do the working class people have to suffer? Why do LAND OWNERS have to have their rights threatened? Why does the WILDLIFE have to suffer? What is going to happen when $683 Million Dollars isn't enough money? What will happen when in the developed areas, not all of the land is cleaned up completely and becomes part of the fill and it contaminates the water? Why if the U.S. Army Corps of Engineers has a 90 foot easement at the base of my property, does it deem necessary to have the State of Florida come in and RECLAIM my land, without any compensation to me? Why is it necessary to RECLAIM my property when it lies in the area of the OLD KISSIMMEE RIVER? When is bad monies going to stop being spent on experiments, and be spent in areas it will benefit the American People? Why must our schools, hospitals, the hungry, the homeless, the elderly, the unemployed, the sick and the disabled; do without benefits and our elected officals decide to spend $683 Million Dollars on an experiment? Why is it stated that "THIS IS A FREE COUNTRY" when an individual, and those like them, do not have any rights if it interferes with what our elected officals decide? Why are our elected officals having so much trouble running this country today? Could it have anything to do with, so much money being wasted in areas that definitely do not reap any benefits to the American People? Why will water bills some day cost the American People as much monthly, as their electric bills, if our elected officals state that spending $683 Million Dollars to Restore the Kissimmee River, will provide water to the residents of Florida? When can the American People, with the help of their elected officals, have a brighter outlook for their future?

34

I have addressed this issue with the best of my ability and have so many questions that need some serious answers. Please take out a little time if you don't mind to send me a letter that addresses my questions. And please take into consideration that Restoring the Kissimmee River Experiment is not a real solution.

A copy of this letter is being sent to the following elected officals and offices: U.S. President (George Bush), Governor (Lawton Chiles), State Senate (Rick Dantzler), State House of Representatives (Bert Harris and Irlo Bronson), SFWMD (Board of Governors-South Florida Water Management District), U.S. House of Representatives (Tom Lewis), U.S. Senate (Bob Graham and Connie Mack) and U.S. Army Corps of Engineers.

Thank you for your time in this very serious issue.

Sincerely Yours,

Mitzi L. Clark

Mitzi L. Clark (landowner)

November 7, 1991

Dear Mr. Read,

I am in favor of the restoration of the Kissimmee River. I feel that nature should be unchanged, exspecially it's ~~way~~ water ways.

Thank you,

James D. Clay

November 7, 1991

Dear Mr. Read,

I am in favor of the restoration of the Kissimmee River. I feel that nature should be left unchanged, exspecially it's water ways.

Thank you,

Mary D. Clay

November 7, 1991

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River. I feel that nature should be unchanged, exspecially it's water ways.

Thank you,

Julie Clary

Dear Mr. Reed,

I urge you to go forward with the U.S. Army Corps of Engineers' plan to restore the Kissimmee River. Restoring the Kissimmee River would not only insure the water quality of Lake Okeechobee, it would restore wildlife, fisheries, habitat, and provide recreation in the area for generations to come. The Kissimmee River is also the headwaters of the Everglades; and without its restoration, the consequences to the Everglades could be devastating. The Kissimmee River must be restored.

Sincerely,

Carrie Coppage
3809 Baines Cove
Winter Haven, Fl 33884

Nov. 4, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps. of Engineers
Box 4970 Attn. CESAJ-PD-F
Jacksonville, FL 32232-0019

Dear Mr. Reed:

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Ever-glades. We must restore and protect the entire system.

Sincerely,
Carey Corbett

Nov. 4, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn. CESAJ-PD-F
Jacksonville, FL 32232-0019

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River.

There is only one Ever-glades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system.

Sincerely,

Susie Corbett

Dear Mr.Peed

I have been informed with the problem which concerns the Kissimmee River.Knowing theres only one Everglades in the world and the Kissimmee River is the head waters.This alone should motavage the government to starte restoration of the Kissimmee River.

I am in favor of the restoration of the Kissimmee River

Sincerely

Robert Covington

11/6/91

RUSS REED
STUDY MANAGER
U.S. ARMY CORPS

PLEASE RESTORE THE KISSIMMEE RIVER TO HELP THE EVERGLADES. THIS IS A NECESSARY PROJECT.

THANK YOU FOR YOUR ATTENTION TO THIS MATTER.

Adelaide D. A. Curtis
4805 VILLAGE GARDENS
SARASOTA 34234, FLA
813 351-6273

NOV 6, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps. of Engineers
Box 4970 Attn: CESAJ-PO-F
Jacksonville, Florida 32232-0019

Dear Mr. Reed

I am in favor of the restoration of the Kissimmee River.

There is only one Everyglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerly, Matt Hamrick

4930 S.W. 2nd Place
Cape Coral, FL 33914
Nov. 6, 1991

U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

[illegible]

Sincerely yours,
Lyle R. Davidson

Dr. Arthur E. Danziger
626 Foxworth Lane
Holmes Beach, FL 34217-1220

November 4th, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
ATTN: CESAJ-PD-F, Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Reed:

The old cliche in conservation - "you win the battle once and lose it five times afterwards" - seems to be never more true than in the Kissimee River Restoration project. Who would have thought after all the hype and action by Governor Chiles on saving the Everglades, we would be back fighting the same old battles.

The "Modified Level II Backfilling Plan" of the Corps is the cornerstone of the plan to save the Everglades. Without it, we are only putting a band-aid on the Everglades problem. If you believe in the value of the Everglades at all, this project must go forward. In addition, it will insure the future quality of the water in Lake Okeechobee.

I urge you to support this plan to restore the Kissimee River.

Sincerely,

Dr. Arthur E. Danziger

4213 Vantage Circle
Sebring, FL 33872
October 10, 1991

US Corps of Engineers
PO Box 4970
Jacksonville, FL 32232-0019

Ladies and Gentlemen:

This is a brief letter in support of the Kissimmee River restoration project. Unfortunately, it seems that most of the people who spoke at the Sebring hearing had personal vested interests or axes to grind to maintain the present "ditch".

For the best interests of Florida and Floridians of the near and distant future -- to say nothing of the natural environment itself -- I urge you to push forward with the restoration.

Along with this, I also urge fair and reasonable compensation to property owners so that neither the property owners or taxpayers are "ripped off"

Very truly yours,

O. James Davis

U.S. Army
Corps of Engineers

I am writing To Protest The Soveirnty issue. I am hoping you will fight with us.

Ten years a go. long afler The river Rechanneling I Purchsed a small five acer Track about Two Miles from The Old Kissimmee River. Not knowing any Thing about The area.

It never acured To Me I was sinking all My saveing into This Land for what Might have been Nothing If The Soveirnty issue Passes The house.

I am older and Partialy disabled were
52 do I go. how do I live? They Tell us. we cannot Sell our land if were listed in The byout Zone. we were listed in The News Paper as being. But when I Called water Managment They Tell Me They don't know. won't answer any questions

I have spent every Cent improving My Property, so That somday My resale value Would Mean somthing. Please Tell Me All My hard work wasn't for Northing. Emery & Glenda [illegible]
5768 [illegible]

Ernest L. De Giacomo
4852 Pine Tree Drive
Lake Worth, FL 33463

October 16, 1991

U.S. Army
Corps of Engineers
P.O. Box 4970
Jacksonville FL 32232

Dear Gentlemen:

Please Help us urgent, help us save our homes.
46 Big Government wants to spend $683 million dollars on the "Restoration of the Kissimmee River Experiment," which has been proven by tests WILL NOT improve the quality of water in Lake Okeechobee.

Let us spend our tax dollars on schools, hospitals, hungry children, the elderly and the disabled.

Our rights of land ownership are being threatened. The State
34 of Florida may reclaim our properties with NO COMPENSATION TO US!

Everyday we read of the waste of Government money being spent. There is no need to hurt the people who support this Government. As a taxpayer and voter I respectfully request that this project be abandoned and leave our homes, businesses, farms and ranches alone.

One of many homes in question is ours (19965 N.W. 80th Dr., River Acres, Okeechobee, FL 34972. Hoping for your support.

Respectfully,
Ernest De Giacomo
Ernest L. De Giacomo

U.S. Army Corps of Engineers
ATTN: CESAD-TD-T
Box 4970
Jacksonville, FL 32232-0019

Dear Sir:

I recently took a boat trip thru the locks on the Caloosahatchee River to Lake OKEECHOBEE — NOT THE FIRST TIME; BUT THE POLLUTION & WATER HYACINTH GROWTH WAS VERY OBVIOUS. THE PROPELLER SHAFT BECAME IMMOBILIZED AT ONE POINT. Previously, the sparkling WATERS of the LAKE were a delight. This time, long & turned around. I had read about the dangers of pollution to the Everglades, & this experience brought it all to our personal attention. I know there are people who can't, or won't, understand this great, unique treasure of the Everglades. Why, none of us understood the potential damage to its cleansing & nurturing systems; but now that we do, we must be steadfast and resolute.

husband') do suppo the "Modified Level Backfilling Plan" for restoring the Kissi mee.

Please procee to "Protect & Save the Everglades" for fut generations to visit to learn of its impo tance.

Yours truly,

Mary Dellafera
Mary Dellafera

P.S. We're quite aware of the oth threats — decreasing fish, birds;

P.O.B 2213
Punland, FL
33941
Nov 8, 1991

Dear Mr. Reed,

I did not see the Kissimmee River and its floodplains before it was turned into a canal, the tragic effects of which have been well documented. However, I have seen the small section of the river which has been restored to its former course. I ask you, for all of us, human and animal, to continue your plan to restore the entire length of the river, reuniting flood plains, restoring the wetlands and their natural effects on the Everglades.

I understand that years of planning, public hearings and permitting are about to bear fruit. Do not allow special interests to deprive us and our children of seeing and benefiting from this unique natural resource returned (almost) to its previous importance in the environment.

Sincerely yours,
(Howard and) Virginia Demorest

Dear Mr. Reed,

Please pass on this letter to the review board in Washington. I want to see the restoration of the Kissimmee River get started. So much time has been spent so far arriving at the Level II Backfilling Plan, which has been found to be the best possible way to rehabilitate this damaged ecosystem. This plan has been approved of by the evironmental community as well. Now I understand that the Army Corps of Engineers is being besieged with letters from a small group of local organizations around Kissimmee to prevent the river from being restored.

Please make the distinction between what these people want and what the people of Florida want. The environmentalists are not motivated by money, and the opponents are. One purpose is noble and everlasting, and the other purpose is crass and self-serving.

We all want to see the Everglades kept in its pristine condition. That can be achieved by restoring the Kissimmee River. The resotation effects will beneficially affect all of south Florida. The restoration will dramatically improve the water quality of lake Okeechobee.

The best part will be the improved wetland habitat for animal life. The Kissimmee River will once again become the great wildlife area that it was in the past. Although the opponents of restoring the Kissimmee River are ignorant of this, the River will offer much more opportunities for recreational fishing after it is restored. Let's all do the right thing. Let the restoration process begin. Let's go ahead with all the planning and intentions we have laid out and allow the 29,000 acres of former wetlands to be flooded. Let's reunite 49,000 acres of floodplain with the River to to restore 70% of the historic 90 mile floodplain.

Sincerely,
Lena Docter
621 Sarabay Drive,

To whom it may concern:

I am writing this letter in protest of the Restoration of the Kissimmee River.

I am a resident of Hidden Acres Estates a small community built on and near the banks of the "Old Kissimmee River." My husband and I invested our life savings - and then some - to build here. Now 8 months later we are faced with losing it all. Why?

We can't educate the children in Fla. or feed and house the homeless but we can spend upwards of one billion dollars on a mistake the Army Corp of Eng. made 35 or 40 years ago.

Many people here can't start over, they are our senior citizens. Must we put them on the role of the homeless?

35 In our back yard we have every bird and animal native to Fla. including the endangered Fla. panther. I guess this means nothing to the so called environmentalists involved in this rape of the "swamp."

is what you want, but leave us our homes. We are in a 400 year old Live Oak hammock and flooding our land is not the course of the "Old

40 Kissimmee River."

My husband and I looked for years for a place like Hidden Acres to retire and enjoy life. No amount of money would be enough to buy us out or move us.

Take the money to be spent on this Kiss. River project and put it into Fla. education system - God knows it would be better spent!

Sincerely,

Carol M. Dun
Lot 122
964 CR 721
Loida, Fl. 33857

Nov. 2. 1991

U.S. Army Corps of Engineers
P.O.Box 4970
JACKSONVILLE, Fl. 32[illegible]2-0019

Attn:RUSS REED

Dear Sir:

We understand that opponents of The Kissimmee have m unted a campaign against the Restoration Plan for the Kissimmee. These are people who have vested interests in keeping the land for their private use land that rightfully has been determined to belong to all of the people and the wildlife that is so dependent on the rewatering that will occur. We hope that you will take note that private landowners in Okeechobee County who have vowed to "do all that is in their power to fight for life, liberty, and the pursuit of happiness on THEIR own land" are maybe a bit short sighted. BECAUSE, in fact, this 29,000 acres of former wetlands and the reuniting of 49,000 acres of floodplain with the river will restore the river to only 70% of the original flood plain. This fight by private interests has been allowed to continue far to long and has caused the citizens of this country to pay for this land by least twice.

This plan was devised by the S. Fl. Water Management District and they have taken great pains over the years of planning to consider the rights of private interests. Many public hearings have been held and many citizens of the state have worked for years (decades) for the restoration of at least a part of this system on which the EVERGLADES is dependent.

It is anticipated that wading bird population will increase about six fold and there are three endangered species that will receive special benefit, bald eagle, snail kite, and the woodstork.

Recreational fishing is expected to increase four fold.

The cattle industry and sugar interests have come close to and indeed may have already destroyed the Glades. Let's proceed while we still have a chance to save a bit of what's left.

Sincerely
Elizabeth Dunlop

October 7, 1991

To whom it may concern:

I do not usually write letters to Public Officials, the reason being--I am pretty sure that they will either not be read, or if they are, they will be laughed at and tossed in file 13. However this issue is so important that as a registered voter and taxpayer, I am going to try.

My husband and I never thought too much about retiring since we were only in our 40's, but in 1985 we found a "little piece of heaven" and decided to invest so that we would have a place to retire to, when the time came. We purchased a couple of places in Hidden Acres Estates on the beautiful Kissimmee River,Highlands County, Florida.

Now as the retirement time fast approaches and we are making more definite plans, we find out that all this could be destroyed by the South Florida Water Management District and the U.S. Army Corps of Engineers.

Today state government has cut funding for education, HRS,and schools are facing massive teacher layoffs. People in desperate need of medical care, are being turned away because of lack of funding. Criminals do not face adequate penalties, due to lack of funding for new prisons. Guess what? Our "intelligent" South Florida Water Management District and US Corps of Engineers are proposing we spend 683 million dollars on restoring the Kissimmee River.How asinine can you be?

Anyway, the purpose of this letter is to make an appeal to you to do whatever is in your power to put a stop to this ridiculous project. Let's use our tax money for more important things. Please don't destroy the beautiful land and wildlife which we have. It is just now recuperating from the stupidity of 25 years ago when they thought they could do a better job than God did when He made this earth.

Thank you if you took the time to read my letter. Please think carefully and examine all possibilities before continuing with this project.

Frances Durham

Frances Durham

Lots 10 & 31

35

October 7,1991

To whom it may concern:

I, as a registered voter and taxpayer, am writing to you as my elected representative. This is about an unjust and ridiculous issue, the restoration of the Kissimmee River, by the South Florida Water Management District and U.S. Army Corps of Engineers.

Being a life long resident of Saint Lucie County, Florida, I can well recall what a turmoil was caused when they straightened the river, some twenty-five years ago. At that time many residents of Okeechobee, Glades, Highlands, Osceola, and Polk Counties were outraged at what the government was doing in the name of preserving wildlife, fishing, and the wetlands. Being some fifty miles away, in St. Lucie County, I was, like a lot of you are, unconcerned because it didn't involve me personally.

Now this restoration non-sense does concern me personally, because I have bought into a corporation at Hidden Acres Estates, Fort Bassinger, Fla., a retirement retreat. It will virtually destroy my family's dream of retirement in a few years, by a buy-out of Hidden Acres Estates.

At a time when money is scarce everywhere, and cutbacks are being made in virtually every government agency, especially education and health care, how can we, in good faith, spend this kind of money, especially on something like this, that so many voters and taxpayers are against.

I am asking for, and counting on, your support on this issue at this time, as you were asking, and counting on, my support when you were elected, and will be asking for it again, if you want to be elected in the future.

Thanking you, I am

Warren E. Durham

Warren E. Durham
Lots 10 and 31
Hidden Acres Estates

[illegible]
[illegible]
[illegible]
[illegible]

Dear Mr Reed:

[illegible] of the restoration of the Kissimmee River.

There is only one Everglades in the world. The Kissimmee River is the headwaters of the Everglades, we must restore & protect the entire system!

Sincerely,
[illegible]
Okeechobee

1280 Gordon Dr. #D
Naples, FL 33940-7221
November 5, 1991

U. S. Army Corps of Engineers
P. O. Box 4970
Jacksonville, FL 32232-0019

Attn: Russ Reed

Dear Sir:

We understand that opponents of The Kissimmee have mounted a campaign against the Restoration Plan for the Kissimmee. These are people who have vested interests in keeping the land for their private use. Land that rightfully has been determined to belong to all of the people and the wildlife that is so dependent on the rewatering that will occur. We hope that you will take note that private landowners in Okeechobee County who have vowed to "do all that is in their power to fight for life, liberty, and the pursuit of happiness on THEIR own land" are maybe a bit short sighted; BECAUSE, in fact, this 29,000 acres of former wetlands and the reuniting of 49,000 acres of floodplain with the river will restore the river to only 70% of the original flood plain. This fight by private interests have been allowed to continue far to long and has caused the citizens of this country to pay for this land by at least twice.

This plan was devised by the S. Fl. Water Management District and they have taken great pains over the years of planning to consider the rights of private interests. Many public hearings have been held and many citizens of the state have worked for years (decades in fact) for the restoration of at least a part of this system on which the EVERGLADES is dependent.

It is anticipated that wading bird population will increase about six fold and there are three endangered species that will receive special benefit, bald eagle, snail kite, and the woodstork.

Recreational fishing is expected to increase four fold.

The cattle industry and sugar interests have come close to and indeed may have already destroyed the Glades. Let's proceed while we still have a chance to save a bit of what's left.

Please go forward with the Modified Level II Backfilling Plan.

Sincerely,

Shirley Eichenauer

Dear Russ Reed
Please save restore save the Kissimmee river
I'd like to see it returned to its
natural state the Kissimmee is the
Headwater of the Everglades
We need to insure future water
quality to lake Okeechobee
This will be premiere wetland
Restoration project in the National
In the world
Please help

Erwin Eckem

P. O. Box 607442
Orlando, FL 32860-7442
November 5, 1991

Mr. Russ Reed, Study Manager
U. S. Army Corps of Engineers
ATTN: CESAJ-PD-F
Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Reed:

I am a thirty-two-year resident of Florida and think what has been done to the Kissimmee River is a crime against nature.

The River is the headwaters of the Everglades, and there is only one Everglades in the world.

Restoration will help insure future water quality to Lake Okeechobee.

This project would be the premiere wetlands restoration project in the nation.

I urge you to implement the "Modified Level II Backfilling Plan." The conscientious people who love Florida want the Kissimmee River restored!

Thank you for your consideration of my letter.

Sincerely,

Virginia D. Eppinger

Virginia D. Eppinger

Dear Mr. Reed,

I urge you to go forward with the U.S. Army Corps of Engineers' plan to restore the Kissimmee River. Restoring the Kissimmee River would not only insure the water quality of Lake Okeechobee, it would restore wildlife, fisheries, habitat, and provide recreation in the area for generations to come. The Kissimmee River is also the headwaters of the Everglades, and without its restoration, the consequences to the Everglades could be devastating. The Kissimmee River must be restored.

Sincerely,

Judy L. Everett
3001 Plantation Road
Winter Haven, FL 33884

Dear Russ Red:
Study Mgr. US Army Corps of Engineers
ATTN CESAJ-PD-F Box 4970
Jax Fl 32232-0019

I was astonished to learn that serious efforts not to restore the Kissimmee River have challenged the long fought effort to Restore the river.

We have done enough damage to the Everglades, Keep the headwaters and the future quality of Lake Okeechobee. Recent efforts to curb cattle and Sugar production will add to the health of the So. Fla Ecosystem. DONT STOP NOW! Restore the Kissimmee River to its original state as planed.

Thank you
Mr & Mrs C. Michael Evans
4102 Prescott Sri Sarasota 34232-3844

P.S. excuse the brevity and handwritten letter but I new it must be posted today and time was of the essence.

November 6, 1991

Mr. Russ Reed, Study Manager
U S ARMY CORPS OF ENGINEERS
ATTN:CESAJ-PD-F
Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Reed:

The Corps of Engineers' plan for restoring the Kissimmee River based on the SFWM District's Level II Backfilling Plan, we think, is the way to go. Not only will thousands of acres of wetland be restored for wildlife, but also, this river, being the headwaters for the Everglades will, over the years, help preserve future water quality for the people in south Florida. At this point, the quality of water for human consumption is just as important as preservation of wildlife habitat.

Restoring the Everglades headwaters through this Kissimmee River Restoration Project will enhance the quality of aquatic wildlife and provide recreational benefits, as well.

If this project is completed, it will be a premiere wetland restoration project which could very well be a key factor in restoring other wetlands nationwide.

WE, THE PEOPLE OF FLORIDA, WANT THE KISSIMMEE RIVER RESTORED!!!

Please act favorable to our request.

Sincerely,

Charles W. Fairbanks and

Mary A. Fairbanks

Mary A. Fairbanks
3309 Dorchester Street, Tampa, Florida 33611-2737

17 Fairglen Drive
Titusville, FL 32796
November 11, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps. of Engineers
Box 4970
Jacksonville, FL 32232-0019

Attn: CESAJ-PD-F

Dear Mr. Reed:

We want you to know we believe that the Kissimmee River should be restored. As it stands now, the water races down to the sea carrying sediment off to the ocean when it should and could be left on our land. The wildlife, both animals and birds, also plant life, will survive and flourish where water meanders through wetlands rather than racing thru a straight sluce.

Please do as much as you are able for getting the Kissimmee River back to its original form.

Sincerely,

Burl G. Ferguson
Jane J. Ferguson
Mr. and Mrs. Burl G. Ferguson

ALICE K. FAUST
7540 S. W. 54 AVE.
MIAMI, FLORIDA 33143

11-8-91

Dear Mr. Read.

I'm writing to tell you that both my husband, Rex, and I are solidly behind the restoration of the Kissimmee River here in Florida. The natural flow of the river as in its natural course supplies our "river of grass" and thus is most important to our wading birds and their habitat. The Everglades national park must be maintained and the river called Kissimmee was in its previous time a most important factor.

Please do what you can to

(over)

tell the Corps of Engineers we long time residents of Florida favor to a great extent the plan called "Modified Level II Backfilling Plan"

Thank you!

Sincerely

Alice and Rex Faust

LANDON C. FORTNER,JR.
401 S. W. 12 STREET
OKEECHOBEE, FL. 34974

October 18, 1991

U. S. Army
Corps of Engineers
P. O. Box 4970
Jacksonville, Fl. 32232

RE: Restoration of Kissimmee River

Dear Sir:

We the people of Okeechobee, Florida need your help immediately.

41 The current proposal for the environmental restoration of the Kissimmee River would have a devastating effect on Okeechobee County. The thousands of acres that would be flooded by this project along with the loss of residential homes and farms would take millions of dollars off the tax rolls of Okeechobee County.

A proposal to spend $683 million and more for the river restoration, at a time when funding for needed services has been cut shows the lack of good judgement.

GOD created this earth and man continues to mess it up and waste a lot of money while doing it.

We strongly urge you and your staff to put a stop to this senseless waste of tax payers money. No amount of money could be spent that would correct the problems that have been caused along the Kissimmee River. please leave it alone.

46 THE RESTORATION OF THE KISSIMMEE RIVER WILL NOT IMPROVE THE QUALITY OF WATER IN THE RIVER OR IN LAKE OKEECHOBEE, THEREFORE DON'T WASTE THE MONEY.

Thank you for your help in this matter.

Yours Truly'

Landon C. Fortner, Jr.

Landon C. Fortner, Jr.

November 4, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 attn. CESAJ-PO-F
Jacksonville, Florida 32232-0019

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely,

Sarah Fortney

Hidden Acres Estates

Debra S. Fruth
964 C.R.#721
Hidden Acres #174
Lorida, Florida 33857
813-467-6547

October 6, 1991

To Whom it May Concern;

It was a very big shock to read in the paper that we live in part of the flood plain for the Kissimmee River Restoration Project.

37 I live in probably the most beautiful place on this earth, Hidden Acres Estates. We have no intention of being bought out. We live in a solid oak hammock with oak trees that are hundreds of years old. Out my back door I have a oak tree that is more then 3 feet across, I picked my lot for the magnificent oak trees. There is no way that this was ever under water or flooded. Oak trees don't live in water.

35 There is more wildlife then you could ever imagine until you live here year round. We have several families of Red Shouldered Hawks and have one pair that has raised their young in the top of an oak tree less than 100' from my house for the past 3 years. We have red foxes, 2 families of grey foxes that raise their young in our back yards, turkeys, wild hogs, owls, several families of pileate wood peckers, Florida panthers, bobcats, civic cats, raccoons, armadillos, deer, all other varieties of both water and land birds, gophers, turtles, and more squirrels than you can count. There are plenty of alligators too!!! There is no other place that you can go that is this populated and live among all the wildlife that is not in captivity as we do. I know that I have missed some. There is not a week that goes by that you don't see all the wildlife that I have mentioned.

The river is finally recovering from the damage that was done when the Corp of Engineers channeled it to start with. It has built a new echo system and is doing just fine. You want to come along and destroy it again.... by spending millions of dollars of tax payers money, to say that you are saving the environment, when all your doing is destroying wildlife, the river, the communities, and the people. You have cut funding for education and health. The only state funded tuberculosis hospital has been shut down for lack of funds. Million of dollars have been raised by the Florida lottery and it was said that the money was going to improve education and build schools for the people and the teachers have been cut and the funding. So how is that benefitting the people?

The people that sit in the position to make the decisions on this project don't even know where Hidden Acres is and have not been out to spend any time on the river. It seems that most of the information that you have received comes from individuals who have spent very little time on the river. We feel that more than likely these people have studied maps and perhaps flown over the area in planes to secure the information they have. These people need to come live on the river and spend their days here to really know how things are. I think the river should stay the way it is...and the government should use the people's money for education, health and welfare of the people. Come and spend time on the river and you will see things in a different light.

Sincerely,

Debra S. Fruth

Debra S. Fruth

Gerald and Elizabeth Fritz
107 Royal Park Dr #[illegible]
Holland Park, FL [illegible]

November 6, 1991

Russ Reed, Study Mng
U.S. Army Corp of Engineers
attn. [illegible]
Box [illegible]
Jacksonville, FL [illegible]

Dear Mr. Reed,

I am writing in regard to Kissimmee restoration project. I believe that Army Corp of Engineers knew, at the time of channelization, that what they were creating was an ecological disaster. My husband and I support the restoration full heartedly and we represent hundreds of others who feel the same way. There is very little of Wild Florida left. Florida's ecology needs this restoration. We hope that you support the Kissimmee restoration and that the proposed project will pass. Thank you for your time.

Sincerely,

Gerald & Elizabeth Fritz

Gerald and Elizabeth Fritz

DEAR MR REED

I AM ASKING YOU TO SUPPORT THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT'S LEVEL II BACKFILLING PLAN. THIS FLOOD PLAIN IS NEED BADLY TO HELP RESTORE WATER QUALITY TO LAKE OKEECHOBEE AND IMPROVE THE AQUAFER IN SOUTH FLORIDA LAST YEAR THE WATER LEVEL IN THE LAKE AND THE EVERGLADES BECAME DANGEROUSLY LOW AND WAS A PREVIEW OF A POSSIBLE DISASTER TO FLORIDA. THE DITCH WAS A MISTAKE AND WE MUST RESTORE THE KISSIMMEE RIVER WATER SHED

THANK YOU FOR YOUR SUPPORT

SINCERELY

JAMES L. FULLER

J L Fuller

A. F. Gagne, Associates
ENGINEERS
2982 Knowles Blvd., Kissimmee, FL 34741

A. F. GAGNE, P.E.
(407) 870-9533

District Engineer, Attn. CESAJ-PD-PF
Jacksonville District
U.S. ARMY CORPS OF ENGINEERS
P.O. Box 4970
Jacksonville, FL 32232-0019

Oct. 20, 1991

Dear Sirs,

I had the pleasure of attending your public meeting Oct. 2, 1991, on the proposed KISSIMMEE RIVER RESTORATION. And now I am glad to take advantage of the opportunity afforded me to offer a statement on the matter. First let me state that for a number of reasons that seem very valid, I consider this proposal not only an egregious waste of taxpayer money, especially at this critical time, but also entailing serious disadvantages, quite in contrary to the rosy picture offered by proponents. To be specific:-

8-77

COSTS The latest official figure is $422,000,000, to come partly from Florida and partly from the U.S. treasury. However, because the work is actually to be stretched out over fifteen years or so, you have suggested a more realistic figure of $683,000,000. From what I heard at the meeting, Headwaters Revitalization is actually apt to run considerably more than allowed for because of flooding shore fronts, etc. of Lake Hatchineha homes; and other cost overruns are not unheard of in projects of this complexity and many unprecedented aspects. This is to result in "28,000 acres of continuous inundated floodplain", which figures out to $24,390 per acre, although in truth some of the 28,000 acres is already under water. But in the State of Florida we now have a desperately underfunded program, "PRESERVATION 2000" designed to buy up habitat and wetlands before the developers can get their hands on them and destroy them. Typically such lands are said to cost around $1000 per acre: thus if funds intended for decanalization were used instead to save existing endangered wetlands, this offers a 24 to 1 benefit ratio. If we recall that no one promises 100% success in restoring the riverine wetlands, this adverse ratio looms even higher. To this add one more adverse cost fac-
41 tor, loss of tax revenue to the counties involved.

BENEFITS SOUGHT. When the canal was completed, it was shortly discovered, to everyone's horror, that the waters coming down from the upper basin were load-

ed with nutrients and helping to cause rapid eutrophication of Lake Okeechobee. A call went up to fix this, endorsed by three governors and others. But over the two decades since, while the matter was being studied, the upper basin polluters largely stopped polluting, and now the official studies show that pollution now comes primarily from farms and ranches along the lower reaches of the canal and around the lake. Perhaps land along the canal should still be bought up, or reclaimed from those occupying it in whatever fashion, but this is vastly different from filling in the canal.

53 The second reason for this work is to restore habitat for the water birds said to have been displaced by the drying of the river basin and, perhaps more importantly, restore habitat for trillions of snails, clams, and other small creatures which are a food base for so much else, including humans. This is indeed a worthwhile objective, but as pointed out above, many more acres of wetlands can be saved, including estuarine areas, by buying up and protecting existing endangered lands. In short, more bang for the buck! Other reasons advanced are improved water quality, enhanced waterfowl hunting, enhanced fishing and enhanced recreational boating. Let's look at each in detail:

IMPROVED WATER QUALITY. Certainly the riverine system proposed would offer better quality water due to its filtering action...after the sediment, etc. resulting from construction is done with. However, it makes more sense to me to go after the sources of whatever pollution is still affecting the waters from the upper basin; this would improve the water for swimming, make fishing in the lakes safer, and best of all, should be achieved at much less cost to the taxpayers because we would be making industries, Disney, private individuals clean up their act in compliance with federal law. Storm water runoff from the various towns would indeed have to be paid for with taxes, but we certainly don't want oil in the lakes, etc.

ENHANCED WATERFOWL HUNTING. Do we really expect taxpayers to be pleased with this form of killing, a sport that is in any event limited to relatively few?

54 ENHANCED FISHING. I am told that the fishing on the canal is pretty good right now, and it is certainly accessible. If the water quality in the upper lakes is further improved, the fishing has to get even better, with one proviso, correction of the hydrilla problem. If the hydrilla infestation cannot be overcome, it will most likely spread to and completely block the restored Kissimmee river. There goes your fishing, although if we leave things as is, the canal is too deep to be seriously affected by hydrilla and fishing there

channel depth 90% of the time, and its twisty reaches are expected to provide the boater with wonderful scenery accessible both night and day. But the Corps report states that a 25 ft. cruising motor boat could well require 4½ ft. when under way. The channel is to be marked initially, but who will maintain the markers and who will see to removal of bars and snags, etc.? Not the Coast Guard. Frankly, as the owner of a 22 ft. motor boat (outboard), I find the prop hitting bottom at three feet; I would not dare traverse 100 miles of poorly marked, uncertain channel at night, particularly with the additional hazard of overhanging branches in the dark. The final blow to the beautiful picture presented by river proponents is the hydrilla, which will block the passage of everything except airboats. Is this what you want in your newly pristine wilderness? Some 20,000 boaters a year now use the canal; imagine the hue and cry when this is no longer possible.

WHAT ABOUT FLOOD PROTECTION? The reason the Corps dug the canal so wide, deep and straight was to avoid future disastrous floods, with their tremendous potential of harm to life and property. The last two decades have been relatively dry, but for how long? I consider it the height of folly to return to a riverine system, partly choked with hydrilla and to ignore the 100-year flood (I understood from the discussion at the meeting that dechannelization was computed to handle only the 10-year flood.) Will we have to rebuild the canal to protect all of the homes, schools and businesses that have been built since the last flood?

Thank you for "listening".

Oct. 20, 1991

A.F. Gagne

M.E. (retired)

October 17, 1991

To Whom it May Concern:

As I understand you are proposing to redo the Kissimmee River. We are in our golden years and were no very affluent when raising our children, however since our children have grown up and on their own, we have saved and planned our future. We have a nice trailer, porch and live very economical as we are as we are on a fixed income and we are very happy with our home.

I think its very unfortunate that you people feel that you have to do what you propose to flood our land.

Is there any way you could reconsider and avert using Hidden Acres Estates as far as you have proposed. I don't think this is part of the original river. If I am wrong please let us know.

How could you deny us of our golden years in peace.

Please Reconsider,
Thank-you,

Angelina Gabany

16/91
15 Galaxy Way
N. Ft Myers, Fl.

Corps of Engineers
PO Box 4970
Jacksonville, Fl

Dear Sirs,

Please go forward with the Modified Level II Backfilling Plan for the restoration of at least a part of the Kissimmee - on which the Everglades is dependent.

Sincerely,
Dorothy Gale

Dear Mr. Reed,

I urge you to go forward with the U.S. Army Corps of Engineers' plan to restore the Kissimmee River. Restoring the Kissimmee River would not only insure the water quality of Lake Okeechobee, it would restore wildlife, fisheries, habitat, and provide recreation in the area for generations to come. The Kissimmee River is also the headwaters of the Everglades, and without its restoration, the consequences to the Everglades could be devastating. The Kissimmee River must be restored.

Sincerely,

Sylvia S. Geier

SYLVIA S. GEIER
2470 LAKEFRONT DR.
LAKE WALES, FL 33853

Nov. 4, 1991

Mr. Russ Reid, Study Manager
U.S. Army Corps of Engineers
Box 4970 attn. CESAJ-PD-F
Jacksonville, Florida 32232-0019

Dear Mr. Reid,

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world, and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely,

Cindy Gentry

GENTHEMEN.

I'M A RETIRED SENIOR CITIZEN, I MOVED HERE FOR LOW INCOME, SAFETY, LOTS OF FRIENDS AND PEACE. I CAN'T SEE WHY YOU HAVE TO MOVE A RIVER ON MY LOT. THE FISH, ANIMALS, AND BIG 100YR OLD TREES ARE PLENTY FULL. WE HAVE OUR OWN WATER PLANT AND SEWER SYSTEM, WE OBEY ALL RULES ACCORDING TO ALL ENVIRONMENT. I FEEL THIS IS A POLITICAL MOVE ON MR BUSH'S PART. I HAVE NO MORE MONEY TO MOVE. I AM ON S.S. BENIFITS ONLY. THERE ARE 140 COUPLES HERE IN THE SAME SPOT. WHERE DO WE GO. WE WILL ALL END UP AS A STATE WARD

PLEAS HELP US.

Henry Gioia

135

8-80

Jeremiah Gilley
725 Ave E. S.E.
Winter Haven Fla. 33880

MR. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn: CESAJ-PO-F
Jackson ville, Florida 32232-0019

Dear MR. Reed:

I am in favor of the restoration of the Kissimmee. There is only one Everglades in the world and the Kissimmee River is the headquarters of the Everglades. We must restore and protect the entire system.

Sincerely,
Jeremiah Gilley

Jeremiah Gilley
725 Ave E. Sotho
Winter Haven Fla
33880

MR. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn CESAJ-PO-F.
Jackson ville, Florida 32232-0019

Dear MR. Reed:

I am in favor of the restoration of the Kissimmee River. There is only one Everglades in the world and the Kissimmee River is the headquarters of the Everglades. We must restore and protect the entire system.

Sincerly,
Marcia Gilley

November 8, 1991

Mr Russ Reed
Study Manager
U.S Army Corps of Engineers
Attn: CESAJ-PD-F
Box 4970
Jacksonville FL 32232-0019

Dear Mr Reed:

I implore you to restore the Kissimmee River. As a native Floridian I cannot begin to express my concern enough over the once beautiful Kissimmee River. Please do everything in your power to ensure the restoration project is carried through on.

Thank you

Janice Gillespie
1916 Bayshore Ct
Safety Harbor FL 34695

11/7/91

Dear Mr. Reed,

I am writing to you because I feel that this is vital importance to restore the Kissimmee River.

I support a Level Two restoration of the river (70% of river).

I would hope that the Corps is able to act upon the restoration as soon as possible.

Thank you

Jeanne S. Girard

JEANNE S. GIRARD
2641 Gately Dr. West #805
WEST PALM BEACH FL. 33415

October 13, 1991

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
CORPS OF ENGINEERS

TO WHOM IT MAY CONCERN:

After hearing of the meeting held in Okeechobee City on October 1, 1991, by the Corps of Engineers and South Florida Water Management District personnel and the information that their plan to backfill the Kissimmee River and how if affects the landowners on both sides of the river, I am greatly concerned and feel that their decision on this matter should
35 receive more planning and information from the property owners. Since this meeting was not made known to the public on a more timely basis, with their intention of purchasing, condemning or otherwise obtaining the properties, it has really affected any sale of properties tremendously - making it almost impossible to find a purchaser. I personally am the owner of two parcels of property, one being in Hidden Acres Estates where I have a considerable investment and the other being in River Oak Acres. I have a prospective buyer for the property in Hidden Acres, or a portion of it, and also the property I have in River Oak Acres is on the market. With the information given at the meeting in Okeechobee and the possibility that some of these lands will be taken for the backfill of the river, no one that I have contacted would be interested in purchasing either property. I have been informed by SFWMD that, if approved, nothing would be happening for a number of years with a slight possibility that it would never happen at all. If this is the case it is unfortunate, as information now being made public about the Kissimmee River Restoration propect has hurt the economy of the counties that these properties are within.

Okeechobee county and the city of Okeechobee have already suffered a setback
41 in their economy by the loss of so many dairies, in addition to the recession that has affected the whole country. The dairies, that have already gone out of business because of the pollution problems has seriously affected their economy. Now, if the information that has come forth from this meeting is correct it affects many others - the realtors, bankers, agriculture people and the businesses who have depended on the dairymen's business. The uncertainity and the nature of the Kissimmee River Restoration project has had the people wondering for years how they would be affected. The information that came from the Oct. 1 meeting was very untimely, when the whole operation is very, very indefinite. Even so, it has affected several other counties tremendously. I certainly feel that this is a cart before the horse situation and it is very, very unlikely that money will be coming for the horse. In my mind it appears that there has not been enough study and observation of the properties that are proposed to be taken for the restoration, most of which are located on the west side of the river where more of the development is located. On the east side there are fewer residences.

I am quite well acquainted with the river and it seems that lands could be taken from the east side which would not disturb as many landowners and homeowners if the project goes forth. Many of the present homeowners are retired and have invested much of their worth in their homes. If the land is purchased, as I

understand, they would have to remove any development that they have. This creates a serious prblem for the homeowners, not only the fact that they will lose money, but because of zoning, to re-locate to comparable developments in the area is practically impossible.

56 I feel the whole project is experimental and feel they have made a mistake in digging the canal in the first place and there is a good chance in my mind that to restore the river now may be another error. I am acquainted with the experiment of the weirs that were installed in the river which routed the water down through the ox bows. It has been admitted that this was a success by some of the people within the different agencies. I would certainly be in favor of exploring that further, opening up more of the oxbows and possibly including more weirs. I feel that the present water control structures and the locks could remain and navigation could continue on the river. The cost of this, I would suggest, would be minimal compared to removing all of the expensive water control structures and locks, displacing people from their homes and could be done in less time than suggested by SFWMD and COE. I respectfully suggest this be considered.

I am a native Floridian and have been active on water control boards for water management, irrigation and boating. I boated the Kissimmee River both in its present state and before there were any alterations made to it.

Sincerely,

A. W. "Buck" Glisson

A. W. Glisson
5656 S. Shore Blvd.
Lake Worth, FL 33467

407/798-2128

AWG/jg

October 13, 1991

CORPS OF ENGINEERS
SOUTH FLORIDA WATER MANAGEMENT DISTRICT

TO WHOM IT MAY CONCERN:

The current proposal for the environmental restoration of the Kissimmee River would have a devastating effect on Okeechobee County.

41 The thousands of acres that would be flooded by this project as well as the loss of residential homes and farms would take millions of dollars off the tax rolls of Okeechobee County.

44 The proposed restoration project map also shows the site for a proposed $8 million co-generation power plant would lie within the five-year flood plain. The potential loss of this power plant would cost the county both in tax dollars and in hundreds of jobs.

The county is already at the 10 mil cap and unable to raise enough money to provide basic services to its residents. The loss of this property off the tax rolls would cripple an already stressed economic system, still reeling from the loss of one-third of the area's dairies due to the dairy buy-out.

45 Another five dairies lie in the proposed five-year flood plain, but are not listed for purchase.

A proposal to spend $683 million for the river restoration, at a time when funding has been cut for education, health and human services and the courts, is quite simply obscene.

We strongly urge you to reconsider disapproval of this proposal.

Katrina Elsken
Keta Crowe
Leonora R. Bohen
Ann Nicoll
Jody H. Parrish
Melvin Santos
Glenda Carver
Karmen Dorale
Twila C. Valentine
Judy Davis
Margie Green
Pamela Phillips
Robin Pfeiffer
Michelle L. Conklin
Tammy Jackson
Joan S. Glisson

Joan S. Glisson

8-84

Dear Mr. Reed,

I urge you to go forward with the U.S. Army Corps of Engineers' plan to restore the Kissimmee River. Restoring the Kissimmee River would not only insure the water quality of Lake Okeechobee, it would restore wildlife, fisheries, habitat, and provide recreation in the area for generations to come. The Kissimmee River is also the headwaters of the Everglades, and without its restoration, the consequences to the Everglades could be devastating. The Kissimmee River must be restored.

Sincerely,

Ana Gonzalez
PO Box 2603
Winter Haven FL
33883

October 14, 1991

CORPS OF ENGINEERS
SOUTH FLORIDA WATER MANAGEMENT DISTRICT

GENTLEMEN:

It is unfortunate that the Corps of Engineers and South Florida Water Management District did not see fit to notify the communities along the Kissimmee River, by mail, on a timely basis, about the public meetings held on October 1, 2 and 3. It is not a complimentary attitude for you governmental agencies to take, but seemingly a refusal to examine all avenues in planning for the Kissimmee River Restoration. It is our basic right as citizens to continue to give input to such an expensive, controversial effort.

57 I am much distressed by what I have been learning about the plans being made for the Kissimmee River Restoration by the SFWMD and COE. Nowhere have I seen any alternative plans which might save the land and homes of the people who live along the river, plans which might better use our
58 tax dollars to improve the education of our children, give adequate health care to our citizens and better control of criminals and a host of other services, with better planning. Nor have I seen plans to provide industry of any kind to replace the livelihood of the people being affected by these plans so that people living along the river could remain in the counties surrounding the river and help maintain the standard of living now in place and support the tax base of the area.

There are serious discrepancies in the projected costs of this restoration presented by the WMD and COE, according to some well researched information I have been reading. Because of these discrepancies it seems to me that these two agencies are cavalierly proceeding with plans that gives them license to spend into eternity. Do these two agencies not interact with each other in planning such large expenditures?

41 Taking more land off the tax rolls will, ultimately, deprive even the most successful citizens of a decent standard of living. Surely you recognize that there is a limit to how much the average citizen can afford to pay in taxes and remain alive and supportive of our state, country, a family and creature comforts.

Perhaps the WMD could sell lands it presently owns to pay the costs of the Kissimmee River Restoration - or lands could be traded.

This restoration has been studied to death, almost since the completion of the channelization, for far too much money, which should have provided for alternatives for both the restoration and replacement of lost industry and employment.

40 As owners of a considerable investment in Hidden Acre Estates in Highlands County, we urge that a physical examination be made of the Hidden Acre property and the plan to take 62 structures be carefully re-considered. Hidden Acre Estates has never been flooded by waters of the Kissimmee River, as evidenced by the large number of giant oak trees on this property, which are hundreds of years old. Oaks do not live in water!

Many of these homeowners live on social security and moved there because it
35 was the most desirable location they could find which they could afford. All have maintained and improved their property very well and it cannot be duplicated anywhere in the area. The land is a higher elevation than most along the river and should not be disturbed by the restoration plans. The wildlife has finally been restored in this area since the channelization of the river 20 years ago.

Let's not disturb both humans and wildlife here again.

PLEASE REEXAMINE WHAT YOU ARE ABOUT TO DO TO AN ALREADY DEPRESSED AREA!

Sincerely,

Joan S. Glisson

Joan S. Glisson
5656 S. Shore Blvd.
Lake Worth, FL 33467

/js

Dear Mr. Reed,

I urge you to do forward with the U.S. Army Corps of Engineers' plan to restore the Kissimmee River. Restoring the Kissimmee River would not only insure the water quality of Lake Okeechobee, it would restore wildlife, fisheries, habitat, and provide recreation in the area for generations to come. The Kissimmee River is also the headwaters of the Everglades, and without its restoration, the consequences to the Everglades could be devastating. The Kissimmee River must be restored.

Sincerely,

James R. Grazier
6708 Broken Arrow Tr. So
Lkld. FL 33813
6468683

U.S. Army Corps of Engineers,

Unlike some of the people who own property along the Kissimmee River, my wife and I are 100% effected by the so called "Kissimmee River Restoration Project" We have no other home to go to.

We have lived at River Acres 365 days a year for the last 9 years We both work at full time jobs Now that the kids are gone, it seemed like we mite finely be able to some day retire on our 1 little acre in this Great Country of ours A REAL NICE DREAM

WRONG Some one came up with the idea of "Restoring the River", convenced a POLATICIAN, and look where we are now

The State Attorney General says that we may not even own the land that the State issued titles for Land that we have been paying taxes on and making mortgage payments on for the last 9 years

What happens to us when our mortgage comes up for renewal and the bank sayes,"The owener ship of the property is to much in doubt, that in the intrest of there depositors, they can not renew our loan" Do you think that some other loan co. would give us a loan? If we don't have the money to pay off the loan, then we will lose everything we have been paying on for the last 9 years.

As a retired military man and giving 20 years of my life to do my small part to preserve "OUR AMERICAN WAY OF LIFE',then to have something like this happen. How do you think we feel about this 'RESTORATION PROJECT" ?

Early environmentals said that the coming of the automoble was the greatest thing there was, now they would no longer have to watch for horse manure when crossing the street

Just look aat what the internal combustion engine has done for our environment

Let us not do something similer to our waters.

With the technology that we have today there are alternitive ways that will benfit both man and nature There is no reason for man to destory his environment and there by himself

LETS BE SURE THAT WE ARE DOING IT RIGHT

JESSE W E GRIFFEN
Jesse W. E. Griffen

U.S. Army Corps of Engineers

"TO WHOM IT MAY CONCERN"

Since I was a child, I have been told to fight for the freedom promised in the constitution of our country. My father and my husband fought to protect the people's rights in our country, and now my son who is on active duty in the Armed Forces , may not have a home to come back to when his tour of duty is over , because our Home is located in one of the main areas involved in the 'River Restoration Project'. Most of the people in the involved area have other homes in other locations to go to ; however , our our home is all we have; WE HAVE NO OTHER HOME

Ruth A. Griffen (River Acres)

Ruth A Griffen

Nov. 2. 1991

U.S. Army Corps of Engineers
P.O.Box 4970
JACKSONVILLE, Fl. 32232-0019

Attn:RUSS REED

Dear Sir:

We understand that opponents of The Kissimmee have mounted a campaign against the Restoration Plan for the Kissimmee. These are people who have vested interests in keeping the land for their private use land that rightfully has been determined to belong to all of the people and the wildlife that is so dependent on the rewatering that will occur. We hope that you will take note that private landowners in Okeechobee County who have vowed to "do all that is in their power to fight for life, liberty, and the pursuit of happiness on THEIR own land" are maybe a bit short sighted. BECAUSE, in fact, this 29,000 acres of former wetlands and the reuniting of 49,000 acres of floodplain with the river will restore the river to only 70% of the original flood plain. This fight by private interests has been allowed to continue far to long and has caused the citizens of this country to pay for this land by least twice.
This plan was devised by the S. Fl. Water Management District and they have taken great pains over the years of planning to consider the rights of private interests. Many public hearings have been held and many citizens of the state have worked for years (decades) for the restoration of at least a part of this system on which the EVERGLADES is dependent.
It is anticipated that wading bird population will increase about six fold and there are three endangered species that will receive special benefit, bald eagle, snail kite, and the woodstork.

Recreational fishing is expected to increase four fold.

The cattle industry and sugar interests have come close to and indeed may have already destroyed the Glades. Let's proceed while we still have a chance to save a bit of what's left.

Please write to the Corps of Engineers P. O. Box 4970 Jacksonville , 32232-0019 asking that they go forward with the Modified Level II Backfilling Plan.

Sincerely,

Nancy Gross
10301 Jarrah Lu
Bonita Springs, Fl 33923

Nov. 2. 1991

U.S. Army Corps of Engineers
P.O.Box 4970
JACKSONVILLE, Fl. 32232-0019

Attn:RUSS REED

Dear Sir:

We understand that opponents of The Kissimmee have mounted a campaign against the Restoration Plan for the Kissimmee. These are people who have vested interests in keeping the land for their private use land that rightfully has been determined to belong to all of the people and the wildlife that is so dependent on the rewatering that will occur. We hope that you will take note that private landowners in Okeechobee County who have vowed to "do all that is in their power to fight for life, liberty, and the pursuit of happiness on THEIR own land" are maybe a bit short sighted. BECAUSE, in fact, this 29,000 acres of former wetlands and the reuniting of 49,000 acres of floodplain with the river will restore the river to only 70% of the original flood plain. This fight by private interests has been allowed to continue far to long and has caused the citizens of this country to pay for this land by least twice.

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It is anticipated that wading bird population will increase about six fold and there are three endangered species that will receive special benefit, bald eagle, snail kite, and the woodstork.

Recreational fishing is expected to increase four fold.

The cattle industry and sugar interests have come close to and indeed may have already destroyed the Glades. Let's proceed while we still have a chance to save a bit of what's left.

Please write to the Corps of Engineers P. O. Box 4970 Jacksonville , 32232-0019 asking that they go forward with the Modified Level II Backfilling Plan.

Sincerely,

Paul Fiss
10301 Sarah St.
Port Sp[illegible], Fl.
33923

I am writing to ask you to allow the restoration of the Kissimmee River to begin. The Modified Level II Back-filling plan will restore this headwater to the Everglades to its original shape

Consider these important reasons for restoring the Kissimmee:

(1) Restoration will insure future water quality to Lake Okeechobee.

(2) The wading bird population would increase six times its present number.

(3) A portion of the Atlantic Flyway wintering grounds would be increased from practically zero to 27,000 acre days.

(4) recreational fishing is expected to increase four fold.

(5) The Kissimmee River is the headwaters of the Everglades. During times of drought this river can help replenish the Everglades.

(6) This project would be the landmark wetland restoration project for the entire nation.

Sincerely,
M. A. Hale
621 Sarasota Drive
Osprey, FLA 34229

Evelyne S. Hale
9 Sandy Cove Rd.
Sarasota, Florida 34242

Nov 6, '91

Dear Miss Reed:

Please do restore the Kissimmee River to its original state. Let get the Everglades function in again.

Sincerely,

Evelyne Hale

October 7, 1991

U. S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Fl. 32232

Re: Restoration of Kissimmee River

35 The animals are getting back to normal from the changes made years ago. We live on a canal going into the river and have seen deer, turkeys, wild pigs, birds of all kinds, armidillos, ground hogs, fox panther, fish bob cats, snakes of course, ottors, alligators on the land, in the river and canals. Flocks and flocks of egrets roost in the trees along the river and canals.

If the river is restored it will take another 25 years to get nature back to normal again. Also the water must not be too stagnant and polluted or these creatures would not be here.

33 At the meeting October I, in Okeechobee, one man said there is no shadow on our properties. There is a big shadow on the properties in the buy-out area. We have two one acre lots side by side in River Acres. We have been trying to sell the empty lot to cut down on the mowing and maintenance. When an interested person calls and we have to tell them we are in the buy-out area, they usually hang up and do not call back. Would You want to put money in any kind of property knowing that eventually the Government is going to buy you out at "fair market value"?

Our river is beautiful now with fish and animals. Please leave it alone and save the monies for something much more important and urgent.

Sincerely,

Mr & Mrs Robert D. Hall

8605 NW 189th Ave.
Okeechobee, Fl. 34972
River Acres Estates

Nov 4, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn: CESAJ-PO-F
Jacksonville, Florida 32232-0019

Dear Mr. Reed:

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the World and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerly,
Steven Hall
Steven Hall

Dear Mr. Reed,

Please, please, restore the Kissimmee River. A project of this importance could be outstanding nationally as a wetlands restoration guide. Returning to natural systems is the only way to long-range improve the water quality of Lake Okeechobee. Florida desperately needs something to be proud of. Let it be the restoration of the Kissimmee River!!

Sincerely.

Margaret S. Hankin
November Seven '91

Hidden Acres Estates

864 CR 721, Lot 126
Lorida, FL 33857
October 9, 1991

U. S. Army Corps of Engineers
P. O. Box 4970
Jacksonville, FL 32232

Dear Chairperson:

This letter is in regard to the Kissimmee River Restoration Project. My main
59 concern is the figure you quoted for Hidden Acres Estates in your Feasibility Study 1991. I am enclosing a copy. The reason that I do not believe these figures are accurate is because the members of the committee presenting these figures were not aware that Hidden Acres Estates is a Corporation. Anything that affects one structure in the Park will affect over 137 structures plus 61 lots.

However, we, the shareholders of Hidden Acres Estates do not, under any conditions, want to relinquish our property. Not because of selfish or monetary reasons, but because money cannot replace the aesthetic qualities which exist here. We have wildlife in abundance and that is exactly why my husband and I purchased this property. At any given hour of the day we see turkeys strolling across the road, alligators sunning themselves on the banks of the river, foxes, snakes, frogs, turtles and occasionally a Florida Panther stalking his prey. At night raccoons knock on our door, armadillo bore through our property and turtles roam the area. Cardinals, bluejays, mockingbirds, pileate woodpeckers, crows, hawks and numerous other birds fly in and out of our trees. We do care about the ecological system and we, too, want it preserved for our children and grandchildren. We believe that the Kissimmee River is just now balancing out from the destruction caused when the ditch was dug. I do not believe that you can possibly glean enough knowledge about the water quality, wetlands, and ecosystem in this particular area from maps, books, and possibly aerial photos. I do hope that you will
35 extend me the courtesy of a reply either by sending a personal representative or at least a phone call or letter.

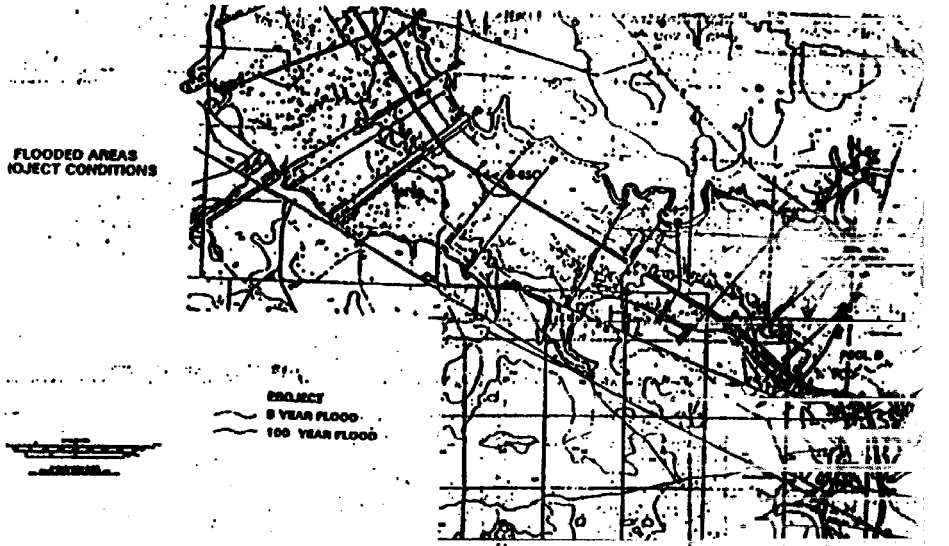
Please do not, in the name of progress, destroy this beautiful, peaceful, crime-free Park where wildlife is abundant and oak trees over 100 years old provide us with shade.

Yours truly,

Emma N. Hansen

Emma N. Hansen
Shareholder, Hidden Acres Estates
Phone: 813 357 0936

cc: Gov. Chiles, Pres. Bush, Sen. Dantzler, Rep. Bronson & Harris



Kissimmee River Restoration
U.S. Army Corps of Engineers
Feasibility Study
September 1991

Location	No. of Structures	Value of Structures and Land
Highlands County		
Riverwoods	14	$ 750,000
Kissimmee River Shores	17	1,032,000
Kissimmee River Fish Camp	28	1,328,000
Hidden Acres Estates	62	3,941,000
Miscellaneous Structures	59	1,793,000
TOTAL		8,844,000
Okeechobee County		
River Acres	91	$ 4,723,000
River Bluffs (S. Yates Marsh)	61	9,209,000
Miscellaneous Structures	6	168,000
W/City of Okeechobee, N. of S.R. 70	33	1,302,000
N. Yates Marsh	11	3,281,000
Other unidentified property		1,715,000
		$20,398,000

November 5, 1991

Russ Reed
Study Manager
U.S.Army Corps of Engineers
Attn: CESAJ-PD-F
Box 4970
Jacksonville, Florida 32232-0019

RE: Modified Level II Backfilling Plan to restore almost 30,000 acres of wetlands in Kissimmee River

Please support the above.

Thank you!

Very truly yours,

Elizabeth Barrett Hardner

Elizabeth Barrett Hardner
6540 North Ocean Boulevard
Apartment #108
Ocean Ridge, Florida 33435

1600 S. W. 120 Avenue
Pembroke Pines, FL 33025-3703

Kissisammee River Restoration
Mr. Russell V Reed
U S Army Corps of Engineers
Attn: CESAJ-PD-PF
P. O. Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Reed:

I am writing to support the efforts to restore the Kissimmee River. In particular I urge your support of the Level II Backfilling Plan. The Kissimmee River is important, not only to the health of Lake Okeechobee, but of the entire Everglades.

Remember, there are many of us throughout the State with serious concerns about the state of our environment. We look to people such as yourself to protect our interests.

Sincerely,

Irma Harris

Irma Harris

Nov. 2. 1991

U.S. Army Corps of Engineers
P.O.Box 4970
JACKSONVILLE, Fl. 32232-0019

Attn:RUSS REED

Dear Sir:

We understand that opponents of The Kissimmee have mounted a campaign against the Restoration Plan for the Kissimmee. These are people who have vested interests in keeping the land for their private use land that rightfully has been determined to belong to all of the people and the wildlife that is so dependent on the rewatering that will occur. We hope that you will take note that private landowners in Okeechobee County who have vowed to "do all that is in their power to fight for life, liberty, and the pursuit of happiness on THEIR own land" are maybe a bit short sighted. BECAUSE, in fact, this 29,000 acres of former wetlands and the reuniting of 49,000 acres of floodplain with the river will restore the river to only 70% of the original flood plain. This fight by private interests has been allowed to continue far to long and has caused the citizens of this country to pay for this land by least twice.

This plan was devised by the S. Fl. Water Management District and they have taken great pains over the years of planning to consider the rights of private interests. Many public hearings have been held and many citizens of the state have worked for years (decades) for the restoration of at least a part of this system on which the EVERGLADES is dependent.

It is anticipated that wading bird population will increase about six fold and there are three endangered species that will receive special benefit, bald eagle, snail kite, and the woodstork.

Recreational fishing is expected to increase four fold.

The cattle industry and sugar interests have come close to and indeed may have already destroyed the Glades. Let's proceed while we still have a chance to save a bit of what's left.

Please write to the Corps of Engineers P. O. Box 4970 Jacksonville , 32232-0019 asking that they go forward with the Modified Level II Backfilling Plan.

Sincerely, Mr. Alice C. Hart 11-9-91

ALERT! SEND BY NOV. 11

[illegible] Corps of Engineers and the South Florida Water Management District

The current proposal for the environmental restoration of the Kissimmee River would have a devastating effect on Okeechobee County.

41 The thousands of acres that would be flooded by this project as well as the loss of residential homes and farms would take millions of dollars off the tax rolls of Okeechobee County.

44 The proposed restoration project map also shows the site for a proposed $8 million co-generation power plant would lie within the five-year flood plain. The potential loss of this power plant would cost the county both in tax dollars and in hundreds of jobs.

The county is already at the 10 mil cap and unable to raise enough money to provide basic services to its residents. The loss of this property off the tax rolls would criple an already stressed economic system, still reeling from the loss of one-third of the area's dairies due to the dairy buy-out.

45 Another five dairies lie in the proposed five-year floodplain, but are not listed for purchase.

A proposal to spend $683 million for the river restoration, at a time when funding has been cut for education, health and human services and the courts, is quite simply obscene.

We strongly urge you to reconsider disapproval of this proposal.

Katrina [illegible]	Twila C. Valentine
Leonora [illegible]	Judy Davis
Joy H. Parrish	Margie Green
Keta Crowe	Pamela Phillips
Ann Nicoll	Robin Pfeiffer
Melvin Santos	Michelle L. Conklin
Glenda Carver	Tammy Jackson
Karmen Dorale	

46 I am one of the residences in the flood plain area (River Acres). I am against this proposal not just because I would Loose my beautiful property that I had planned to retire on but because I cannot see spending 683 million on a restoration project of the Kissimmee River which is experimental and has proved by tests that it WILL NOT improve the quality of the water in Lake Okeechobee.

Please spend our tax dollars in this time of recession on more needy projects.

Sincerely,

Rachel Hassinger

Rachel Hassinger
1370 NE Martin Ave.

Mr. [illegible], Study Manager
U.S. Army Corps of Engineers
[illegible] CESAS-PO-F
[illegible]

Dear Mr. [illegible]
[illegible] favor of the
restoration of the Kissimmee
River.
[illegible] only one Everglades
[illegible] the Kissimmee
[illegible] the restoration of
the Everglades. [illegible]
[illegible]

[illegible]

U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232

RE: "THE KISSIMMEE RESTORATION EXPERIMENT"

THE "KISSIMMEE RESTORATION EXPERIMENT" WILL BECOME ONE OF THE GREATEST MISTAKES IN AMERICAN HISTORY IF UNINFORMED PEOPLE ARE ALLOWED TO BLUNDER AHEAD AND REMOVE ONE OF THE GREATEST ENGINEERING FEATS EVER ACCOMPLISHED IN THE STATE OF FLORIDA.

THERE IS NO DOUBT THAT THE LOCKS HAVE MADE MORE WETLANDS THAN FLORIDA HAD PREVIOUSLY. WATER LEVELS ARE RAISED OVER A GREAT AREA AND ARE CONTAINED EVEN DURING HIGH FLOOD LEVELS. PEOPLE ARE SAFE FROM FLOODS.

JUST BECAUSE NATURE GIVES MAN SEVERAL YEARS OF DROUGHT DOES NOT MEAN IT WILL CONTINUE. THIS YEAR WETLANDS ARE RETURNING AT A TREMENDOUS RATE.

THE BENEFITS THAT FARMERS AND OTHERS RECEIVE FROM THIS SUPPLY OF WATER THROUGH THE CANALS, LOCKS, AND CONNECTIONS ARE INNUMERABLE.

LET US NOT MAKE A GREAT HISTORICAL FAILURE AND REMOVE A GREAT ASSET WHICH WAS WELL-PLANNED AND HAS MADE FLORIDA A BETTER PLACE FOR WILDLIFE AND PEOPLE.

VOTE "NO" ON THE "KISSIMMEE RESTORATION EXPERIMENT".

SINCERELY YOURS,

Mr. + Mrs. Brett Hawkins

Dear Mr Reed,

The Kissimmee River has been straighten and shorten, years ago. Water has flowed fast and straight, taking pollutants southward to the everglade. By restoring the Kissimmee River the water will flow slowly and let the pollutants filtered out.

I urge you to Restore the Kissimmee.

Thomas D Hay

14425 NW 248th St.
Okeechobee, FL 34972

November 9, 1991

Mr. Russ Reed
Study Manager
U.S. Corps of Engineers
ATTN:CESAJ-PD-F
Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Reed:

I correspond in support of restoring the wetland values and ecological integrity of the Kissimmee River. It is of vital importance to the hydrology and water quality of the entire watershed.

I believe if people have moved into areas which were traditionally floodplain wetlands they should be compensated fairly for losses they incur. Society should carry these costs, not the individuals effected.

It is unfortunate that the feverish self interest which fuels the opposition to the river restoration is not applied to the more subtle, more complex, yet no less desperate reality which faces us - a people, one nation - that can no better survive in a world degraded by our own ignorance, than the organisms we replace trying.

or

A good parasite doesn't kill its host.

Sincerely,

Scott Hedges

Scott Hedges

Sunmarc 5, 1991

(Mr Russ Reed Study Manager
U. S. Army Corps of Engineers)
Box 4970 Attn. CESAJ-PO-F
Jacksonville, Florida 33232-0019

Dear Mr Reed.

I am in favor of the restoration of the Kissimmee River.

The water quality of Lake Okeechobee desperately needs to be improved. A return to our natural systems is the only way to do this for the long term.

Sincerely,
Dorothy M Hedley
Winter Haven, Florida
Polk County

11/8/91

3835 Malei Circle
Sarasota FL 34233

Mr Russ Reed
Study Manager
U.S. Army Corps of Engineers
Attn CESAJ-PO-F
Box 4970
Jacksonville FL 32232-0019

Dear Mr. Reed,

I urge you to restore the Kissimmee River because it will insure the future water quality of Lake Okeechobee and the Everglades. This will be the premiere water project in the nation and is absolutely necessary for the future of the Everglades

Sincerely
Mary Hemingen

5129 Oak Hill Drive
Winter Park, Fl 32792
November 6, 1991

Dr. Ross Reed, Study Manager
U.S. Army Corps of Engineers
Attention: CESAJ PD F
P.O. BOX 9970
Jacksonville, Fl 32232 0019

Dear Dr. Reed,

We are writing to you to support the restoration of the Kissimmee River to it's fullest possible extent. We are aware that several groups of homeowners, ranches and farmers are opposed to this restoration project. While we understand their concerns, there needs to be a radical reexamination of the toll of human intervention upon the ecology of our planet in general and the state of Florida in particular. We cannot continue to use up or pollute our resources and not expect grave consequences.

When the Kissimmee River was straightened and the surrounding areas were dammed and/or drained, the impacts were far reaching and disastrous. The Everglades have been in decline because the Kissimmee River is the headwaters of the Everglades. Lake Okeechobee, the third largest freshwater lake wholly within the United States, is in serious decline. Unless this restoration project is implemented, the quality of the water of Lake Okeechobee, the Everglades and the State of Florida will decline irreparably.

If the State of Florida fulfills the plans for the restoration of the Kissimmee River, we will achieve the recognition of the EPA, the environmental community and the Nation. On Wednesday, William Riley, the head of the Environmental Protection Agency, announced that the Federal Government would set the standards and limits for water quality for the states that do not meet the criteria for pollutants. So far, Florida is not expected to meet the February 19th deadline. We can show the EPA that Florida is serious about their water quality. This restoration project would be a model for the rest of the country.

In addition, imagine the image of a state that is committed to the repopulation of their endangered and migratory bird populations. Every year, the national news programs are filled with the stories that display the annual return of the swallows annually to San Juan Capistrano or the migration of the snow geese and the blue geese throughout the midwest. The bald eagle, the wood stork and the snail kite are three of the endangered species that would see at least a 70% increase in population if this River were to be restored toward it's original condition. That would be a wonderful triumph for the United States Army Corp of Engineers.

Reestablishment of the Kissimmee River would vastly improve the nature of Florida's environment. If the Corp of Engineers see to it's logical conclusion, it will contribute to the citizens' perception that the Corp has the ability to restore the original splendor of Nature's intention. You will have the support of several of the legislators, such as Senator Bob Graham. In addition, you can count on the patronage of the environmental community. Feel free to contact us if we can help.

Please resist the pressure from those who oppose this paramount program! It is absolutely necessary and completely worthwhile for the future of the Fine State of Florida!

Thank you for your attention.

Most Sincerely,

Cecilia Height
Leslie Height

November 8, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Attn: CE JAJ - PD - F
Box 4970
Jacksonville, FL 32232-0019

3835 Malec Circle
Sarasota, FL 34233

Dear Mr. Reed,

The Kissimmee needs to be restored. If we do not restore it the Everglades will be imperiled along with the wildlife that lives there. It is also necessary to save Lake Okeechobee.

Thank you.

Sincerely,

Dr. Eric Hohnwald

Dr. Eric Hohnwald

Dear Mr. Reed,

I urge you to go forward with the U.S. Army Corps of Engineers' plan to restore the Kissimmee River. Restoring the Kissimmee River would not only insure the water quality of Lake Okeechobee, it would restore wildlife, fisheries, habitat, and provide recreation in the area for generations to come. The Kissimmee River is also the headwaters of the Everglades, and without its restoration, the consequences to the Everglades could be devastating. The Kissimmee River must be restored.

Sincerely,

Susan [illegible]
[illegible] Hawthorne Rd.
Winter Haven, FL 33884

November 4, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn. CESAJ-PO-F
Jacksonville, Florida 32232-0019

Dear Mr. Reed:

I am in favor of the restoration of the Kissammee River.

This project would be the premier wetlands restoration project in the nation, and for a change I would like to be proud of something the State of Florida is involved in.

Sincerely,

THEODORE J. HOLZHAUSEN
DENISON JUNIOR H.S.

THE EARTH DOES NOT BELONG TO MAN, MAN BELONGS TO THE EARTH.

8-99

B. L. Hovecker
1621 Sand Castle Rd., Sanibel Island, Fl. 33957

November 6, 1991

Corps of Engineers
P.O. Box 4970
Jacksonville, Fl 32232-0019

Dear Sirs:

For the eventual restoration of what is left of the Everglades it is absolutely essential that proceed with the Restoration Plan for the Kissammee. This letter is to urge you to proceed with the Multipid Level II Backfilling Plan.

Please do not allow the cattle and sugar interest to complete the destruction of one of Florida's greatest natural resources.

Sincerely
Bernard L. Hovecker, M.D.

Nov 6 1991

Dear Sir:

As you may well know the future of the state of Florida is at stake and restoration of the Kissimee River is a very important to the quality of water and the life of wildlife in the everglades and the surrounding environment.

I urge you to restore the Kissimee to the "Modified Level II Backfilling Plan".

Thank you —

Joseph A Horvath
1026 So 6 St
Lake Worth, FL 33460

U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232

RE: "THE KISSIMMEE RESTORATION EXPERIMENT"

THE "KISSIMMEE RESTORATION EXPERIMENT" WILL BECOME ONE OF THE GREATEST MISTAKES IN AMERICAN HISTORY IF UNINFORMED PEOPLE ARE ALLOWED TO BLUNDER AHEAD AND REMOVE ONE OF THE GREATEST ENGINEERING FEATS EVER ACCOMPLISHED IN THE STATE OF FLORIDA.

THERE IS NO DOUBT THAT THE LOCKS HAVE MADE MORE WETLANDS THAN FLORIDA HAD PREVIOUSLY. WATER LEVELS ARE RAISED OVER A GREAT AREA AND ARE CONTAINED EVEN DURING HIGH FLOOD LEVELS. PEOPLE ARE SAFE FROM FLOODS.

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THE BENEFITS THAT FARMERS AND OTHERS RECEIVE FROM THIS SUPPLY OF WATER THROUGH THE CANALS, LOCKS, AND CONNECTIONS ARE INNUMERABLE.

LET US NOT MAKE A GREAT HISTORICAL FAILURE AND REMOVE A GREAT ASSET WHICH WAS WELL-PLANNED AND HAS MADE FLORIDA A BETTER PLACE FOR WILDLIFE AND PEOPLE.

VOTE "NO" ON THE "KISSIMMEE RESTORATION EXPERIMENT".

SINCERELY YOURS,

Bob & Joanne Houghton

U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232

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VOTE "NO" ON THE "KISSIMMEE RESTORATION EXPERIMENT".

SINCERELY YOURS,

Calvin + Ruth Houghton

U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232

RE: "THE KISSIMMEE RESTORATION EXPERIMENT"

THE "KISSIMMEE RESTORATION EXPERIMENT" WILL BECOME ONE OF THE GREATEST MISTAKES IN AMERICAN HISTORY IF UNINFORMED PEOPLE ARE ALLOWED TO BLUNDER AHEAD AND REMOVE ONE OF THE GREATEST ENGINEERING FEATS EVER ACCOMPLISHED IN THE STATE OF FLORIDA.

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VOTE "NO" ON THE "KISSIMMEE RESTORATION EXPERIMENT".

SINCERELY YOURS,

David + Vicki Houghton

U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232

RE: "THE KISSIMMEE RESTORATION EXPERIMENT"

THE "KISSIMMEE RESTORATION EXPERIMENT" WILL BECOME ONE OF THE GREATEST MISTAKES IN AMERICAN HISTORY IF UNINFORMED PEOPLE ARE ALLOWED TO BLUNDER AHEAD AND REMOVE ONE OF THE GREATEST ENGINEERING FEATS EVER ACCOMPLISHED IN THE STATE OF FLORIDA.

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VOTE "NO" ON THE "KISSIMMEE RESTORATION EXPERIMENT".

SINCERELY YOURS,

Ray C Houghton

U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232

RE: "THE KISSIMMEE RESTORATION EXPERIMENT"

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VOTE "NO" ON THE "KISSIMMEE RESTORATION EXPERIMENT".

SINCERELY YOURS,

Ray + Wanda Houghton

U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Fl. 32232

Mr. & Mrs. Robert C. Houghton Sr.
19010 N.W. 80th Drive
Okeechobee, Fl. 34972

Re: "Restoration of Kissimmee River Experiment"

Dear Sirs:

It will become one of the greatest mistakes in American History if uninformed people are allowed to blunder ahead and remove one of the greatest engineering feats ever accomplished in the state of Florida.

There is no doubt that the locks have made more wetlands than Florida had previously. Water levels are raised over a great area and contained for desiring high flood levels.

Just because nature gives more several years of drought does not mean it will continue. This year wetlands are returning at a tremendous rate.

The benefits that farmers and others receive from this supply of water through the canals, locks and connections are innumerable.

Let's not make a great historical failure and remove a great asset which was well planned and has made Florida a better place for wildlife and people.

Sincerely yours,

Robert and Dorothy Houghton

November 6, 1991

Mr. Russ Reed
Study Manager
U.S. Army Corps of Engineers
Attn: CESAJ - PDF
Box 4970
Jacksonville, FL 32232-0019

RE: Kissimmee River Restoration

Dear Mr. Reed:

Please keep on with the Kissimmee River Restoration Project. We need this river returned to its original state. All of us here in our local group in South Florida know the importance of the river to the health of the Everglades and the whole ecological system of South Florida. It is vital for us and all future generations that this river be returned to its original pathways as much as possible.

We all urge you to finish the project disregard all special interest groups that are short-sighted and seem to place their personal gain above the good of all the people.

Thank you for your consideration.

Sincerely,

Patricia Lumley

Patricia Lumley
3231 SW 39 Ave
Hollywood, FL 33023

Jeret Madei
411 1/2 E. College, Apt. 2
Tallahassee, Florida 32301

November 7, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
ATTN: CESAJ-PD-F
Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Reed:

I am writing to express my support for the Level II Backfilling Plan for the restoration of the Kissimmee River. Restoration of the Kissimmee River is critical in order to safeguard the water quality in Lake Okeechobee and the Everglades. Water quality is the lifeblood for all the threatened wildlife in the region.

Please support the Level II Backfilling Plan and restore the Kissimmee River.

Sincerely,

Jeret Madei

Jeret Madei

October 19, 1991

US ARMY CORPS OF ENGINEERS
P O BOX 4970
JACKSONVILLE FL 32232

We own a week-end retreat in River Acres, Okeechobee County, on the Kissimmee River (Canal C-38), directly in front of an old cut of the river. We purchased the property; looking forward to retirement in approximately fifteen years; to building a home in a unique water front community, that offers the quiet of country living, approximately 100 nieghbors, an air-strip, one acre lots, swimming, water skiing, fantastic fishing, plus charming senic boat trips. We considered the property an excellent investment.

The water in the old cuts of the river, and in Canal C-38 is not polluted. Canal C-38 was built to control flood waters and it provides a reservoir for drought. It is doing exactly what it was built to do and was paid for by tax payers dollars. The Canal and old River cuts are not dead, and are not contributing to the pollution of Lake Okeechobee.

To restore the river you will accomplish the following:

A. Uproot approximately 500 families in Okeechobee and Highlands Counties.

45 B. Put five large dairies out of business or force them to move, which will increase unemployment in rural Okeechobee and Highlands Counties.

41 C. Remove from tax rolls property valuing $8,244,000 from Highlands County and $20,298,000 from Okeechobee County.

35 D. Destroy the ecological system that has developed since the Canal was dug in 1963-64, to replace it with an (unknown) ecological system for wading birds.

E. Create another ecological problem somewhere else digging dirt to fill the Canal.

F. Spend $683,000,000 of tax money that does not need to be spent.

We oppose the Kissimmee River restoration. We urge you to consider that nativies in this area opposed the Canal when it was built and predicted what would happen. Now, these same people, living in the area, oppose restoration as planned. It will never put the River back like it was, and will create new problems. The planned restoration is not needed nor wanted by local governments. The restoration will cost tax dollars to repair a system that is working.

Please vote no to this project.

Sincerely,

Thos. J. Lyons
William J. Lyons

Mr. & Mrs. William Lyons
969 Thelma Avenue
Orange City, Fl. 32763

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970
Jacksonville, Fl. 33232-0019
Attn: CESAJ DD I

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River. There is only one Everglades in the World and the Kissimmee River is the head waters of the Everglades. We must restore and protect the entire system.

Sincerely,

Danielle Mandarino

Dear Sir -

In regards to the restoration of the Kissimmee river, we are direly concerned. We have chosen Hidden Acres, Estates for our retirement years - first because of the beauty, the lovely class of people and the clean fresh air - we have invested $5,000 in a R.V. and permanent porch, we could do so only because the maintance is so reasonable. We & about 125 others will be completely as a loss if this happens. We beg of you to give your deepest consideration to this matter.

Thank you for listening.

Yours truly.

Mr. & Mrs. Earl Maxson

Russ Reed, Study Manager
Army Corps of Engineers
Box 4970 Attn: CESAJ-PO-F
Jacksonville, FL 32232-0019

Dale McCray
P.O. Box 114
Eagle Lake, FL 33839

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee river is the headwaters of the Everglades. We must restore and prbtect the entire system.

Sincerly,

Dale A. McCray

Russ Reed, Study Manager
Army Corps of Engineers
Box 4970 Attn: CESAJ-PO-F
Jacksonville, FL 32232-0019

Jan McCray
P.O. Box 114
Eagle Lake, FL 33839

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee river is the headwaters of the Everglades. We must restore and protect the entire system.

Sincerly,

Jan Marie McCray

Nov. 4, 1991
252 Rose Rojo
Winter Haven
FL. 33884

Russ Read - Study Manager
U.S. Army Corps Engineers

Dear Sir:

I am in favor of the restoration of the Kissimmee River!

There is only one Everglades in the world — and we have it. The Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system.

For once — let us seize new potential for good — let us forget individual benefits and do what is right.

Sincerely
Rose B. McKibben

Dear Sir:

We understand that opponents of The Kissimmee have mounted a campaign against The restoration Plan for The Kissimmee. These are people who have vested interests in keeping the land for their private use land that rightfully has been determined to belong to all of the people and the wildlife that is so dependent on the rewatering that will occur. We hope that you will take note that private landowners in Okeechobee County who have vowed to "do all that is in their power to fight for life, liberty, and the pursuit of happiness on their own land" are maybe a bit short sighted. Becuase, in fact, this 29,000 acres of former wetlands and the reuniting of 49,000 acres of floodplain with the river will restore the river to only 70% of the original flood plain. This fight by private interests has been allowed to continue far to long and has caused the citizens of this country to pay for this land by least twice.

This plan was devised by The South Florida Water Management District and they have taken great pains over the years of planning to consider the rights of private interests. Many public hearings have been held and many citizens fo the atate have worked for years (decades) for the restoration

of at least a part of this system on which the Everglades is dependent.

It is anticipated that wading bird population will increase about six fold and there are three endangered species that will receive special benefit, bald eagle, snail kite, and the woodstork. Recreational fishing is expected to increase four fold.

The cattle industry and sugar interests have come close to and indeed may have already destroyed the Glades. Let's proceed while we still have a chance to save a bit of what's left. What I'm asking you to do is to go ahead with The Modified Level II Backfilling Plan.

Yours Truly,
Charlie Mccullough
P.O. Box 1641
Ft. Myers, FL 33902

Charlie McCullough
[illegible]

[illegible] 4, 1991

Mr. [illegible] Study Manager
[illegible] Army Corps of Engineers
Box [illegible] Attn: CESAJ-PO-[illegible]
Jacksonville, Florida 32202-0019

Dear Mr. [illegible]:

I am in favor of the restoration of the [illegible] River.

There is only one Everglades in the [illegible] and the [illegible] is the [illegible] of the Everglades. We [illegible] and [illegible] the [illegible]

[illegible]

Hidden Acres Estates Oct. 8th 1991

To who it may concern—
when we retired we looked for a nice place to live in the country, and a place where we could fish an enjoy ourselfs. there is a store - clubhouse - swimming pool - arts & crafts and a lane to walk or jog.
you can go up the river through several lakes over one Hundred miles and to the Ocean the other way. we dont want the river to come a swamp land or race track for Air boats, if they fill it in like they say, they will have to use 1000's more gallon's spray to keep the weeds down which is all ready sprayed to much.
Sincerely, "Leave the River alone."

Cleo E. Mikel
964 CR-721 Lot-50
Florida, Fla. 33857

Hidden Acres Estates Oct. 8th, 1991
"To Old To Move Again"

to whom it may concern

when we retired we came to Florida and looked for a quite place not to far from town and close to fishing. Hidden Acres Estates was on the Kissimmee River, the ideal place. country store - Clubhouse - swimming pool - picnic area Large shade trees all over the camp. Owls - Ospreys - turkeys - deer - fox - deer - rabbits - excellent fishing, a long lane to walk or jog. we can go over 100 miles up the river through lakes or down the river to the Atlantic Ocean or the other way to Gulf of Mexico. The river was put here for people to look at and fish, not for the Water Management to be redoing every time they want to. we ask what would be the results if they redone it, they said it was a gamble. we dont want a swamp for Mosquitos or a racetrack for Air Boats. so please leave the river alone.

Sincerely
Cleo E. Mikel

Cleo E. & Verna Mikel
964 CR-721 Lot-50
Lorida, Fla. 33857
Ph-1-813-467-5732

October 15, 1991

To Whom it May Concern:

My husband and I first came to Fort Bassinger in 1983. Friends had told us about a place they had found on the Kissimmee River that was very special place. It was Hidden Acres.

At the time, we had a motorhome and had traveled the state in search of fun. One weekend, we decided to go see what our friends were so excited about. We found out as soon as we arrived. To reach Hidden Acres, we drove through a cow pasture (no fences) and into an oak hammock on the river. I didn't think a place could exist in this flat dry country that we drove past for miles. It did, Hidden Acres.

Our friends took us for a ride on the river on their pontoon boat, and we "were sold". Come Sunday we had a "For Sale" sign on our motor home and were in search of a trailer to leave at Hidden Acres because our traveling was over. We had found what we were searching for.

In 1986 we were able to move my parents to Hidden Acres. They are 83 and 85 years old. After we had them settled, we gave up our jobs and moved here in October of that year. I would dread the thought of leaving here. My parents expects to spend their remaining years here.

We come from Pompano Beach and Boca Raton. You can imagine which place you would choose, cars and sirens or crickets and owls. Another thing, out here you can see the stars. In town you can hardly see darkness.

My husband still spends some time at work as he is semi-retired. I spend my days on the river. I love it. Even if the fish aren't biting, the scenery is beautiful. Every day you see something new and amazing. I have seen one panther, numerous Bobcats, wild hogs, and deer. Small animals are in abundance. There are birds of all species, including turkeys.

If it were possible, I would like all the persons involved in making the final decision to relocate us, to come to see what we all gave here. We are close friend. I believe they would, as we all know to be true, find this to be a "little bit of paradise " Hidden Acres is just that.

Please leave us alone to enjoy the golden years. Most residents are Senior Citizens and the relocation process would be tragic.

Respectfully,
Jack & Debra Miner

Dear Mr Reed, Nov. 7, 1991

I am in favor of the restoration of the Kissimmee River.

There is only one Everglade. In the world. The Kissimmee River is the headwaters of the Everglades. We must restore & protect the entire system.

Sincerely,

Gloria Moore

Dear Mr. Reed: November 7, 1991

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades we must restore and protect the entire system!

Sincerely,

Gloria Moore

Dear Mr. Reed: November 7, 1991

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world, and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely,

Karen A. Moore

Dear Mr. Reed, Nov. 4, 1991

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore & protect the entire system!

Sincerely,

Karen Moore

Dear Mr. Reed: November 7, 1991

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world, and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely,
Martin Moore

May 4, 1991

Mr. Russ Reed, Study Manager
US Army Corp. of Engineers
Box 4970 ATTN: CESAJ-PD-F
Jacksonville, Florida 32232-0019

Dear Mr. Reed
I am in favor of the restoration of the Kissimmee River.
There is Only One Everglades in the world and the Kissimmee River is the headwaters of the Everglades We must Restore and protect the entire System!!

Sincerely,
Pamela Moore
Pamela Moore

November 8, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Attn: CESAJ-PD-F
Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Reed -

I am writing to you in support of the restoration of the Kissimmee River, in particular, the Level II Backfilling Plan. I believe this to be an important wetlands restoration project that will have positive affects on the Kissimmee River, Lake Okeechobee, and the Everglades. Concerned that river restoration opponents are becoming more vocal, I want to encourage you to continue with the Kissimmee River's Level II Backfilling Plan as the best option for restoring the Kissimmee River.

Sincerely,

Sally Morrison

Sally Morrison
Rt. 3, Box 13
Newberry, FL 32669

Mr Russell V. Reed
US Army Corps of Engineers
Attn: CESAJ-PD-PF
PO Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Reed:

As a resident of Broward, member of the Sierra Club and nature oriented person my whole life, I'm writing to express my support for the RESTORATION OF THE KISSIMMEE RIVER AS ESSENTIAL TO SAVE LAKE OCHEECHOBEE and IMPLEMENT THE LEVEL II BACKFILLING PLAN.

I also intend to express my support of these concepts to the appropriate legislators.

Thanks for your consideration and support!

Sincerely yours, [illegible]

P.S. What's status of project?

November 6, 1991

Mr. Reed:

I am a concerned student who is for the Kissimmee River being restored to its original course. I believe it is of the utmost environmental importance that this be done. The Kissimmee River, being on of the most important water sources for the Florida Everglades, needs to be as natural as possible. The river's importance to the Everglades cannot be stressed enough. There is one Everglades, a unique habitat in which dozens of species depend on for survival. The river, if not returned to its original course, will course irreparable damage to the Everglades environment. Many species will become extinct. Please carry out this project with the utmost possible speed.

Sincerely,

Kevin Murphy

11-6-91

Mr Russ Reed, Study Mgr.
U.S. Army Corps of Engineers
Box 4970
Jacksonville, Fla. 32232-0019

Dear Mr Reed.

The Kissimmee River is where the Everglades begins and restoration of the natural run for the river is very important to the water system in Florida

Sincerely,
Virginia Myers
411 Avenue NE
Winter Haven, Fla
33881

Hidden Acres Estates
on the Kissimmee River
Ft. Basinger, Florida

To Whom it May Concern

Living in south central Florida in our retirement years has been something we have worked long and hard to achieve. My bride and I sold two homes in central Indiana to make this move. After looking around we found this place, on the river in a live oak grove, with Indian mounds, all kinds of native wild life, good fishing, no highway noises, lots of shade, good neighbors and real peace and quiet. Truly a garden of Eden!

We thought this was most to human and planned to live out our life right here in these huge and beautiful live oaks. We have a fine trailer with Florida room and open deck, storage shed, pontoon boat and great landscaping with flowers year around.

We were told last week that some of us will have to sell out and move! That great wrecker of the Florida landscape, the Army Corps of Engineers has decided to change the route of the Kissimmee again! The wild life, fishing and general ecology have pretty much recovered from the mess first resulting completed twenty years ago.

The Corps must think it's time to destroy it again. It can't be because there is 600 million extra dollars lying around! This entire affair is not only shameful it is a downright disgrace!

The "powerful" Corps of Engineers have time and again proven how inept they are right here in Florida. How much land, wild life and "ecology" did they destroy in the "Cross Florida Barge Canal" project? Thank God that was stopped when it was! The "Corps" should look up the word "ecology". They don't know the meaning of the word.

However they do recognize when they are running out of projects to justify their existence. As long as they can use tax dollars to accomplish their so called "engineering" they don't care. By Damn, we don't. How much of this juvenile thinking do we have to bear?

I for one resent this outrage! I came here to retire. I found my heaven here on earth. I fought for this in W.W.II. I have earned the right to be left alone, to sit back and enjoy what is left of my life!

So Col. Rock Salt (if that is your real name) leave us alone! Don't destroy the river again, because come judgement day, you sir, will have a lot of explaining to do.

Sincerely,
Carl F. Wiebel
Registered Voter & Taxpayer
U.S. Submarine Veteran of W.W.II
& retired U.S. Citizen

David J. Nelson, M.D.
2604 Winding Way
Palm Harbor, FL 34683

November 4, 1991

Mr. Russ Reed
Study Manager
U.S. Corps of Engineers
ATTN: CESAJ-PD-F
Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Reed,

It appears the revisions of ideas what constitutes wet-lands are a big step against nature habitats.

The Everglades should be restored and not allowed to further deteriorate.

Please count me as a strong supporter of restoring the Kissimee River to its original course so as to bring back adjacent wet-lands and give the Everglades the help it desparately needs. Thank You!

Sincerely,

David J. Nelson, M.D.

David J. Nelson, M.D.

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
P.O. Box 4970 ATTN CESAJ-PD-F
Jacksonville, Florida 32232-0019

Dear Mr. Reed

I'm in favor of the restoration of the Kissimee River. This is only one Everglades in the world and the Kissimee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely,

Erin Nilsson

W. Palm Beach, Fla. 33411
11/1/91

U.S. Army Corps of Engineers
Box 4970 - Jacksonville, Fla. 32232
ATTN: CESAJ-PD-F Mr. Russ Reed

Dear Mr. Reed:

I wish to express my endorsement of the modified Level II Backfilling Plan for the Kissimmee River.

As a fisherman of Lake Okeechobee for 23 years and informed activist, I am convinced that significant water quality improvements to the Lake can be achieved with this restoration. Significant enough to save the Lake, which is in desperate shape from nutrient inputs.

However the restoration of the enormous fish, wildlife, and recreational values lost because of channelization are sufficient reason alone to restore the river.

In so doing the Corps will regain something it has lost: the respect and credibility of the people of Florida and the nation. Let's get on with it. The ability to admit and correct one's mistakes is the hallmark of maturity and honesty in an agency as well as an individual.

Sincerely yours,
Wayne L. Nelson

November 6, 1991
U.S. Army Corp. of Engineers
Mr. Russ Reed Study Mgr.
Attn. CESAJ-PD-F Box 4970
Jacksonville, Fl. 32232-0019

Dear Mr. Reed

My name is William Nunn, I am writing to you concerning the Kissimee River reclamation project. I understand that there is a lot of pressure being directed at the Corp. from the ranchers and dairy farmers along the Kissimee River. They do not like the fact that the free land that they aquired when the river was straightened, will be lost to them if this project goes forward. And I understand how they feel. No one likes to lose something that they feel is theirs. But I feel that the people of Florida will lose a great deal more if this project is stopped.

I would like to thank you for your time, and here is something you can tell the ranchers and dairymen the next time you have to defend this project. Tell them they are lucky that the State of Florida is not charging them rent on this land. Oh and by the way I am a native Floridian.

Sincerely,

William T. Nunn

Col Salt (sp?) new District Eng., Jax District
Neither the local
Record, SFWMD,
US Soil Cons. Service
had your address or name
I apologize for the
guesswork of the
spelling of your name.
M. Northrup

MARTIN R. NORTHRUP
P.O. BOX 420815
KISSIMMEE, FL 34742-0815

October 8, 1991

The Hon. Nancy Dorn
Assistant Secretary of the Army
Civil Works
Dept. of the Army
The Pentagon
Washington, D.C. 20301

Re: Kissimmee River (Fla.) River Restoration Project: (How to turn a ditch back into a natural meandered river).

Dear Ms. Dorn:

On Oct. 2 of this year, I attended one of many public hearings on a very complicated state/federal river restoration project. This project is historic because it is an attempt to correct an error made in the past by filling in a monsterous ditch so that the original meanders of the Kissimmee River might be utilized once again.

Local politicians are generally silent about the restoration project because they don't want to be publicly connected with land holdings in the river floodplain areas. However, there is a definite connection between State Rep. Irlo Bronson and land holdings in the Kissimmee River floodplain and his associate and former Osceola County Property Appraiser Dan Lackey has opposed the restoration project at previous public hearings. One of the most vocal supporters of the "C-38 ditch left as it is now," is Bill Morris who worked for a Florida water management agency and contacted land owners before the canal was built to talk them into endorsing the original canal project. Mr. Morris spoke at the Oct. 2nd hearing, but he did not have a prepared statement. State Senator Quillian Yancy appointed Mr. Morris his "environmental advisor" and obviously, Mr. Morris lobbied Sen. Yancy to oppose the restoration project. However, the Fla. Legislature voted to support the restoration project because Floridians in general, are realizing problems in many areas caused by excessive dredging of natural areas.

At the Oct. 2nd hearing I suggested that the Corps of Engineers, and you, are stonewalling the restoration project, probably because some wealthy landowners, and land-owning politicians have been lobbying the Corps and you, to stop the restoration. I am all for protection of property rights, but lately, foreign investors have moved into the Central and Southern Florida area, including Japanese, Tiawanese, and Arabs, which suggests that future land developments in Florida may not have the best interests of the State of Florida, and the U.S.A. at heart. I opposed a land development project on the Lake Hatchineha floodplain years ago and we traced the land owner to Phillipine gold mining interests! A friend of mine and highly regarded naturalist was paid by the developer to argue that a berm along the waterfront was natural and not manmade because 100-year-old oak trees grew on the berm (determined by a boring of a tree). Years later I discovered evidence of dredging in the lake and Kissimmee River system over 100 years ago. A resident of that development spoke at the Oct 2nd hearing and expressed concern over water levels.

I once promoted a compromise restoration project so that we might have a natural river and a flood control ditch at the same time, utilizing one or the other as the need arose. Huge land developments in the "headwaters" of the Kissimmee River system have been built on former (?) floodplains. The City of Kissimmee is susceptable to flooding, but has not had a serious flood since 1957. Yet, even with the massive C-38 canal which drains this whole Central Florida area, flooding occurs in Kissimmee and surrounding areas. There are proposals for stormwater control which are delayed.

The proposed state/federal backfilling project will allow floodwaters to spill out of the river meanders onto the historic floodplains of the Kissimmee River. I used to worry that such a "sheetflow" will create flood problems in Central Florida. But then I got to thinking that the restrictions, and friction, of the C-38 Canal actually limits water flow to a narrow "pipeline" where a cubic foot of water has to move in a "vertical block." It occurs to me that if that cubic foot of water was flowing on a flat floodpain, you get less resistance, some filtration downward in the sand, and tremendous evaporation. Plus the water is purified as it flows through grassy areas. Locks in the canal also restrict floodwater flow even if they are left wide open. It occurs to me that the major benefit of the C-38 Canal is to cattle ranchers who are able to graze their cattle on the Kissimmee River floodplain year-round, instead of just during the winter dry months. And there is a big question regarding their ownership of those floodplains.

I am requesting that you support the restoration project at the traditional 75/25 ratio level. Congress will appropriate the necessary monies, if ever. Attached is an article entitled "U.S. may dam cash flow for river." Your statement was a major blow to the restoration project, and probably set back completion of the project 20 years or more.

As I mentioned in my statement Oct. 2nd, we should not be worrying about the present floodplain "landowners" lining their pockets now. We should be worrying about the future of Florida 50 to 100 years in the future. Continued growth in Florida, apparently unstoppable, will create tremendous water control and pollution pressures all along the Kissimmee River System, especially in the headwaters area. The money for such an important restoration project amounts to one bomber. I'm sure that if the Lockheed Corp. was promoting the project and involved in "reconstruction" we'd have no problems.

We need your support. Thank you.

Respectfully,

Martin R. Northrup

MRN/s
Enclosures
copies c/o Gov. Sununu, members of Congress, Dist. Office Corps., S.F.W.M.D., others
Col. Salt (sp?) new District Eng., Jax District

flow for river

☐ Calling the plan too big and costly, the corps wants to pay for one-third of the Kissimmee River restoration rather than the usual 75 percent.

By Rene Stutzman
OF THE SENTINEL STAFF 10/1/91

KISSIMMEE — Dirt has begun to fly — not on the actual restoration of the Kissimmee River, but on the question of who will pay for the mammoth $422 million public works project.

Florida has been counting on the federal government to pay 75 percent of the cost of returning the river to its natural channel. But the top officer at the U.S. Army Corps of Engineers said Monday that the corps is willing to pay less than half of that.

"I don't think we can lose sight of the fact that we're talking about a half-billion dollars here," said Nancy Dorn, assistant secretary of the Army for civil works.

At 75 percent, the federal government would be forking over $316.5 million.

Dorn last week proposed that it pay for about one-third of the project, or about $137 million.

She said the river restoration, which was designed by the South Florida Water Management District, is simply too big and too expensive for the federal government to pay more.

The federal government already has spent $17.3 million on engineering, design work and land acquisition for the project, which is designed to push the river back into its old banks and restore 45,000 acres of wetlands.

They were lost in the 1960s when the corps diverted the river into a 56-mile-long channel to control flooding.

Dorn said the corps is eager to become involved in the water district's restoration plans but cannot afford to pay 75 percent of such a big project.

"I think if the corps had been approaching the Kissimmee River situation in a traditional way, we would have probably come up with a ... restoration project probably a quarter or a tenth of the size of the project that's envisioned now," she said.

However, Rep. Jim Bacchus, R-Fla., said Dorn will not have the final say.

"She doesn't have a vote in Congress," he said.

Congress is expected to consider funding for the project next year.

Officials in Tallahassee said Monday that a cut in federal money would hurt but not kill the project.

"It could delay some of the restoration work. It certainly would not put a halt to it," said Kathy Putnam, the governor's deputy press secretary.

"The state is not happy with the offer ... We want the traditional 75-25" cost-sharing split, she said.

Patricia Scudley, the project manager with the water district, said the state is not willing to scale back the restoration.

She said state officials will continue working with the corps to try to boost its funding recommendation.

Public invited for discussion of river restoration

10/1/91

KISSIMMEE — The state and federal agencies wanting to spend $422 million to put the kinks back into the Kissimmee River will hold a public meeting tonight at Kissimmee City Hall.

Officials with the U.S. Army Corps of Engineers and the South Florida Water Management District will listen to public comment at the 7 p.m. meeting.

Patricia Scudley, the water district official in charge of the restoration project, said she expects the discussion to be dominated by the price tag and a dispute over land rights.

The corps diverted the river into a 56-mile-long channel in the 1960s as a flood-control project. The restoration would send the river back into its old, winding channel and revive 45,000 acres of wetlands.

The project is in the early planning stages, but already there are major obstacles. One is acquiring land.

The state attorney general's office has halted the purchase of property that would be flooded as a result of the restoration.

Assistant Attorney General Jon Glogau argues that the land was state property when it was previously underwater, and that it still belongs to the state since the state did not sell it.

Osceola County ranchers and others who would be affected contend they have deeds to the land and have been paying taxes on it.

The governor and Cabinet are expected to resolve the dispute in the next few months.

— RENE STUTZMAN

Public Hearing Oct. 2, 1991
Kissimmee, Florida

U.S. Army Corps of Engineers
South Florida Water Management District

I am Martin Northrup, and I reside at 902 North Thacker Ave. in Kissimmee. I have been a resident of Kissimmee for over 10 years and a resident of Florida for over 35 years. I have attended meetings on water management problems all over the State of Florida and in Washington D.C. through the years, and I have attended numerous public hearings on the restoration of the Kissimmee River. I have represented organizations and myself. Today I am representing myself, as a fisherman, boater and amateur naturalist.

I want to apologize in advance for my being facetious. I have been picking on the Corps for over 20 years and it's hard to get out of the habit. The Corps usually loses my speaker's card or puts me last on the agenda. Tonight you did both, unintentionally of course. I have a written statement to turn in, and I intend to send a copy to Asst. Sec. of Army Dorn, who has expressed a reluctance to properly fund the restoration project. I intend to adlib a little.

A civil engineer in California has designed the restoration project for the Kissimmee River which includes land acquisition. I attended his presentation where he described his studies and the development of his water-flow models. Of course if you plug up the canal, water will flow into the old meanders of the river as it was before it was ditched. It didn't take over $600,000 and a non-Florida engineer to inform me of that obvious concept. I promoted a compromise plan which was not accepted. Now I support the State and Corps plan.

Environmentalists love natural meandering rivers, not just for the beauty of such a natural system, not just for the incredible wildlife of such a natural system, but also for the natural filtration of

stormwater within the marshes and other wetlands along such a riverine system. Artificial stormwater treatment by municipalities is very expensive as many cities in Florida are now finding out. The Kissimmee City Commission is having trouble finding money for proper treatment of water flowing into Lake Tohopekeliga, part of the Kissimmee River system headwaters. There is a reluctance to set up stormwater utility taxing. Continued growth in Florida will increase pollution all along the Kissimmee River System. Periodic flooding of former wetlands along the Kissimmee River System is obviously very important to control the quality of water flowing out of Central Florida into South Florida. I challenge any of the previous speakers to drink the water in the C-38 ditch since they think it's so pure.

The land within such a riverine system belongs to the people, but private cattle ranching is compatable. I note that the State Attorney General contends that land which was previously underwater, but now dry, is still state land.

The present flooding in Jacksonville does not give me confidence in the Corps plan for the Kissimmee since the Corps' district office is in Jacksonville.

I am including an article which describes the Corps' reluctance to participate in traditional Federal/state funding of such a project.

I think that the U.S. Army Corps of Engineers hired the ghost of General Stonewall Jackson to patrol the banks of the C-38 Canal. But the ghost is not protecting some Army fortification. He is stonewalling the restoration of important water flows which will help to protect water quality for future generations of Floridians. Gen. Jacksons' ghost has many troopers along the canal who help him politically. I suspect that more than one of those land-controlling troopers are politicians and many hide housing development interests behind the

grand old tradition of cattle ranching, which is a noble enterprise, with limited taxation.

The plan as presented includes control of 5-year "flood events". That is not much of a guarantee to the residents in flood-prone areas which include most of Osceola County. The state and the corps need to be concerned about wetland loss in the headwaters area, and not just Reedy Creek and the Walker Ranch area. I have seen swamplands platted for future development.

Thank you for listening to me at this late hour.

Attached is a local article dated 10/1/91 "U.S. may dam cash flow for river"

Attached is an article announcing this hearing "Public invited for discussion of river restoration" 10/2/91

WITH OBVIOUS INTENTIONS FOR DEVELOPMENT

Seminole developers fight to keep tax breaks on land

By Mike Berry
OF THE SENTINEL STAFF

SANFORD — Several Seminole County developers, including one group planning a home, hotel and office complex near Oviedo, want farming tax breaks on their undeveloped property.

Property Appraiser Bill Suber said such tax breaks were unjustified. A county appeals board will decide who is right.

This week, about 30 property owners are appealing a decision to deny them 1991 agricultural classifications, which can be worth tens of thousands of dollars in tax savings. The hearings start tomorrow.

The Viera Co., formerly known as Duda Lands, was denied a farming label on about 320 acres of land near Aloma Avenue and Winter Springs Boulevard.

The A. Duda family plans to build Seminole's largest office park, along with 512 apartments, stores and a 250-room hotel, on 500 acres there. But a slow market has delayed the project.

Viera argues that the 320 acres is currently used for cattle grazing and is worthy of an agricultural classification.

Par Four Partnership, which wants to build a shopping center near Aloma and Tuskawilla Road, was denied a farming tax break on about 10 acres at the site. Neighbors have sued to block the shopping center. Par Four said the land is being used now to grow pine trees.

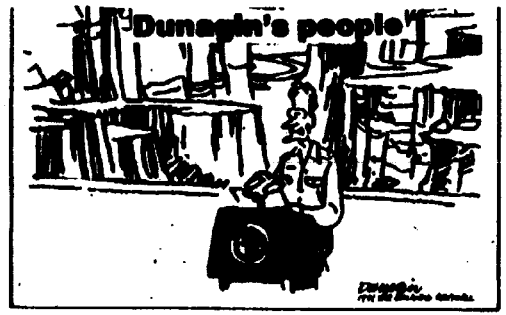
Viola Kastner, who intends to build offices, shops and apartments on land she owns near a planned mall in north Seminole, was denied a tax break on about 45 acres near State Road 46 and Interstate 4. She said the land is being used for cattle grazing.

And former circuit judge Kenneth Leffler and family were denied a farming classification on about 20 acres off State Road 434 just outside Winter Springs. The family said it is growing pine trees there.

In all cases, the land is zoned commercial or planned development, which can include offices, stores and homes. Suber's office argues that such uses preclude farming.

The land value of a planned development averages about $23,000 an acre, compared with $178 an acre for agricultural use.

"We always have to remember, the rest of taxpayers pick up slack for everybody who gets those breaks," said Jordan Stuart, attorney for the property appraiser's office.



'One cannot stand here and not be moved by this scene ... but I think the Corps of Engineers can fix it!'

8-122

Dear Mr. Reed,

I am writing in regards to the Kissimmee Restoration Project. I understand that the project may be in jeopardy due to objections by a powerful few. Florida and its fragile environment would greatly benefit from this restoration project. It would help the water quality in Lake Okeechobee and people throughout Florida would benefit from that. The Kissimmee is the head waters for the Everglades and by returning it to its natural state we may one day see an improvement in the Everglades also.

I support the "Modified Level II Backfilling Plan" and hope that the Kissimmee will continue to get your support also. It would be a shame if this important project, after getting so close to being a reality, is side tracked. Water is so essential to the Florida environment, and by restoring it to its natural state we can improve the quality of life for all.

Sincerely,

Judi Ottmans
7760 NW 6 Ct
Pembroke Pines FL 33024

[illegible] S. Ocean Blvd
Palm Beach, FL 33480
[illegible]

Mr Russ Reed
U.S. Corps of Engineers
CESAJ-PD-F Box 4970
Jacksonville FL 32232-0019

Dear Sir —

Help us like the Everglades by bringing the Kissimmee River to a level 2 restoration — 70% of the River. This is IMPORTANT for the Health and Welfare for State and a service to our country!!

Sincerely,

Ruth Opstrom

Harold N Opstrom

Ruth & Harold Opstrom
2800 South Ocean Blvd #400
Palm Beach, FL 33480

7-5-01

Mr Russ Reed
Study Manager
U.S. Army Corp of Engineers
ATTENTION CESAJ-PD-F
Box 4970
Jacksonville, FL 32232-0019

Dear Mr Reed,

We lived in Florida since 1950 and have seen many rivers and streams destroyed by progress!

The opportunity for the Army Corp of Engineers to restore the Kissimmee would be a great step to preserve Florida for future generations.

Since restoration will help insure future water quality to Lake Okeechobee much of the wildlife in Florida will also be preserved.

I support the restoration and urge you to also support it.

Sincerely,

Nov 4, 1991.

Mr. Russ Reid, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn: CESAJ-PO-F
Jacksonville, Florida 32232-0019

Dear Mr Reid —

I and my family are solidly in favor of the restoration of the Kissimmee River and we have been in favor of restoration for twenty years!

Channelization was a gross mistake, it has resulted in a great up-cost of state land going to a few large-scale property owners + the general public of Florida and the nation resents it. Moreover, we are tired of having to say it! Just move dirt + do it —

Very truly yours,
Frances H. Howell

9120 West Lake Rd
Winter Haven, Fl 33884

An Open Letter to the
U.S. Army Corps of Engineers
and the
South Florida Water Management District

The current proposal for the environmental restoration of the Kissimmee River would have a devastating effect on Okeechobee County.

41 The thousand of acres that would be flooded by this project as well as the loss of residential homes and farms would take millions of dollars off the tax rolls of Okeechobee County.

44 The proposed restoration project map also shows the site for the proposed 40 million co-generation power plant would lie within the five-year flood plain. The potential loss of this power plant would cost the county both in tax dollars and in hundreds of jobs.

The county is already at the 10 mil cap and unable to raise enough money to provide basic services to its residents. The loss of this property off the tax rolls would cripple an already stressed economic system, still reeling from the loss of one-third of the area's dairies due to the dairy buy-out.

45 Another five dairies lie in the proposed five-year floodplain, but are not listed for purchase.

A proposal to spend $683 million for the river restoration, at a time when funding has been cut for education, health and human services and the courts, is quite simply obscene.

We strongly urge you to reconsider disapproval of the proposal.

Sincerely,

October 16th, 1991

Susan B. Hughes
Susan B. Hughes
13303 N.E. 14th Avenue
Okeechobee, FL 34972
813-467-2849

DON INGRAM Real Estate
SEVEN N.E. TWENTY SEVENTH AVENUE
POMPANO BEACH, FLORIDA 33062
(305) 943-8601

11/1/91

Mr. Russ Reed

Dear Russ

Please support this plan to return the Kissimmee River to its original State. The Level II Plan is the right way to go. I'm told, I've located the Kissimmee many times & the old "Hitch" is a disease & a petitioned waste of one of our states great natural water systems

[illegible]

11/7

Dear Mr Russ Reed,

Please have the Kissimmee River restored to its original state. As a long time Florida resident, I feel very strongly about our Florida land! There is only one Everglades, and it needs to be saved. Please, restore the river, perhaps the water from Lake Okeechobee will become a ~~[illegible]~~ great place for fishing once again.

Thanks for your consideration.

Sincerely

LORI JACKSON
4135 NW 4th AV
BOCA RATON FL 33431
407 982 1137

November 4, 1991
PO Box 264
Dundee, FL 33838

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn: CESAJ-PO-F
Jacksonville, Florida 32232-0019

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River.

This project would be the premier wetlands restoration project in the nation and for a change I would like to be proud of something the state of Florida is involved in!

Sincerely,

David Jacobs

Dundee, FL 33838
Nov. 4, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn. CESAJ-PO-F
Jacksonville, Florida 32232-0019

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River - in fact I thought it had been decided several years ago. But - it seems there is foot dragging again.

There is only one Everglades in the world, and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely,

Jenny Jacobs

November 4, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn. CESAJ-PD-F
Jacksonville, Florida 32232-0019

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River.

This project would be the premier wetlands restoration project in the nation and for a change I would like to be proud of something the State of Florida is involved in.

Sincerely,

Janine Jones

8-127

October 11, 1991

U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232

Dear Sirs:

I am a lifelong resident of the State of Florida. I am writing you to express my outrage at what I feel is serious injustice being wrought on the people of this great state.

More than thirty years ago, the Kissimmee River Basin was a natural ecosystem of lakes, wetlands, and a wild, meandering river. The Army Corps of Engineers destroyed the river by digging a canal through the area as means of flood control, and in order to make once uninhabitable lands high and dry, and desirable for development.

This horrible "surgery" caused tremendous damage to the wildlife and waterfowl, as well as irreparable harm to the wetlands. However, in the thirty years since this project was completed, the wildlife and waterfowl have adapted, and their populations are gradually increasing. **More importantly, people have begun to inhabit these areas as well.**

I am very much aware of the recent proposals for restoration of the
35 Kissimmee River (by filling in parts of the canal.) **Because of this proposal, hundreds of taxpaying families and businesses are being threatened with extinction,** not to mention the complete devastation that will be wrought on the wildlife and waterfowl, as their homes are once again destroyed!

Additionally, I am aware of the astronomical costs involved. Current figures estimate that the restoration project will cost American taxpayers $683 million dollars. This apparently does not include costs to buy the land or to resettle the people who currently call the banks of the Kissimmee River home. In a time when so many Americans are homeless and hungry, when so many children are cheated out of a decent education because of budget cuts, how can such a terrible and unfair project be allowed to take place?

The proposed project looks pretty good on paper. If only it were so
34 easy...but no one could possibly hope to undo the horrendous damage caused by your organization nearly thirty years ago!! **There are no guarantees that this time the Army Corps of Engineers will doing the right thing.** What is going to happen to all the people who will loose their homes without financial compensation, not to mention the wildlife (including the six endangered species) that will die if you destroy their present habitat? We should have never tried to "fix" Mother Nature in the first place, but to add insult to injury is, in my opinion, dead wrong!

Two wrongs don't make a right. The citizens of Florida deserve much better.

Sincerely,

Diane Jerauld

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970
Attn: [illegible]
Jacksonville, Fl [illegible]

Dear Mr. Reed,

November [illegible], 1991

This letter is to inform you that I am in favor of the Kissimmee River Restoration Project to help protect the Florida Everglades.

Sincerely,

Calvin J. Kalal

Calvin J. Kalal

JR

Dear Mr. Reed,

I urge you to go forward with the U.S. Army Corps of Engineers' plan to restore the Kissimmee River. Restoring the Kissimmee River would not only insure the water quality of Lake Okeechobee, it would restore wildlife, fisheries, habitat, and provide recreation in the area for generations to come. The Kissimmee River is also the headwaters of the Everglades, and without its restoration, the consequences to the Everglades could be devastating. The Kissimmee River must be restored.

Sincerely,

Kate Kaplan

Secretary, Earth Club, Winter Haven High School

Mr. Stan M. Kaplan
2930 Plantation Road
Winter Haven, Florida 33880
November 10, 1991

Mr. Russ Reed
Study Manager,
U.S. Army Corps of Engineers
Attn: CESAJ-ED-F
Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Reed,

I understand an aggressive campaign has been launched in opposition to the restoration of the Kissimmee River. I urge you to continue with the U.S. Army Corps of Engineers plan to restore the Kissimmee, in particular, the "Modified Land II Backfilling Plan. This project would be the number one wetlands restoration project in the nation.

Restoration efforts have come too far to be halted now, especially in light of all the state and national attention they have received. We must restore the Kissimmee River.

Sincerely,

Stan M. Kaplan

Stan M. Kaplan

740 Acton Lane, SE
Port St. Lucie, FL 34983-2702
November 1, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers,
Box 4970, Jacksonville, FL 32232-0019

Dear Study Manager Reed,

We understand that your feasibility study on the restoration of the Kissimmee River has met with some opposition.

In our opinion this admirable plan by the Corps, known as the "Modified Level II Backfilling Plan will yield immeasurable benefits as the floodplain is reunited to the Kissimmee River.

Florida and the Nation need these wetlands. Too many wetlands have already been destroyed, some by the Corps.

Now is an opportunity to use your water management skills to restore what was mistakenly destroyed in the first place. The Kissimmee River is the headwaters of the Everglades, and anything that can be done to enhance and preserve this national treasure should be done.

We hope your study will meet with favor when it is reviewed in Washington.

Sincerely,

Carl L. Kaufman

Carl L. Kaufman

Mary A. Kaufman

Mary A. Kaufman

8-129

Hidden Acres Estates

10-10-91

Dear Sir!-
I am a widow eighty two years old, living on a fixed income. I found this beautiful park on the Kissimmee River with 100 yr old Oak trees, Country store, swimming pool and Club House.
This is definitely not wet lands please investigate before doing anything unnecessary.

Sincerely
Alice Kenney

[illegible]
U.S. Corps of Engineers
[illegible]
Jacksonville, Fl 32[illegible]

Re: Restoration of Kissimmee River

Please recommend Level 2 restoration of the river. A 20% restoration would be great.

I can't see how the people who gained land when the river was dictated have any legal right to that land when the river is restored - back to its natural course.

Mrs. Cecil M. Kirchner
2731 E. Ashley Dr, West
Te Palm Beach, Fl.
33415-8246

DEAR SIR.

I COULDN'T BELIEVE IT WHEN I RECENTLY FOUND OUT THAT MOST LETTERS TO YOU HAVE BEEN AGAINST RESTORING THE KISSIMMEE RIVER. THIS IS INCREDIBLE. EVERYONE ALL OVER THE STATE IS FOR RESTORATION. WE'VE FOUGHT VERY HARD FOR THIS. EVERYONE WANTS TO SAVE THE EVERGLADES AND RESTORING THE KISSIMMEE IS A MAJOR STEP.

WHEN I FIRST MOVED TO FLA. 20 YEARS ONE OF THE FIRST THINGS I SAW WAS THIS DISASTER THAT HAD BEEN A BEAUTIFUL AND USEFUL, FOR MAN AND NATURE, RIVER. I SAID THEN THAT WHOEVER DID THIS SHOULD BE PUBLICLY HORSEWHIPPED AND NEVER ALLOWED NEAR A SHOVEL AGAIN. WORSE SHOULD HAPPEN TO HE WHO STANDS IN THE WAY OF FIXING IT.

SINCERELY,
RICHARD A. KIRCHNER
601 S. NEWPORT AVE
APT 2
TAMPA, FL. 33606

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Attn: CESAJ PD F
Box 4970
Jacksonville,
FL 32232-0019

Dan Kixmiller
Conservation Chair
Big Bend Sierra Club
3504 Sharer Rd.
Tallahassee,
FL 32312

Dear Mr. Reed:

The Kissimmee River should be restored according to the backfilling plan to undue the damage to the ecosystem that has contributed to dangerous declines in wildlife populations. Endangered species of the bald eagle, wood stork and snail kite would benefit directly from reflooded wetlands. Wading and migratory birds, as well as wildlife downstream to the Everglades would have an improved chance of survival.

Species are endangered mostly because of habitat loss. This restoration project is becoming increasingly important as development in Florida continues. On behalf of the local club here in Tallahassee and the critters all over Florida, I ask you to execute the Kissimmee River restoration project.

Sincerely,

[signature]

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn: CESAJ-PDF
Jacksonville, Florida 32232-0019

Dear Mr Reed,

I am in favor of the restoration of Kissimmee River. There is only one Everglade in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system.

Sincerely,
Kyle Knowles

[illegible]

[illegible]

Dear Mr. Reed

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect this unique system.

Sincerely,

Carolyn McCling

Henry A. Kowalski

242 Serenade Drive, Lake Placid, FL 33852

(813) 465-6618

November 8th, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Attn: CESAJ-PD-F
Box 4970, Jacksonville, Fl. 32232-0019

Dear Mr. Reed:

Please consider this a vote in favor of the "Modified Level II Backfilling Plan" as it pertains to the restoration of the Kissimmee River.

The whole world knows that there is but one Everglades, and every means possible must be used to protect this ecosystem. The Corps knows better than all of us how important the Kissimmee River is to the Everglades; therefore, let it be sufficient to say that the people of Florida want the river restored!

Most Sincerely,

Hank Kowalski

Mr. & Mrs. Hank Kowalski

Highlands County, Florida

U.S. Army Corps of Engineers
CESAJ-PD-F
P.O. Box 4970
Jacksonville, FL 32232-0019

November 5, 1991

Re: Kissimmee Restoration Project

Gentlemen:

I would like to voice my support for the Kissimmee Restoration Project; however, I think it is imperative that the homeowners being displaced be given just compensation for their homes. The people should be made to understand that this project is necessary, although disruptive to their lives.

It is crucial that the beauty of the Everglades be preserved for the residents of Florida as well as for the thousands of tourists who travel here each year. The birds that migrate here, in addition to other wildlife need as much help as we can offer. As a Florida native, I can appreciate the need for such a project and I hope the homeowners will be fairly treated.

Sincerely,

Debra J. Kowitt

Debra J. Kowitt

[illegible]

[illegible]

[illegible]

[illegible]

Sincerely,

[illegible]

2435 Park Ave.
Riviera Beach, Fl.
November 1, 1991

Mr Russ Reed
Study Manager,
U.S. Army Corps of Engineers
Jacksonville, Fl.

Dear Mr. Reed,

I want you to know I favor the restoration of the Kissimmee River. One important reason is that it is the headwaters of the Everglades which is a unique natural phenomenon which is being destroyed and should be preserved.

I hope the Army Corps of Engineers will backfill the Kissimmee River as is set forth in the South Florida Water Management District's Level II Backfilling Plan.

Florida wetlands have been disappearing to the Developer, whose only interest is making money no matter what environmental damage is done, much too fast.

This Backfilling Plan would help improve water quality in Lake Okeechobee too.

Furthermore, Florida would be carrying out the first wetlands restoration in our nation — a beautiful example for other states.

Let's do it.

Sincerely yours,
Lorna Krom

Nov 5, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970
Jacksonville, FL 32232-0019

Attn: CESAJ-PD-F

Dear Mr Reed:

I am in favor of the restoration of the Kissimmee River.

This project would be the premier wetlands restoration project in the nation and for a change I would like to be proud of something the state of Florida is involved in.

Sincerely,
Brenda H. Lane
68 Coleman Rd
Winter Haven, Fl 33880

November 4, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 attn. CESAJ-PO-F
Jacksonville, Florida 32232-0019

Dear Mr. Reed,

I am in favor of the restoration of the Kissemmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system.

Sincerely,
Jane L. LaRue

November 6, 1991

Dear Mr. Reed,

I am writing you concerning the restoration of the Kissimmee River. I am in favor of this restoration of the river. The restoration of the river would benefit the wild life and environment of the area. It would also attract many rare types of birds that would breed and grow in numbers. And finally, there is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades. So you see, we must restore and protect the entire system.

Sincerely yours,
Matthew A. LaRue
Matthew A. LaRue

19707 Turnberry Way #7-F
Aventura, FL 33180
Nov. 3, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

Attn: CESAJ-PD-F

Dear Mr. Reed:

There should be no doubt in the mind of any Floridian with the ability to see and appreciate beauty that the Kissimmee River should be restored.

When one considers the effect on the water quality in Lake Okeechobee and the subsequent flow into the wetlands of the Everglades one can only wonder why the natural channel was ever tampered with. But when we realize that we have a Vice-President who offers as a definition of wetlands, "How about if we say that when it's wet, it's wet?", the question becomes rhetorical, the answer obvious, and the results disastrous.

Considering the effect of restoration on wildlife would take pages. One example: Have you ever seen thirty thousand birds-ibis, heron, egret-rising from their rookeries and head for the coast? No? Neither have I. But my grandfather had seen them and carried the awe he felt to his grave.

I have spent forty-five of my sixty-three years in Florida and have watched it die a little each year. This has to stop, and a good time to begin is now.

Sincerely yours,

Seth Lefkow

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970
Jacksonville, FL 32232-0019
Attn: CESAJ-PD-F

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River. There is only one Everglades in the World and the Kissimmee River is the head waters of the Everglades. We must restore and protect the entire system.

Sincerely,

Brent LeMaels

William Lewis
P.O. Box 2511
Sarasota, FL 34230
(813) 366-9498

November 3, 1991

Russ Reed, Study Manager
U.S. Army Corps of Engineers
ATTN: CESAJ-PD-F
Box 4970
Jacksonville, FL 32232-0019

re: Restoration of the Kissimmee River

Dear Mr. Reed,

For many years the ecology, hydrology, wildlife and recreational values of the Kissimmee/Everglades system has been deteriorating. One key to reversing this trend would be to restore the historic flows of the Kissimmee River. I strongly urge the Army Corps of Engineers to proceed as quickly as possible to restore portions of the river.

This would not only improve the entire ecosystem, it would also set an excellent example for the nation and for other countries who are looking to the United States to set the example in protecting the environment.

Sincerely,

William Lewis

November 2, 1991
6959 Flat 19 Ct.
Orlando, Fl. 32814

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Attn: CESAJ-PD-F, Box 4970
Jacksonville, Fl. 32232-0019

Re: Modified Level 21 Backfilling Plan
– Kissimmee River

Dear Mr. Reed:

I was born in Florida, educated in Florida, raised my family in Florida and still reside in Florida. For these reasons I hope the right to expect the Kissimmee River to be returned and restored to its original glory, at least the portion that applies to the "Modified Level 21 Plan". It is the headwaters of the Everglades and the only Everglades in the world. We owe it to ourselves and future generations. Please know that we will be watching this transaction very closely.

Sincerely,
Virginia E. Light

cc: Common Cause
League of Women Voters
Senator Bob Graham
Senator Connie Mack

November 6,1991

Mr.Russ Reed,Study Manager
US Army Corps of Engineers
Box 4970 Attn:CESAJ-PO-F
Jacksonville,Florida 32232-0019

Dear Mr. Reed,

I am in favor of the retoration of the Kissimmee River. There is only one Everglades in the world and the Kissimmee is the headwaters of the Everglades.We must restore and protect the entire system.

Sincerly,

Bessie Pantouris

B.Pantouris

November 6,1991

Mr.Russ Reed,Study Manager
US Army Corps of Engineers
Box 4970 Attn:CESAJ-PO-F
Jacksonville,Florida 32232-0019

Dear Mr. Reed,

I am in favor of the retoration of the Kissimmee River. There is only one Everglades in the world and the Kissimmee is the headwaters of the Everglades.We must restore and protect the entire system.

Sincerly,

C.Pantouris

C.Pantouris

5 Nov. 1991

U. S. Army Corps of Engineers
P. O. 4970
Jacksonville, FL 32232

Attn: Russ Reed

Gentlemen,

We understand that opponents of the Kissimee have mounted a campaign against the Restoration Plan for the Kissimee. These are people who have vested interests in keeping the land for their private use - land that rightfully has been determined to belong to all of the people and to the wildlife that is so dependent on the rewatering that will occur. We hope that you will take note that private landowners in Okeechobee County who habe vowed to "do all that is in their power to fight for life, liberty and the pursuit of happiness on THEIR own land" are maybe a bit shortsighted, BECAUSE, in fact, this 29,000 acres of former wetlands and the reuniting of 49,000 acres of floodplain with the river will restore the river to only 70% of the original flood plain. This fight for private interests has been allowed to continue far too long and has caused the citizens of this country to pay for this land at least twice.

This plan was devised by the So. Florida Water Management District and they have taken great pains over the years of planning to consider the rights of private interests. Many public hearings have been held and many citizens of the state have worked for years (decades) for the restoration of at least a part of this system on which the EVERGLADES (unique in our planet) is dependent.

It is anticipated that wading bird populations will increase about six-fold and there are three endangered species that will reap special benefit: the bald eagle, snail kite and the woodstork.

Recreational fishing is expected to increase four-fold.

The cattle industry and sugar interests have come close to and indeed may have already destroyed the Glades. Let's proceed while we still have a chance to save a bit of what's left.

Sincerely,

Sara L. Pardo and family
27631 Southview Dr.
Bonita Spgs., FL. 33923

NOV. 4, 1991

U.S. ARMY CORPS OF ENGINEERS
BOX 4970, JACKSONVILLE, FL.
ATTN: CESAJ-ID-F

ATTENTION: MR. RUSS REED

SIR

SUBJECT: MODIFIED LEVEL II BACKFILLING PLAN

PLEASE DO NOT LET THE RESTORATION OF THE KISSIMMEE RIVER BE INHIBITED BY SPECIAL INTERESTS. THIS IS FLORIDA'S CHANCE TO LEAD THE NATION IN WETLANDS RESTORATION.
THE FUTURE WATER QUALITY OF LAKE OKEECHOBEE CAN ONLY BE SAVED BY RESTORING THE KISSIMMEE TO ITS NATURAL STATE.
IN ADDITION FLORIDA'S MOST VALUABLE ECOLOGICAL ASSET THE EVERGLADES WILL BE SAVED FROM FURTHER ENVIORMENTAL DAMAGE.
PLEASE PROCEED WITH THE RESTORATION OF THE KISSIMMEE RIVER; IT IS FLORIDA'S CHANCE TO SURVIVE IN THE NEXT CENTURY.

SINCERELY YOURS

Charles S. Parkhill

LIFETIME FLORIDA RESIDENT
C. PARKHILL
131 RIO VISTA CT.
TAMPA, FL. 33604

6733 N.W. 151 st Terrace
Okeechobee, FLA. 34972-9532
October, 18, 1991

U. S. Army Corps of Engineers
P. O. Box 4970
Jacksonville, FLA 32232

Dear Sirs:

We own property and have lived in the buyout area for the Kissimee River Restoration for the past ten (10) years. The property was purchased after the river was channeled and before the Restoratèn was proposed.

34 We live; work, and pay taxes in Okeechobee County. The possibility of losing our home with no proper restitution is very disturbing. In the face of Florida's present budget problems, please reconsider disapproval of the Restoration Project.

Sincerely,
Hazel R. Parnis
Hazel R. Parnis
Sanford Parnis
Sanford Parnis

P/

October 8, 1991

U. S. Corps of Engineers

P.O. Box 4970

Jacksonville, FL 32232

RE: Restoration of Kissimmee River

Dear Sirs,

I attended the meeting you held at the Okeechobee Civic Center on October 1, 1991. Please add this letter to the transcript of that meeting.

We are lifelong residents of Florida, ages 61 and 54. We do remember the floods in Broward and Dade Counties in 1947 and 1948. Our property in Kendall (11240 S.W. 93 St.) was under water in the early 50's and again after Hurricane Donna tore through the upper Keys and south Dade in 1960.

The Army Corps of Engineers made land that was once uninhabitable, because of swamps and marshes, very desireable, high and dry places for people to live.

Yes, there was a cost; as we lost many of our wetlands, we also saw diminished populations of waterfowl and wildlife.

To restore the Kissimmee River after nearly 30 years will only cause additional degradation to the birds, reptiles and animals. You cannot put Humpty Dumpty back together again!

The river is healing itself and adjusting to "the acute surgery" done on her in the 60's. Additional "surgery" will cause unspeakable, unthinkable hardships, not just to the wildlife this time, but to people as well. Our homes have become "an endangered species."

I've read that 350,000 people move to Florida each year. Those folks need roads, hospitals, schools and homes in which to live. The proposed Kissimmee River restoration will destroy established communities. As homeowners in River Acres in Okeechobee County, we resent that our right of land ownership is being threatened by the project. Surely no Federal or State ELECTED official will vote to force us off our land that we pay taxes on!

Please help us! Please save our homes.

In the words of Governor Lawton Chiles, "This time, the people win."---or will it be bureaucracy?

Yours truly,

Elizabeth M. Pearce

Mrs. Herbert H. Pearce

19990 N. W. 80th Dr.

Okeechobee, FL 34972

35

October 11,1991

Army Corps of Engineers
Colonel Rock Salt

Colonel Salt,

I was present at the meeting you chaired in OKEECHOBEE on October 1,1991,I thought the meeting went very well considering the facts that so many people are in danger of being displaced to run an experiment of restoring a river for the birds,snakes, turtles and fish.

Colonel,I am a native FLORIDIAN--I am 61 years old and had hoped to spend my GOLDEN YEARS here on the KISSIMMEE RIVER,my wife and I have saved to buy a little piece of property on the river, we have sent our four children to college,and now that my retirement is so close ,it appears that the CORPS and THE SOUTH FLA.WATER MANAGEMENT DISTRICT want to take away my lifes dream.

Colonel Salt,you appeared to me to be the most reasonable individual on the entire panel--you spoke with authoritity,clearity,and purpose I PLEAD WITH YOU HELP US SAVE OUR HOMES the river has almost healed itself from the last manmade change---that change was for flood control and the channelized river is doing a good job.

Our tax dollars could be better spent on a lot more needed projects like EDUCATION,WELFARE,ELDERLY,HOSPITALS,and JAILS.

I beg for you to have compassion,leave our river alone and HELP US SAVE OUR HOMES.

Sincerely,

H. H. Pearce

Herbert H. Pearce
19990 N.W. 60th Dr.
Okeechobee, FL 34972

October 15, 1991

To Whom I Hope May Be Concerned:

My husband and I live in Hidden Acres Estates, which is in your "Pool D" in the plans for the Kissimmee River Restoration. Our camp is built on the site of the old historic Fort Basinger, which was a supply depot fort for the soldiers during the Seminole Indian Wars.

We have oak trees, a whole grove of them, which are well over a hundred years old. Oak trees do not grow in water, so we couldn't have been on a flood plain.

We have grey fox, wild turkey, bobcat, deer and Fla. Panther that we have seen in the 6 year we've lived here. It is a beautiful place made more so by the large variety of birds which are here including the endangered "limpkin" which has raised her young here each year. Each year there are 2 beautiful egrets which stay at our camp during the winter.

Our neighbor, Mrs Edna Pierce Lockett's place has been on the river for years, ever since her great grandfather homesteaded thousands of acres along the river and the river was the only mode of transportation for people along the river.

Mrs. Lockett's family cemetery is located in a corner of her land, not far from the river. So how could it be a flood plain?

35 The Corp of Engineers pushed thru the "Big Ditch" the first time and people finally learned to live with it,building their homes and lives along the river. Now you want to undo what should never have been done in the first place. The eco system has adapted to the "Big Ditch" and people has also adapted.

Think of all the people (voters) who will be hurt by going with this restoration. What would we be gaining? What will you be regaining?!

With our country in the up heaved it is, people homeless, jobless, hungry, our schools not getting what is necessary to educate our future citizens, surely something better to help our country and people or even the national debt could be done with that money.

We help all other countries, isn't it time to <u>help our country and its people</u> who vote for the government official in Washington.

Sincerely,

Mr & Mrs Wm L. Lenn Sr

COMMUNITY CHIROPRACTIC CENTER
DR. CLIFFORD F. PETERS 6909 STATE ROAD 54, NEW PORT RICHEY, FL 34653 848 5967

November 8, 1991

Mr. Russ Reed, Study Manager
US Army Corps of Engineers
Attn: CESAJ-PD-F
Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Reed:

My wife and I are both in favor of restoring the Kissimmee River. Since it is the headwaters of the Everglades it is absolutely essential for us to normalize the river. The Everglades need to be preserved and restored and we need good quality water which will be ensured by this restoration plan. America's wetlands need to be protected and it is my opinion that this modified level II backfilling plan can be one of the premiere programs.

Sincerely,

Clifford F. Peters, DC

CFP:mlp

P.O.Box 345
Estero, Fl. 33928
Nov. 2. 1991

U.S.Army Corps of Engineers
P.O.Box 4970
Jacksonville, Fl. 32232-0019

Attn: Russ Reed:

Dear Sir:

We understand that opponents of The Kissimmee have mounted a campaign against the Restoration Plan for the Kissimmee. These are people who have vested interests in keeping the land for their private use land that rightfully has been determined to belong to all of the people and the wildlife that is so dependent on the rewatering that will occur. We hope that you will take note that private landowners in Okeechobee County who have vowed to "do all that is in their power to fight for life, liberty, and the pursuit of happiness on THEIR own land" are maybe a bit short sighted. BECAUSE, in fact, this 29,000 acres of former wetlands and the reuniting of 49,000 acres of floodplain with the river will restore the river to only 70% of the original flood plain. This fight by private interests has been allowed to continue far to long and has caused the citizens of this country to pay for this land by least twice.
This plan was devised by the S. Fl. Water Management District and they have taken great pains over the years of planning to consider the rights of private interests. Many public hearings have been held and many citizens of the state have worked for years for the restoration of at least a part of this system on which the EVERGLADES is dependent. It is anticipated that wading bird population will increase about six fold and there are three endangered species that will receive special benefit, bald eagle, snail kite, and the woodstork.

Recreational fishing is expected to increase four fold.

The cattle industry and sugar interests have come close to and indeed may have already destroyed the Glades.
Please go forward with the Modified Level II Backfilling Plan.

Sincerely,

Ellen Peterson, chair Sierra Club Calusa Group (representing 900 members living in Southwest Florida)

5243 Lido St.
Orlando FL 32807
Nov 4, 1991

Mr. Russ Reed
Army Corps of Eng
Jacksonville FL

Dear Mr. Reed,

I am pleased the Army Corps of Engineers will restore the Kissimmee River to its original form.

As a Kissimmee native, I remember the Kissimmee River full of fish, winding for miles to Lake Okeechobee, home to now-threatened species of birds and animals. Restoring this floodplain will be one of the greatest wetlands restoration projects ever attempted. Many endangered species will benefit. The water quality of Lake Okeechobee and the Everglades will benefit.

Our entire state will benefit!

You and the Army Corps can undo the environmental disaster created by straightening the Kissimmee. As Floridians, we must protect and restore what is unique and wonderful about our state — our natural environment.

Please restore the Kissimmee River!

Sincerely,

Terry Piper

5243 Lidin St.
Orlando, FL
32803

11/4/91

Dear Mr Reed,

As a concerned long-time resident of central Florida I strongly support restoration of the Kissimmee River

The proper functioning of the aquatic ecosystem of this area is vital to the long-term prosperity of both human and animal life. Our state's economy depends strongly on natural beauty and wildlife.

Please do not be swayed by the short-term goals of local land owners who have no natural rights on the land. Nature will eventually reclaim the region regardless.

Sincerely,

Alex Piper, P.E.

Nov. 4, 1991

Dear Sir:

What I can say regarding my feelings against the Kissimmee River Restoration Project has already been said. Please add my name to the list of objectors. The possibility of the state of Florida

34 reclaiming land I purchased in good faith, with a full warranty deed in River Acres, should NEVER have a question as to state ownership--certainly not at this point in time. I am vehemently against House Bill 2269.

In addition, I would like to make it perfectly clear, I want to see my hard earned tax dollars spent on more urgent needs. I feel right now these are: improving our economy, creating new producing jobs, improving education, and health costs and availability of preventive medicine and information. I plan to vote for someone shares my feelings. Ihope you will help!

Sincerely,

Flora J. Potts

Flora J. Potts

Nov. 2. 1991

U.S. Army Corps of Engineers
P.O.Box 4970
JACKSONVILLE, Fl. 32232-0019

Attn:RUSS REED

Dear Sir:

We understand that opponents of The Kissimmee have mounted a campaign against the Restoration Plan for the Kissimmee. These are people who have vested interests in keeping the land for their private use land that rightfully has been determined to belong to all of the people and the wildlife that is so dependent on the rewatering that will occur. We hope that you will take note that private landowners in Okeechobee County who have vowed to "do all that is in their power to fight for life, liberty, and the pursuit of happiness on THEIR own land" are maybe a bit short sighted. BECAUSE, in fact, this 29,000 acres of former wetlands and the reuniting of 49,000 acres of floodplain with the river will restore the river to only 70% of the original flood plain. This fight by private interests has been allowed to continue far to long and has caused the citizens of this country to pay for this land by least twice.

This plan was devised by the S. Fl. Water Management District and they have taken great pains over the years of planning to consider the rights of private interests. Many public hearings have been held and many citizens of the state have worked for years (decades) for the restoration of at least a part of this system on which the EVERGLADES is dependent.

It is anticipated that wading bird population will increase about six fold and there are three endangered species that will receive special benefit; bald eagle, snail kite, and the woodstork.

Recreational fishing is expected to increase four fold.

The cattle industry and sugar interests have come close to and indeed may have already destroyed the Glades. Let's proceed while we still have a chance to save a bit of what's left.

Please write to the Corps of Engineers P. O. Box 4970 Jacksonville , 32232-0019 asking that they go forward with the Modified Level II Backfilling Plan.

Sincerely,

Elaine Towell
4041 Kaneboro Drive
Fort Myers, Florida
33916
(813) 693-7450

Dear Mr. Reed,

I urge you to go forward with the U.S. Army Corps of Engineers' plan to restore the Kissimmee River. Restoring the Kissimmee River would not only insure the water quality of Lake Okeechobee, it would restore wildlife, fisheries, habitat, and provide recreation in the area for generations to come. The Kissimmee River is also the headwaters of the Everglades, and without its restoration, the consequences to the Everglades could be devastating. The Kissimmee River must be restored.

Sincerely,

Stephen [illegible] 3103 E. Carleton Cir. Lakeland Fl. 33803

Nov. 2. 1991

U.S. Army Corps of Engineers
P.O.Box 4970
JACKSONVILLE, Fl. 32232-0019

Attn:RUSS REED

Dear Sir:

We understand that opponents of The Kissimmee have mounted a campaign against the Restoration Plan for the Kissimmee. These are people who have vested interests in keeping the land for their private use land that rightfully has been determined to belong to all of the people and the wildlife that is so dependent on the rewatering that will occur. We hope that you will take note that private landowners in Okeechobee County who have vowed to "do all that is in their power to fight for life, liberty, and the pursuit of happiness on THEIR own land" are maybe a bit short sighted. BECAUSE, in fact, this 29,000 acres of former wetlands and the reuniting of 49,000 acres of floodplain with the river will restore the river to only 70% of the original flood plain. This fight by private interests has been allowed to continue far to long and has caused the citizens of this country to pay for this land by least twice.
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Recreational fishing is expected to increase four fold.

The cattle industry and sugar interests have come close to and indeed may have already destroyed the Glades. Let's proceed while we still have a chance to save a bit of what's left.

Please write to the Corps of Engineers P. O. Box 4970 Jacksonville, 32232-0019 asking that they go forward with the Modified Level II Backfilling Plan.

Sincerely,

Thomas A. Redd
11361 Dellwood Ln.
Bonita Springs, FL
33923

P.S. Please respond with info concerning the decision made

10919 Russell Road
Bokeelia, Florida 33922
Nov. 8, 1991

U.S. Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019
Attn: Russ Reed

Dear sir:

I understand that the opponents of the plan to restore the Kissimmee have mounted a campaign against this plan. I hope that you will not be deterred by pressure from this special interest group and will continue to restore the Kissimmee. This project will improve the wildlife habitat and insure a future for the Everglades!

The plan was devised by the South Florida Water Management District only after careful consideration of public and private interests. It was fially adopted after many public hearings..

Hopefully, by prompt action you can protect the Kissimmee watershed and save the Everglades from further deterioration.

Sincerely yours,

Edward C. Riley

Edward C. Riley, M.D.

November 6, 1991

Mr. Russ Reed
Study Manager
U.S. Army Corps of Engineers
Attn: CESAJ - PDF
Box 4970
Jacksonville, Fl. 32232-0019

RE: Kissimmee River Restoration Project

Dear Mr. Reed:

I am writing to ask you to please keep on going with the Kissimmee River Restoration Project until it is completed. We really do need this work done as soon as possible to safeguard our Everglades and protect the whole ecological area of South Florida.

I am concerned that failure to restore the river back to its natural state will result in great harm to an irreplaceable asset to our country -- The Florida Everglades.

Thank you.

Sincerely,

Cheryl Robertson

Cheryl Robertson

FHR
F. HERBERT ROBERTSON
REGISTERED FORESTER
1028 WEST EIGHTH STREET PANAMA CITY FLORIDA 32401
TELEPHONE 904 763 5049

Mr. Russ Reed, Study Manager
U.S.A., Corps of Engineers
Post Office Box 4970
Jacksonville, Fl. 32232-0019

November 9, 1991

Attention: CESAJ-PD-F

Dear Mr. Reed,

I encourage the "Corps" to proceed with the "Modified Level II Backfilling Plan".

It would appear that this proceedure will result in the greatest good to all concerned.

Thank you for hearing my view.

Sincerely,

F. Herbert Robertson

2905 [illegible]
[illegible]
Nov [illegible]

Mr Russ Reed
Study Manager
U.S Army Corps of Engineers
Jacksonville Fl. 32232-0019
RE: Kissimmee River

Dear Mr Reed:

I'm sure I don't have to remind you the the good Lord placed us all on this earth to get along in harmony Not to extinct each other.

We in Florida need the Kissimmee River for it's the headwaters of the Everglades. And it's need to maintain all branching waterways is essential. Otherwise drought could hit us all like California fishing and other wildlife would be depleted.

Please reconsider your thinking

Thanks
Barbara [illegible]

Fred W. Robitschek
560 Teakwood Ave
Satellite Beach, FL 32937
November 6, 1991

Mr. Russ Reed
Study Manager
U.S. Army Corps of Engineers
Attn: CESAJ-PD-F
BOx 4970
Jacksonville, FL 32232-0019

Sir:

As a native born Floridian, I strongly support implementation of the "Modified Level II Backfilling Plan" to restore the Kissimmee River.

- Predictions that the channelization of the Kissimmee would reap undesireable environmental results have come home to roost.
- The entire eco-system of southern Florida is under seige Any project which can REVERSE this trend should be supported.
- Opposition by local homeowners and agricultural interests is based upon the subordination of the larger public interest to protection of their private interests and economic gain. The extent of existing and potential environmental damage should preclude any tradeoff in favor of those private interests.
- With the days of enough water for everyone in south Florida coming to an end, projects which can enhance water quality, as this one will, need to have a high priority to better enable us to deal with future water resource problems.
- People, houses, and developments have been sacrificed BEFORE in the name of the Corps' projects. If places like the Hidden Acres Estates (built where nature would never have permitted without massive human terraforming intervention by the Corps) have to bite the bullet - so be it.
- The Corps had better look to its own future by finding large, long term projects which environmentalists will support. Now you finally have one that can keep the Corps happily employed moving dirt for an extended period - not a good one to let slip through your fingers.

Sincerely,

Fred W. Robitschek
(407) 773 5139

NOV 13, 1991

CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLA

GENTLEMEN

ENOUGH IS ENOUGH!! PLEASE GO FORWARD WITH THE MODIFIED LEVEL II BACKFILLING PLAN. THE SELFISH SELF INTEREST GROUPS HAVE TIED UP THIS RESTORATION PLAN TO LONG. THE WILL OF THE PEOPLE HAS SPOKEN!!

SINCERELY
DAVID ROLLINGS
20261 OAKU CIRCLE
ESTERO, FLORIDA 33928

Dear Mr. Reed: 11/3/91

Please carry out the Level II Backfilling Plan for restoring the Kissimmee River. Our state needs restoration work in order to restore the natural health of the Everglades. The Plan will also insure future water quality of Lake Okeechobee. And finally, this project would be one of the finest wetlands restoration projects in our nation.

Sincerely yours,
R. C. Ross
Geraldine Ross

R. C. Ross
8000 Baymeadows Circle E
#15
Jacksonville, FL 32256

Please help restore the Kissimmee [illegible] returned to its natural state. The Kissimmee is the headwater of the Everglades. We need to insure future water quality to Lake Okeechobee. This will be the premiere wetland restoration project in the nation.

Please help!

Edward Rubio
Box 292
Ozona, FL

[illegible] not you at [illegible] [illegible] camp on Interco [illegible] project.

November 4, 1991

Mr. Russ Reed
Study Manager
U.S. Army Corps of Engineers
ATTN: CESAJ-PO-F
Box 4970
Jacksonville, FL 32232-0019

Re: Kissimmee River Restoration

Dear Mr. Reed,

I am writing this letter to be included as a statement of support for the complete restoration of the Kissimmee River. This river is the headwaters of the Everglades, a nationally protected area. Restoration will help to insure the future water quality to Lake Okeechobee and South Florida.

When people talk about their rights, such as the folks from areas like "Hidden Acres Estates," they really are not considering the rights of all people and our right to clean air, clean water and clean food. These people are only concerned about their short term goals and to hell with the rest of Florida.

I want to encourage you to help push through the restoration of the Kissimmee River for the sake of our future and our children's future. Let the Army Corp of Engineers show the world and the nation that they are big enough to first admit a mistake and second to fix that mistake. This project could be the premiere wetlands restoration project in the nation.

I hope you will consider this plea for help and restore what was ours in the first place. Let the Kissimmee River do what it is supposed to be doing.

Sincerely,

Bruce M. Ryan
226 8th Ave NE
St Petersburg, FL 33701
813-823-6168

cc: Theresa Woody, Sierra Club
file

J. P. SATTERWHITE, M.D.
2460 S. LAKE DENTON ROAD
AVON PARK, FLORIDA 33825

11/7/91

Mr. Russ Reed
Study Manager U.S. Army Corps of Engineers
ATTN: CESAJ-PDF
Box 4970, Jacksonville, FL 32232-0019

Dear Mr. Reed:

Please move into your plans for the "Modified Level II Backfilling Plan" for the Kissimmee River!

It will be the premiere wetlands restoration project in the nation!

The Kissimmee River is the headwater of the Everglades, the only everglades in the world.

Restoration will be up in some water quality in Lake Okeechobee.

And will re-establish important parts of the Atlantic Flyway wintering grounds for birds.

Sincerely,

J. P. Satterwhite M.D.
(Armed Forces 1925-)

Nov 5, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Reed:

I am in favor of the restoration of the Kissimmee River.

The water quality of Lake Okeechobee desperately needs to be improved. A return to our natural systems is the only way to do this for the long term.

Sincerely,

Kitty Hendrickson
[illegible]
[illegible]

Nov. 6, 1991

Dear Mr. Reed:

I am writing you to express my support of the Kissimmee River Restoration Project.

Since it's the headwaters of the Everglades and helps fill Lake Okeechobee's water level, I feel that this project should have top priority in your state projects.

Restoring it to it's natural winding path will make it another beautiful recreational area for water enjoyment.

We need to keep restoring Florida back to it's natural setting, so that the reason people came here in the beginning won't become just a memory.

I'm a native Floridian and we're losing battles all the time. I hope that you will give this project your consideration.

Thank you,

Penny Saltzman

Mr. Paul Lambert Schmitz M D
1017 NE 60th St.
Miami, FL 33138-2547

11-4-91

Dear Mr. Steed,

Kindly restore the Kissimmee River.
it is very necessary for the future of Florida;
for those generations to come - our children
and children's children.

Sincerely

Paul L Schmitz

To whom it Concerns, Oct 12, 1991

Living in the United States, is supposed to be something to be proud of. It's called the Christian Country, please lets keep it that way, instead of destroying the faith of our older retired people. Taking everything they have worked a life time for, how can we call our Country, a safe place to live. Our Goverment, should take a good look at itself, and start making decisions, to protect them, instead of destroying their lifes, and hopes. If the goverment (water management dept), can come in and take their homes, and uproot their lives, what do American have to look forward too. Hidden Acres Estate, is well keep, we follow the law, and is a beautiful Animal haven. We call this our home, please don't let it be destroyed, we do not intend to give up, without a loud voice heard from.

Clara Schultz
Lot #41

Tampa, Florida 33684-1352

November 4, 1991

U. S. Army Corps of Engineers
ATTN: CESAJ-PD-F
Box 4970
Jacksonville, Fl 32232-0019

ATTENTION: Mr. Russ Reed, Study Manager

REFERENCE: South Florida Water Management District's Level II Backfilling Plan - Restoration of the Kissimmee River

Dear Sir,

This letter is with regard to restoration of the Kissimmee River. I consider the restoration of the Kissimmee River one of the most important wetlands restoration projects ever. There is only one Everglades in the world. The Everglades are dying due to the needless and senseless intervention of man (approved by the Army Corps of Engineers, I might add). The Kissimmee River is the headwaters of the Everglades. It's restoration would rewater approximately 29,000 acres of former wetlands.

This project is important to the people of Florida, the nation and ultimately the world. We must learn to nurture Nature's finest creations and undo as much as possible the harm we have created simply because we failed to understand just how wetlands and flood plains function to create a source of consumable (potable) water, as well, as sustain wildlife, fowl, fish, flora and fauna. Restoration of the Kissimmee River is important not only to the Everglades, but, Lake Okeechobee.

Lake Okeechobee supplies water to the human inhabitants of southern Florida. This restoration project should help insure future water quality to the lake. Accordingly, this will insure future water quality to millions of South Florida residents.

This restoration project is important, the people of Florida have worked long and hard to bring the need of project to those who can appropriate the funds attention. This project should begin immediately and not discussed or delayed any longer.

Sincerely yours,

Gloria Schuyler

Gloria Schuyler

[illegible]

Sincerely,
[illegible]

Dear Mr. Reed,
I am in favor of the restoration of the Kissimmee River. We should take care of the river because it is the headwaters of the Everglades. There is only one Everglades in the world. We must protect and restore the entire system!

Sincerely,
Lori Sheffield

Mr. Russ Reed
U.S. Army Corps of Engineers
Jacksonville, FL

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River. There is only one Everglades in the world and the Kissimmee river is the headwater of the Everglades. We must restore and protect the entire system. Thank you.

Sincerely,
[illegible]
Robert G. Sheffield
Director of Leisure Services
City of Winter Haven

[illegible] 58th [illegible]
Bradenton, FL 34[illegible]
[illegible] 1991

Mr. Russ Reed
Study Manager
U.S. Army Corps of Engineers
ATTN: CESAJ-PD-F
Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Reed,

I support the Modified Level II Backfilling Plan to restore the Kissimmee River. This river's restoration is essential to cleaning up the water quality in Lake Okeechobee; restoring the hydrology of the area, slowing down storm water runoff into the lake and on into the Everglades. There is only one Everglades anywhere on earth. The restoration of the Kissimmee River, cleaning up the water quality in Lake Okeechobee and restoring the water to the Everglades are all essential to the system.

Florida depends on its rain, its wetlands retaining part of the rainfall and evaporating it into the air to again fall as rain. To restore 78,000 acres of wetlands is to help Florida remain green rather than drying out into a desert as much of the world's lands are at Florida's latitude.

Thank you for accepting my comments.

Sincerely,
[illegible]

Florida 33830

November 3, 1991

Mr Russ Read, Study Mgr.
U.S Army Corps of Engineers
ATTN: CESAJ-PD-F Box 4970
Jacksonville, Fla. 32232-0019

Dear Mr. Reed:

Ever since I was a child, watching the denuded hills of Kentucky go into landslides, I've been concerned about the environment. So, I wish to endorse the "Modified Level II Backfilling Plan" to restore the Kissimmee River.

I've been in Florida since 1948 when I came to teach in Mulberry, heart of the

The landscape was ravaged and air and streams were polluted. You could taste acid on the wind. As the public demanded a clean up, gradually a restoration of the environment has happened.

This restoration could happen to the Everglades, only one of its kind in the world, headquarters of the Everglades. It will help future water quality of the Lake Okechobee. It would increase the bird population and benefit endangered species — bring back some of the old Florida I knew and loved forty years ago.

Sincerely, Bertha Seal

Nov. 4, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn: CESAJ-PD-F
Jacksonville, Florida 32232-0019

Dear Mr. Reed.

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely,

[illegible]

Nov. 6, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn. CESAJ-PD-F
Jacksonville, Florida 32232-0019

Dear Mr. Reed:

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely,
Preston Sizemore
Preston Sizemore

the Country Store & Café

TO ALL THAT I HOPE THIS WILL CONCERN!

10-11-91

TO COUNTY, STATE AND FEDERAL OFFICIALS-

TO THE MEDIA AND FELLOW CITIZENS!

THIS IS A LETTER WRITTEN FROM LOVE AND FOR LIFE. PLEASE READ IT ALL AS IT COMES FROM THE HEART.

I OWN THE COUNTRY STORE AT HIDDEN ACRES. OUR ROCKING CHAIR PORCH SITS 35 FEET FROM THE WATERS OF THE KISSIMMEE RIVER IN SOUTH CENTRAL FLORIDA. BY BOAT YOU CAN TRAVEL THE WORLD FROM OUR DOCK DOWN RIVER ACROSS LAKE OKEECHOBEE, OUT THE SAINT LUCE CANAL TO THE ATLANTIC OR OUT THE CALOOSAHATCHE RIVER TO THE GULF OF MEXICO.

I HAVE INVESTED LITERALLY EVERYTHING I HAVE IN THE CREATION OF THIS STORE AFTER WORKING IN THE FIELD OF ARCHITECTURE ALL MY LIFE.

ON A STRETCH OF RIVER APPROXIMATELY 65 MILES LONG, NORTH OF THE LAKE, I AM THE ONLY COMMERCIAL BUSINESS WHERE A FISHERMAN OR BOATER CAN BUY FOOD, GAS, ICE, ETC. OR GET EMERGENCY HELP. THE ONLY DOCKS WHERE AN AUDUBON SOCIETY MEMBER CAN TIE UP FOR A WEEK OR JUST THE NIGHT AND FILL HIS "SIGHTING" DIARY.

THIS LETTER IS IN REFERENCE TO THE PROPOSED KISSIMMEE RIVER RESTORATION PROJECT TO BE BROUGHT BEFORE THE U. S. CONGRESS IN THE EARLY MONTHS OF 1992 BY THE U. S. CORP OF ENGINEERS.

YOU! THE UNITED STATES ARMY CORP OF ENGINEERS, ARE OBLIGATED AS PUBLIC SERVICE EMPLOYEES , NOT JUST TO THE ENVIRONMENT, BUT TO THE PEOPLE WHO ARE AFFECTED BY YOUR OPINION OF WHATS GOOD FOR THE ENVIRONMENT.

YOU ARE DESTROYING COMMUNITIES NOW! HIDDEN ACRES ESTATES IS A COMMUNITY OF 114 FAMILIES - 193 HOME SITES. WE ARE PEOPLE FROM ALL OVER THE UNITED STATES WHO HAVE SELECTED THIS BEAUTIFUL LIVE-OAK FOREST, RIVER BANK LOCATION OVER ANY OTHER PLACE IN THE WORLD TO INVEST SAVINGS AND RETIREMENT MONIES, BECAUSE WE LOVE THE NATURALLY BEAUTIFUL AND UNSPOILED SETTING.

33 YOU SAY, "IT MAY BE FIVE YEARS BEFORE WE WILL ACQUIRE YOU SO WE CAN THEN FLOOD YOU! AND THEN CONSTRUCTION WILL TAKE 15 YEARS. YOU HAVE LITTERALLY KILLED US DEAD IN THE WATER! SALES OR RESALES ARE A JOKE DUE TO THE CLOUD YOU HAVE PLACED OVER US! FOR HEALTH REASONS, I NEED TO SELL MY STORE AND THERE IS NO THINKING BUYER THAT WOULD NOW TOUCH IT!

40 YOU SAY YOUR CONCERN IS TO RESTORE WETLANDS! HIDDEN ACRES HAS NEVER
37 BEEN A WETLAND! MAYBE YOU ARE COUNTING THE FLOOD THAT PUT NOAH TO WORK. WE HAVE OVER 400 ANCIENT LIVE OAK TREES HERE, SOME AS OLD AS 500 YEARS! THESE WOULD BE KILLED IF FLOODED!

PLEASE CONTINUE TO NEXT PAGE

RT. I, BOX 508, LORIDA, FLORIDA 33857

October 16, 1991

TO WHOM I HOPE WILL BE CONCERNED:

HIDDEN ACRES ESTATES, INC. IS NOT FOR SALE, to S.F.W.M. or the CORP. OF ENGINEERS, Or to anyone else.

Hidden Acres is very important to me it is my HOME. I am a registered voter in Highlands County. I am a tax paying citisen of the U.S.A. and the State of Florida.

It is very hard for me to believe that the congress of the U.S.A. and the Florida legislation would vote to spend well over 422 million dollars for the so called Kissimmee Restoration Plan when the economy of this country and the State of Florida is well on its way to disaster!

We don't have the money to feed the hungry, house the homeless, pay our school teachers a proper wage or provide medical treatment to those who can't pay the high prices for Doctors and medicne. Yet some organizations such as S.F.W.M. and the Corp. of Engineers, the Seira Club and some politicions, want to spend millions to "fill the ditch".

If all tax payers knew of this program I think that most would agree with me - "DON'T DO IT".

Please do me and others who might loose their homes, the curtisy of hearing our side of this issue before you vote to destroy our homes and life style. You have no idea how this project will devastate the economy of this area.

Here"s hoping that someone with the athority will put a stop to this feasco.

Sincerely,

Bill Smith

Bill Smith
964 CR 721 Lot 124
Lorida Fla. 33857 Phone No. 1-813-467-9604

U.S. Army
Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232

RE: Restoration of Kissimmee River

Dear U.S. Army Corps of Engineers:

As an ecology minded citizen, I am not against the restoration. I would gladly move and give up my ownership of land on the Kissimmee River for improvement of both the wildlife and water.

Although my family enjoys immensely our home on the river, River Acres Section, I was content that the cause was good, but now after the meeting at Okeechobee Civic Center, October 1, 1991, my losing ownership has become a major fear.

34 We were aware that we most likely could not replace our land with a similar purchase elsewhere, but now, talk of not buying our land or paying reasonable money, has caused great hardship.

All of my retirement plans and money sits on the Kissimmee River. After working and planning for retirement, I now have to live in fear, and the unknown of being able to ever retire. I have approximately 4 years to retire, and without the land, or equitable reimbursement, we will be forced to give up our dream.

Waterfowl and wildlife are dear to me, so is my family. If restoration is completed, please do not destroy families in the process.

As many folks are cursing and fighting against restoration, I am not. The projects goals are worthwhile, but not at the cost of making people homeless, or financially ruined.

Until questions concerning landowners are answered, our health, emotions, and finances will continue to be negatively impacted.

Please take action and save our homes, properly relocate, or save us financially.

Sincerely,

Bruce W. Smith

BRUCE W. SMITH
20000 N.W. 80th Drive
Okeechobee, Florida 34972

cc: President George Bush
Governor Lawton Chiles
State Senator Rick Dantzler
State House Representative Bert Harris
Irlo Bronson
SFWMD
U.S. House Representative Tom Lewis
U.S. Senator Bob Graham
Connie Mack

YOU ARE CONCERNED ABOUT WILDLIFE? COME LET US SHOW YOU SOME! DAILY WE OBSERVE DEER, WILD TURKEY, ALLIGATORS, RED FOR, BOBCAT, RACCOONS, WOOD DUCKS, GALLINULES, BLUE HERON, GREAT SNOWY EGRET, LIMPKINS, WOODSTORK, ETC., ETC.

WE ARE SUNG TO SLEEP AT NIGHT BY FOUR RESIDENT GREAT HORNED OWLS. THERE ARE SIX RESIDENT SCREECH OWLS UP AND DOWN OUR SHELL PAVED ROADS. IN THE CENTER OF 25 ACRE COMMUNITY A RED SHOULDERED HAWK RAISES HER YOUNG EACH AND EVERY YEAR. WE CAN WALK WITHIN 10 FEET WHILE SHE FEEDS LIZARDS OR FROGS TO HER NESTLINGS. A BALANCE OF THE ECO-SYSTEM CAN BE VIEWED AND APPRECIATED WITH IN EVEN OUR SMALL COMMUNITY MUCH LESS THE MILES OF RIVER WE ALL FREQUENT DAILY FROM OUR DOCKS. THE WATER IS CLEAN AND FULL OF LIFE. WE HAVE SEEN THE FLORIDA PANTHER CROSSING OUR ROADS AT DAWN AND DUSK, SEEN EVIDENCE OF THE BLACK BEAR AND WATCHED OUR GREAT BALD EAGLE SOUR ABOVE OUR HOMES.

35 IT IS NOT THAT WE ARE AGAINST ADDING WETLANDS FOR MORE OF GOD'S CREATURES TO THRIVE AND FIND SHELTER IN, WE ARE AGAINST THE DEVISTATING CONSTRUCTION THAT WILL BE ON THE RIVER CANAL FOR YEARS TO COME. AGAINST THE RAPE OF THE LAND AND WATER THAT WILL TAKE CENTURIES TO HEAL. IT HAS ALMOST COMPLETELY HEALED NOW FROM THE WHORENDOUS SCARING AND DEATH RENDERED IT BETWEEN 1961 AND 1971 BY THE U. S. ARMY CORP OF ENGINEERS.AS THEY DUG AND FILLED THEIR STRAIGHT CANAL.

WHAT ADDITIONAL DEATH AND LOSS WILL BE ADDED? HOW MANY SPECIES WILL BE RAVAGED IF THIS SO CALLED RESTORATION PROPOSAL GOES FORWARD? THE CORP HAS ADMITTED IT'S GROSS ERROR IN THINKING THAT THE GOOD OF ALL WOULD BE SERVED WHEN IT DUG THE STRAIT CANAL AND DISTURBED THE MARVELOUS MEANDERINGS OF THE OLD RIVER BED.

THE CORP HAS NEVER BEEN A FRIEND OF ECOLOGY! IT IS A MILITARY MACHINE! IT IS NOT FAMILIAR WITH THE SENSITIVE OR THE DELICATE!

THE CORP IS A SURGEON THAT NEARLY KILLED IT'S PATIENT BY AN ENORMOUS ACT OF MALPRACTICE! ALL AMERICANS PAID A DEAR FEE IN THE MULTIPLE MILLIONS FOR THE 10 YEAR SURGERY BETWEEN 1961 AND1971. THE LAND AND THE RIVER HAS PAID IT'S DEAR PRICE ONCE, AND NOW, 20 YEARS LATER, IT'S THREATENED AGAIN.

INSANITY HAS REARED IT'S HEAD AGAIN! ANOTHER SURGERY IS PROPOSED WITH A FEE OF OVER SIX-HUNDRED-MILLION DOLLARS THIS TIME AROUND. AND ANOTHER BED REST PERIOD OF 20 TO 30 YEARS TO HOPEFULLY RECOVER--CAUSE YOU SEE, THE SURGERY IS NOT GUARANTEED!

THIS TIME, PEOPLES' HAPPINESS, DREAMS AND PEACE OF MIND ARE INVOLVED!

56 LEAVE THE STRAIT CANAL ALONE! USE STONE OR TIMBER PILONS AS DIVERTERS TO INCREASE WATER FLOW INTO THE OLD RIVER BEDS DELICATELY OPENING THE BLOCKAGES. DO THIS WITH ENVIRONMENTAL CONTRACTORS, NOT THE CORP!

RETIRE YOUR MILITARY MACHINE!!!!!DON'T PUT IT IN BED WITH OUR ENVIRONMENT BECAUSE! ALLIGATORS DON'T SLEEP WITH THE RACCOONS, AND FOXES DON'T LIE DOWN WITH THE CHICKENS!

WITH UTMOST SINCERETY,

Emily Anne Smith

EMILY ANNE SMITH, OWNER OF THE COUNTRY STORE, ON THE KISSIMMEE RIVER
964 COUNTY ROAD 721, LORIDA, FLORIDA 33857 (813) 763-9532

1420 Harvard Street
Orlando, FL 32804

November 7, 1991

Russ Reed
Study Manager, U.S. Army Core of Engineers
ATTN: CESAJ-PD-F, Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Reed:

I am writing to request that you recommend that the restoration of the Kissimmee River proceed. I believe that this project is of great importantance because:

1. The Kissimmee River is the headwaters of the Everglades and there is only one Everglades in the entire world. The deterioration of this system could be slowed and perhaps even halted if the River were able to function naturally again to help clean the water flowing to the Everglades.

2. Lake Okeechobee is a dying lake with part of the problem being the poor water quality of the Kissimmee River. Cleaning up the water in the River by allowing it to filter through marshes along its course would be a great benefit to the lake.

3. I believe that the damage that has been done to this ecosystem should be repaired and that the restoration will benefit the people of Florida and their heirs as well as world in general and that this benefit is more important than the interests of the people who oppose it.

Please present a favorable recommendation for the restoration of the Kissimmee River.

Sincerely,

Raymond D. Smith, III

964 CR 721, Lot 124
Lorida, Florida 33857

October 11, 1991

To Whom I Hope Will Be Concerned:

$422,000,000 million dollars. I have never heard of a Government contract that didn't go way past its original estimate.

Can the State of Florida afford its share of this fiasco? The state can't pay its school teachers. The Governor is talking about a tax increase. The State economy is in bad need of funds.

The Kissimmee River Restoration plan proposed by South Florida Water Management and the Corps of Engineers would be a disaster to the people, counties, cities, and wildlife in the Kissimmee River basin.

The South Florida Water Management and Corps of Engineers want to confiscate land that has never been flooded and never will be.

I live in an R.V. Park, Hidden Acres Estates, Inc., 8 tenths of a mile south of highway 98 bridge. The area is called Fort Basinger. I am a permanent, year-round resident. The restoration project would take
40 at least one half of our park, 60 to 70 lots and units. The park is covered with oak trees. Oak trees will not live under water. Our area has never been a wetland.

If our park is to be flooded, the Corps of Engineers will have to build a bridge from Sebring, Florida to Okeechobee. Highway 98 will
60 be under water. This is ridiculous. If the locks and dams are removed, as stated in the proposal, the water level will drop -- not rise.

The dairies, ranches, and orange groves are polluting the river. Move them away from the river, not the people that have chosen to make this beautiful area their home.

Come see our area, come talk to us before another gigantic blunder is made by the Corps of Engineers.

HI and Dry in Hidden Acres!!

William S. Smith
phone: 813 467 9604

October 16, 1991

RE: KISSIMMEE RIVER RESTORATION

TO WHOM IT MAY CONCERN:

"NOT FOR SALE"
HIDDEN ACRES ESTATES, INC.

Like River Ranch we are not FOR SALE. The money the residents of Hidden Acres have invested is ASTRONOMICAL.

We have around 130 occupied homesites. We are on beautiful DRY LAND. We are in a beautiful oak hamock with trees hundreds of years old. (you see we couldn't be wet lands) Why do they want our property.

We have new park models (from $20,000. to $30,000). We have a little older park models, motor homes, campers and mobile homes. We all have florida rooms or porches and all have sheds. Our lots were very expensive.

On our water front we have a lot of boat docks that through rental help to pay our taxes. We have a beautiful office, shuffle board courts, a swimming pool with a shower, a clubhouse with a kitchen in one end and baths with showers and a laundry room attached, a large barn with a fence all around, a fenced in storage yard for boat trailers and sheds etc., and a very nice up-to-date store. We have a very nice park with a shed for serving food and drink and a big stage for bands etc. We have shell roads. What a nice park to live in.

We are built on a Historic Site, Fort Basinger. We also have an indian mound on our property. We have almost every bird and wild animal in Florida, even a Florida Panther. Hidden Acres Estates, Inc. is not poluting the River nor will the River ever flood us out.

41 The polution problems could only be the citrus groves and the cows. However I have heard from several of the old timers that the River has always been poluted even from the very first. There are many less expensive ways the River could be corrected. Come on less try some other ways to correct this River instead of using the millions of dollars that the Corp of Engineers and S.F.W.M. want to spend. Have you thought of the taxes we wouldn't receive anymore from properties sold or taken for the River?

Sincerely,

Vera Smith

Vera Smith
A Happy Resident
of Hidden Acres Estates, Inc.

964 CR 721, Lot 124
Lorida, Florida 33857
October 11, 1991

To Those I Hope Will Be Concerned:

After 35 years with Delta Air Lines I retired in 1985. My wife and I decided to make our home in Florida. We toured the state by boat and car for two years. We found a place called Hidden Acres Estates on the Kissimmee River. A unique, small community of trailers, park models, and mobile homes where people from all over the United States and Canada have settled. Some are retired, some come on weekends, some that come for the season and some that live here all year round.

We live Hi and Dry in our oak hammock. We have our own water system, swimming pool, clubhouse, country store and marina. I can get in my boat and go to the East coast or West coast. I am not land-locked.

I am a permanent resident. This is my home. I plan to spend the rest of my life here. I have approximately $60,000 invested in my home. Now, I understand that the South Florida Water Management and the Corps of Engineers want to destroy my lifestyle and move me out of the most unique place I could find in the State of Florida to live.

35 To put it mildly, I am upset. The Kissimmee River Basin is just now coming back to life after the last blunder made by the Corps of Engineers. Now they want to screw it up again to supposedly repair their last screw-up. The impact on the area is far greater than you've been led to believe. Listen to the people that will be affected and you will get the true story.

I cannot believe that the U. S. Government or the State of Florida would allocate funds to "Fill The Ditch" when there are far greater problems that need the millions of dollars that will be wasted on this so-called River Restoration.

Put yourself in our shoes. Talk to us, not the ones that want to destroy us. Come see our beautiful area before you make up your minds to allocate funds to destroy an area and lifestyle that is second to none.

Thank you for your help and consideration.

Yours truly, Wm. S. Smith

A voting, tax-paying citizen of hte U.S.A.
Atate of Florida and Highlands County

I would like to see the Kissimmee River restored - I value the system. It is the headquarters of the Everglades. There is only one Everglades in the world.

Restoration will help insure future water quality to Lake Okeechobee.

Please listen to our voices for us - our children & for all future generations

Thank you,

Joan K. Snyder
808-53rd Ave. E. 207-I
Bradenton, Fla.
34203

U.S. Army Corps of Engineers
Attn: CESAJ-PD-F
Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Reed,

I want to submit my support for restoring the Kissimmee River to its original natural state. This area of Central Florida is the headquarters of the everglades. Its restoration will help insure water quality and quantity to Lake Okeechobee as well as provide much needed wetland restoration for uncountable wildlife and environmental resources.

"Restore the River".

Very truly Yours
Louis W. Sanger
Paula M. Sanger
1445 Devils Dip
Tallahassee, FL 32308
Ph. [illegible]

Donna Stasiak
9851 Lancewood Dr.
Orlando, FL 32817
(407) 660-0343 work
(407) 678-7148 home

Mr. Russ Reed
Study Manager
U.S. Army Corps of Engineers
ATTN: CESAJ-PD-F
PO Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Reed:

I am very pleased and impressed with the feasibility study done by the Corps to restore the Kissimmee River. With success, this project will promote environmental restoration throughout the nation.

Not only would this plan restore valuable former wetlands in Florida, but it would also allow for the preservation of the wading bird population. It would also provide future water quality for Lake Okeechobee and help preserve the Florida Everglades. I commend the Corps on its efforts toward providing Florida with a more promising environmental future, and I offer my full support of such efforts.

I have spoken to many people about the efforts of the Corps, and the response has been one of high praise and favor. I hope to see a continuation of such careful studies of our environment.

With much thanks and sincerity,

Donna L. Stasiak

Donna L. Stasiak

DICKSON S. STAUFFER, JR.
430 Whitfield Avenue
Sarasota FL 34243
November 8, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
ATTN: CESAJ-PD-F
P.O.Box 4970
Jacksonville FL 32232-0019

Dear Mr. Reed:

We want the Kissimmee River restored in accordance with "Modified Level II Backfilling Plan".

We believe that it will be of great benefit to the Everglades.

We believe that it will return the rainfall on our coast to the levels we enjoyed before the rivercourse was changed.

We believe that it will be of benefit to Lake Okeechobee.

We believe that it will increase the bird population.

PLEASE, we want the Kissimmee River restored.

Thank you,

Willomette W. Stauffer
Willomette W. Stauffer

Dickson S. Stauffer, Jr.
Dickson S. Stauffer, Jr.

U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232

RE: "THE KISSIMMEE RESTORATION EXPERIMENT"

THE "KISSIMMEE RESTORATION EXPERIMENT" WILL BECOME ONE OF THE GREATEST MISTAKES IN AMERICAN HISTORY IF UNINFORMED PEOPLE ARE ALLOWED TO BLUNDER AHEAD AND REMOVE ONE OF THE GREATEST ENGINEERING FEATS EVER ACCOMPLISHED IN THE STATE OF FLORIDA.

THERE IS NO DOUBT THAT THE LOCKS HAVE MADE MORE WETLANDS THAN FLORIDA HAD PREVIOUSLY. WATER LEVELS ARE RAISED OVER A GREAT AREA AND ARE CONTAINED EVEN DURING HIGH FLOOD LEVELS. PEOPLE ARE SAFE FROM FLOODS.

JUST BECAUSE NATURE GIVES MAN SEVERAL YEARS OF DROUGHT DOES NOT MEAN IT WILL CONTINUE. THIS YEAR WETLANDS ARE RETURNING AT A TREMENDOUS RATE.

THE BENEFITS THAT FARMERS AND OTHERS RECEIVE FROM THIS SUPPLY OF WATER THROUGH THE CANALS, LOCKS, AND CONNECTIONS ARE INNUMERABLE.

LET US NOT MAKE A GREAT HISTORICAL FAILURE AND REMOVE A GREAT ASSET WHICH WAS WELL-PLANNED AND HAS MADE FLORIDA A BETTER PLACE FOR WILDLIFE AND PEOPLE.

VOTE "NO" ON THE "KISSIMMEE RESTORATION EXPERIMENT".

SINCERELY YOURS,

Beth Stock

Nov 4, [illegible]

U.S. Army Corps of Engineers
[illegible]
Jacksonville, Fl [illegible]

Dear Mr [illegible]:

I fully support the "Modified Level II Backfilling Plan" for restoration of the Kissimmee river. Restoring the floodplain to its original natural state will give the [illegible] bird population [illegible] [illegible] fishing [illegible] expected to increase as well. Another important benefit will be to help ensure future water quality to Lake Okeechobee.

Regards,
Brenda Stone

Nov. 4, 1991

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn: CESAJ-PO-F
Jacksonville Florida 32232-0019

Dear Mr. Reed

I am in favor of the restoration of the Kissimmee River

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades We must restore and Protect the entire System!

Sincerely
Megan Stover

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn:CESAJ-PO-F
Jacksonville, FL 32232-0019

November 7, 1991

Dear Mr. Reed,

Very few of us really understand what little is left of our Earth's natural resources and wildlife. I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the head waters of the Everglades. It is our responsibility to restore and protect the entire system! I am sure that we will be able to protect and enjoy what our Earth has to offer, with everyone's effort.

Sincerely,
Carolynn St. Pierre
Carolynn St.Pierre

Mr. Russ Reed
Study Manager
U.S. Army Corps of Engineers
ATTN: CESAJ PD F
Box 4970
Jacksonville, FL 32232-0019

November 6, 1991

Dear Mr. Reed:

I am writing to let you know that you have my wholehearted support for your "Modified Level II Backfilling Plan." Just in case the benefits are not obvious to everyone, they include improving the quality of:

- the Everglades, I believe the only wetland of its kind in the world;
- the water in Lake Okeechobee;
- the general conditions for wildlife;
- similar projects that follow, since they will be able to learn much from your project.

We cannot afford to turn our back on such powerful reasons for restoring the river. I wish you the best of luck in your efforts.

Sincerely,

Ake Stroede

Ake Stroede
8230 Sanderling Rd.
Sarasota, FL 34242

Mr. Russ Reed
Study Manager
U.S. Army Corps of Engineers
ATTN: CESAJ-PD-F
Box 4970
Jacksonville, FL 32232-0019

November 6, 1991

Dear Mr. Reed:

I just wanted to let you know that I think you are doing a wonderful job, and that your "Modified Level II Backfilling Plan" is extremely important. Thank you for coming to the rescue of Kissimmee River, Lake Okeechobee and the Everglades.

Sincerely,

Birgitta Stroede

Birgitta Stroede
8230 Sanderling Rd.
Sarasota, FL 34242

Mr. Russ Reed
Study Manager
U.S. Army Corps of Engineers
ATTN: CESAJ-PD-F
Box 4970
Jacksonville, FL 32232-0019

November 5, 1991

Dear Mr. Reed:

I am writing in support of your "Modified Level II Backfilling Plan." The benefits of restoring Kissimmee River will accrue to the whole nation, as there is so much at stake. The Everglades will be better off, which is of tremendous importance because of its uniqueness. That alone is a powerful reason to go ahead with the project. Add the benefits of the improved water quality in Lake Okeechobee and the better conditions for, and hence increase in, wildlife, and it is obvious that we have no real choice but to execute your plan. Other groups can then learn from your experience and use what they learn in implementing their own plans.

I realize it is easy to sit hours away from Kissimmee River and say "go right ahead!" Granted, your project will not affect me directly in the short run. But I feel that in cases like this we must look beyond our own immediate gains or losses to those of the nation as a whole and our position in the precarious eco system. Should your next project of this nature turn out to land on my own door step, I would like to think my support will be just as wholehearted.

Again, I applaud your effort to restore Kissimmee River. I hope our friends in Washington will realize its urgency too. Thank you.

Sincerely,

Kristina Stroede

Kristina Stroede
4411 Winners Circle #1214
Sarasota, FL 34238

Dear Mr. Reed:

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely,

Josh Stolen

11/29/91

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely,
Janie Sullivan

Aug 6, 1991

Mr. Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn: CESAS-PD-E

Dear Mr. Reed:

I am in favor of the reconstruction of the Kissimmee River.

The Florida Everglades are the best in the world and the Kissimmee River is essential to the Everglades and the wildlife that depends on the river. We must save the Kissimmee River!

Sincerely,
Ann Sullivan

November 6, 1991

Russel V. Reed
U. S. Army Corps of Engineers
Attn: CESAJ-PD-PF
P. O. Box 4970
Jacksonville, Florida 32232-0019

Re: Kissimmee River Restoration

Dear Mr. Reed:

I would like to add my voice to those who are committed to the restoration of the Kissimmee River. As an environmental advocate of twenty years, I have kept up with the issues regarding water quality. The engineering fix that occurred with channelization of this river has given us algal blooms, maximized polluted run-off, loss of wetlands for birds and mammals, and ugliness.

While there is much soul searching to be done about the reflooding of the previously drained lands as far as compensation, restoration must be accomplished, sooner rather than later. I do not understand why adjacent property owners feel they are due compensation since the riparian rights of the state seem clear, but that is a legal issue that I feel confident our Attorney General, Bob Butterworth, can resolve.

My concern is that the Army Corps of Engineers gets the message that Floridians are extremely anxious about our water supply. We want potable water for our urban needs and we want sufficient water to keep the Everglades healthy. We are well aware that this need can only be met with limitations on growth of demand. We will continue to work on this and your agency can help our hurt by your stand on wetlands protection.

Along with the Sierra Club, I support the Level II backfilling plan.

Thank you for your consideration.

Sincerely,

Joyce Tarnow

Joyce Tarnow, (305) 772-1123
531 E. McNab Road
Pompano Beach, Fl. 33060

cc Rep. Clay Shaw

Ginny Tarter
3260-3 Royal Canadian Tr.
Ft.Myers, FL 33907

U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

Attn: Russ Reed

Dear Sir:

It is imperative that the Army Corps of Engineers go forward with the Modified Level II Backfilling Plan for the restoration of the Kissimmee.

I understand the private landowners in Okeechobee County have concerns, but the Fl Water Mgmt. Dist. has taken great pains to address these converns while still restoring enough of the flood plain to keep the entire area from dying.

Please don't allow the time and money invested in the project to go to waste and the entire area to die out for the very special interests of a few greedy people.

Sincerely,

MR. & MRS. ANDREW J. TAYLOR, II
808 S.E. 10th ST.
OKEECHOBEE, FL 34974

Dear Sir:

I am writing to voice my opposition to the Kissimmee River Restoration Project.

I believe that this project would do untold damage to both the economy and the ecology of Okeechobee County.

34 Economically speaking, many people will lose the homes and investments they have made in the projected floodplain. The loss of more
45 dairies would severely impact Okeechobee County and its residents. There
41 will be a reduction in taxable property in a county that already has too little property of value to provide an adequate tax base. This project also
44 endangers the power plant project that the citizens of Okeechobee fought for and desperately need to boost the economy.

Finally, how can government consider spending so much on this project when schools, health care, prisons and other necessary public services are suffering?

Ecologically speaking, the Kissimmee River has developed a new
35 ecosystem; during the time since channelization. Restoring the old river would destroy this ecosystem and threaten the health of Lake Okeechobee once again. Perhaps the channelization should have never been done, but now that it has been done and the environment has adjusted, let us not destroy the new ecosystem that has become established.

I implore you to stop the efforts of the Army Corps of Engineers to restore the Kissimmee. I can never be returned to the way it once was. Please consider the needs of the newest endangered species, the Citizens of Okeechobee County, and put a halt to the Kissimmee River Restoration Project.

Sincerely,

Margaret S. Taylor

Margaret S. Taylor

MARY M. TEAHAN
1119 NORTH M STREET
LAKE WORTH, FLORIDA 33460

Nov 6, 1991

Dear Sir
U.S. Army Corps of Engineers
Jacksonville, FL

I am writing to urge the restoration of the Kissimmee River to the maximum attainable — called a Level 2 Restoration.

It is time to get on with the work to correct a long-standing, ill-advised channelization. The future of our water quality is at stake.

Thank you in advance for your efforts in this worthwhile cause. The children in Florida today will be the beneficiaries of this restoration.

Sincerely,
Mary M Teahan

5431 N.E. 25th Ave. #303B
Fort Lauderdale, Fl. 33308
November 6, 1991

U.S. Army Corps of Engineers
Attention CESAJ-PD-F
P.O. Box 4970
Jacksonville, Fl. 32232-0019

Dear Mrs Reed;

I am writing as a citizen of Florida asking you to please support the efforts to return the Kissimmee River to its original state. The water resources of our state are becoming desperate and before we become another California it is up to you to help us plan for the future.

Restoration of the Kissimmee may help reduce the loss of our migratory waterfowl and help our water resources for the future growing populations. With the sugar industries contempt for cleaning up their massive toxic runoff restoration of the Kissimmee is our best hope for addressing water resources.

The resettlement of families and communities is most unfortunate. But this is an issue that is much better adressed now than ten years from now when it will cost the state's taxpayers much more to move a greater number of families then. These families must be given fair compensation and it is implicit that they understand the importance of this issue.

Please do not cave in on this issue. This is the future of Florida. Will we have any wildlife in the future to attract those tourist dollars? And will we have a clean source of water for our own children and residents. Or shall we have to build huge, costly, polluting de-salinization plants to provide what we can and should have naturally.

Sincerely,

Roderick T. Tirrell

Hidden Acres Estates

Governor Lawton Chiles
The Capital
Tallahassee, Fl.
32399

Dear Governor Chiles

We at Hidden Acres Estates would like to play host to some [illegible] from your office so that we might explain and show the devastating effect the environmental restoration of the Kissimmee River would have on just under 200 families in this development.

We put a lot of thought, hard work and money into developing a peaceful retirement park.

We have dealt with the original blunder the Army Corp of Engineers made in turning a beautiful lazy, winding, natural river into a [illegible] wide channel with locks to control the waters in this area. After 20 years our river has healed to the point that our wild life, birds and fish are abundant now.

To fill this river at this time will mean loss of hundreds of oak trees which are hundreds of years old, up root many, many families, destroy the wild life, birds and fish which took over [illegible] years to replenish, to say nothing of spending 683 million dollars which would be better spent on education for our young and health care for our elderly.

[illegible]

35

October 18, 1991

US ARMY CORPS OF ENGINEERS
P O BOX 4870
JACKSONVILLE FL 32232

We attended the Okeechobee open meeting at the Civic Center on the restoration of the Kissimmee River on October 1, 1991. We were appauled that the attitudes of the South Florida Water Management Commission, the Army Corp of Engineers, and some of our state and federal officials could be so different from ours.

We are concerned about the envrionment, about preservation, and about wildlife. But, unlike the officials for the restoration project we have grave doubts about the results, the cost, and impact to the local economy along with the wildlife system that is now in place.

Listed below are our questions and opinions on the restoration:

1. Pollution:
The Kissimmee River (Canal C-38) is not polluted. We live on the canal in River Acres, Okeechobee County. We swim in the canal, fish the canal, and sit and watch beautiful sunsets over the canal along with the wildlife.

2. Wildlife Needs to be Restored:
35 We have plenty of alligators and do not need any more. We have turkeys, sandhill cranes, American bald eagle, herons, buzzards, and many other species of birds. We have armadillos, rabbits, bob-cats, gopher (land turtles), deer, snakes, coons, fox, etc. Fishing is great.

3. Flooding:
42 The canal was built to solve the problem. It is doing exactly what it was built to do. Why are we changing it in order to return the problem? We have a reservior for years of drought.

4. Buy Out of Property:
34 What happens to the economy of Okeechobee and Highlands Counties? The real estate person with the South Florida Water Management Commission said we were not river property but we were canal property and would be appraised as such. We bought and consider our property to be unique, beautiful, and not your normal canal property. We do not consider that it should be evaluated as other narrow, shallow and walled canals in Florida. How do we guarantee a fair appraisal?

5. Relocation:
61 If this project is approved, we feel that all property owners should be given the opportunity to sell as soon as it is approved. Not five or ten years from now. If we must move we would like to be able to begin our relocation search now. This matter is extremely important to us.

6. Cost:
62 How will the Counties of Okeechobee and Highlands recover their loss of income as a result of the impact of the restoration? The State of Florida cannot afford this project. At the present time only the United States Government can print money.

We would like to express our gratitude to the Okeechobee County Commission that presented a proclamation opposed to the restoration project at the October 1st. meeting.

We are opposed to the restoration project. We thank you for your attention to this letter and will appreciate a personal reply addressing our questions and concerns.

Sincerely,

Howard A. Thullbery Jr.

Mr. & Mrs. Howard A. Thullbery, Jr.
19590 NW 80th Drive
Okeechobee, FL 34972-9664

Hidden Acres Estates

U.S. Congressman
Sam Gibbons
The White House
Washington, D.C. 20510

Dear Sam

Jim and I have this lovely retirement home set up in Hidden Acres Estate in Highlands Co.

We and just under 200 families are very concerned about our well being because of the environmental restoration of the Kissimmee River.

We put a lot of thought, hard work and money into this development to assure a much needed, well earned retirement and now we are told us we are in the flood zone and will have to move. We question this flood plain because we have hundreds of oak trees which are hundreds of years old, and we find it hard to believe these trees would be here if the original river had flooded this area.

It has taken 23 years to heal from the original blunder that the Army Corp of Engineers made in turning this beautiful lazy, winding, natural river into a deep channel with locks to control waters in this area. We beg you to look into this matter and maybe realize that this $683 million dollars can be better spent on educating our young and health care for our elderly.

Sincerely Jim and Betty Turner

[illegible] Road #271 • Lorida Florida 33857 • (813) 763-8766

8-173

40
35

5 November 1991

Mr. Russ Reed, Study Manager
CESAJ-PD-F, Box 4970
U.S. Army Corps of Engineers
Jacksonville, FL 32232-0019

Dear Mr. Reed:

I write you in the greatest concern regarding the draft feasibility study and the Environmental Impact Statement on the Restoration of the Kissimmee River, and the restoration itself for which the two referenced papers were undertaken.

I understand that opponents of river restoration are inundating the Corps of Engineers with letters against the intended restoration. This is the restoration based on the Modified Level II Backfilling Plan; and I, as Conservation Chair of the St. John's County Sierra Committee, tell you that we strongly support this project.

I urge you to remember that the headwaters of the incomparable Everglades are the Kissimmee River. Consider the fact that the only way future water quality in Lake Okeechobee can be assured is through the recommended restoration. Do not forget that Florida will be able to demonstrate to the rest of the country an example of wetlands restoration without equal elsewhere.

Please do not be intimidated or distracted into retreat on this far-sighted project by a bunch of well-organized, self-interested letter writers. (One such group of opponents -- Hidden Acres Estates in Okeechobee County -- even insults our intelligence by basing their opposition on a jingoist appeal "to continue life, liberty and the pursuit of happiness on their own land". It would be laughable if it were not so destructive.)

Yours sincerely and respectfully,

Judith B. Ungermann

640 Gentian Rd.
St. Augustine, FL 32086-6403

Hidden Acres Estates

U.S. President
George Bush
The White House
Washington DC 20570

Dr. Mr. President

We at Hidden Acres Estates would like a government representative here in person so that we might show and explain the devastating effect the environmental restoration of the Kissimmee River would have on just under 200 families here.

We put a lot of thought, money and hard work in this development to assure a well earned peaceful retirement.

We have dealt with the original blunder the Army Corp of Engineers made in turning a beautiful lazy, winding natural river into a rapid man made deep channel. After 20 years the river has healed to the point of the return of our wild life, fish and birds and water can be controlled.

35 We feel our government can find more critical project to spend our tax dollars on such as education for our young people and health care for our elderly.

Sincerely

James M & Betty M. Turner

964 County Road #721 • Lorida, Florida 33857 • (813) 763-8266

8-174

Mr. Russ Reed
Study Manager
U.S. Army Corps of Engineers

Nov. 4, 1991

Dear Mr. Reed,

This is a plea for the restoration of the Kissimmee River. It is vital to the health of the Everglades and Lake Okeechobee. The Everglades is a wonderful natural aquifier. Florida is desperate for fresh water it seems that anything that can be done to strengthen & promote the growth of the Everglades should be given first priority. The Level 11 Backfilling Plan will help rewater thousands of acres of former wetlands. This is a vital and necessary step in bringing back part of our wonderful Everglades. no other place on earth like it.

Thank for your help

Sincerely,

Dorothy Van Balen

DOROTHY VANBALEN
400 S. Dakota Ave.
Tampa, Fl
33606-2504

Mr. James Reed, Study Manager

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River. I think this matter should be taken seriously because of its effect on the Everglades. The Everglades are important to Florida in many ways, and it is the only Everglades we have.

Concerned resident,
Sandy Turley

Sandy Turley

Mr. James Reed, Study Manager

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River. I think this matter should be taken seriously because of its effect on the Everglades. The Everglades are important to Florida in many ways, and it is the only Everglades we have.

Concerned student,
Brian A. Turley

Brian A. Turley

8-175

River Acres, Lot # 16
19960 N.W. 80 th. Dr.
Okeechobee, Fla. 34972

Dear Mr. President:

I am writing concerning the reconstruction of the Kississimmee River, canal C-38. The canal was built in the early sixities to control water flow by the U.S. Corp of Engineers. I live on the canal and the Attorney General of the State of Florida has stated that they want to condemn our property and take it because it is part of the flood line of the old river.

34 Many people that live in this area are retired and would have no where to go when no money is paid for their land and homes. The proposed cost of the proposal is six hundred plus million dollars. The cost would be much lower if they condemned our land. I believe with the economy as it is, this amount of expendure could be used to help more people than a certain group or groups.

I would appreciate it if you would look at the matter at hand. Changes can be made that would help the environment without taking our property. The South Florida Water Management and the U.S. Corp of Engineers proposal will be in Washington to be cecided on after January 92 until March 92.

35 We tried to sell our property last year because we had a business in Okeechobee and had to close it because of the economy. The Real Estate Agency had a sell, but the buyer read what the S.F.W.M. were going to do with the Okeechobee Lake and Kississimmee River and they bought on the St. Johns River north of us.

Sincerely Yours,
Pat Voce

Patricia Voce

cc: Lawton Chiles, Governor, State of Florida
Rick Dantzler, State Senate
Bert Harris, State House of Representatives
Irlo Bronson
Board of Governors, SFWMD
Tom Lewis, U. S. House of Representatives
Bob Graham, U.S. Senate
Connie Mack, U. S. Senate
U. S. Army Corps of Engineers

River Acres, lot # 16
19960 N.W. 80 th. Dr.
Okeechobee, Fla. 34972

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39 in Okeechobee and had to close it because of the economy. The Real Estate Agency had a sell, but the buyer read what the S.F.W.M. were going to do with the Okeechobee Lake and Kississimmee River and they bought on the St.Johns River north of us.

Sincerely Yours,

Walter Voce

Walter Voce

cc: Lawton Chiles, Governor, State of Florida
Rick Dantzler, State Senate
Bert Harris, State House of Representatives
Inlo Bronson
Board of Governors, SFWMD
Tom Lewis, U. S. House of Representatives
Bob Graham, U.S. Senate
Connie Mack, U. S. Senate
U. S. Army Corps of Engineers

THE CAPITAL
TALLAHASSEE,FLORIDA 32399

10/22/97

DEAR GOVERNOR CHILES,

IMAGINE YOU ARE STANDING ON TEN ACRES OF LAND IT IS COVERED WITH TREES AND WILDFLOWERS,THE AIR IS FRESH.THE WILDLIFE ABUNDANT IN THE MORNING YOU WATCH THE MOST GORGEOUS SUNRISE AND IN THE EVENING THE MOST BEAUTIFUL SUNSET YOU HAVE WORKED SO HARD FOR THIS DREAM AND IT HAS BEEN A REALITY FOR SIXTEEN YEARS.

YOU ARE BRINGING UP A FAMILY NOW,YOU ARE FAITHFUL IN SERVICE TO YOUR CHURCH,YOU HAVE A GOOD JOB AND YOU SEND YOUR CHIDREN TO PUBLIC SCHOOLS. YOU PAY TAXES AND YOU ABIDE BY THE LAWS

AND NOW THE STATE OF FLORIDA SAYS THE LAND IS THEIRS AND THEY WANT TO RECLAIM IT!!??!WE BOUGHT THE LAND FROM A REALTOR AND WITH AN ATTORNEY AND WITH A TITLE SEARCH AND TITLE INSURANCE TO BE PROTECTED AGAINST JUST THAT!!!!!

WE ARE REFERRING TO THE KISSIMMEE RIVER RESTORATION PROJECT WE LIVE IN OKEECHOBEE COUNTY BUT HIGHLANDS,POLK,OSCEOLA,AND GLADES COUNTIES WILL BE AFFECTED TOO.THE U.S. CORPS OF ENGINEERS ESTIMATES A TOTAL OF 67,843
41 ACRES AND MANY HOUSES,BARNS,MOBILE HOMES,DAIRIES,RANCHES,ETC.THIS FLOOD PLAN WILL DEVASTATE OKEECHOBEE COUNTY'S TAX BASE BECAUSE OF LOST REVENUE FROM THESE PROPERTIES.THIS COUNTY IS ALREADY IN AN ECONOMIC SLUMP

WHAT IS MORE ALARMING IS THIS PROPOSAL IS GOING TO BE VOTED ON IN CONGRESS WILL THESE SENATORS,REPRESENTATIVES,AND CONGRESSMEN FROM OTHER STATES BE ADVISED OF THE HOMES AND LIVES THAT LAY IN THE PATH OF THE KISSIMMEE RIVER PROJECT?

LET'S TAKE THE ESTIMATED 683 MILLION DOLLARS AND PUT IT INTO EDUCATION,UNEMPLOYMENT BENEFITS,AND A L.D.S RESEARCH

WE APPEAL TO YOU TO CRUSH THIS PROPOSAL JUST AS THE CROSS FLORIDA BARGE CANAL PROJECT WAS STOPPED FOR THE GOOD OF FLORIDA,FOR THE GOOD OF THE COUNTIES INVOLVED, FOR THE GOOD OF THE HARDWORKING, TAX-PAYING FAMILIES IN IT'S PATH, WE URGE YOU AND YOUR CABINET TO STOP THIS PROPOSAL. AND SENATOR GRAHAM YOU TOO MUST SQUASH THIS PROJECT

WE WILL RELY ON THE GOOD LORD TO DO WHAT HE SEES FIT.WE SHOULD RELY ON HIM TO FIX THE ECOSYSTEM ALSO!!MAN REROUTED THE KISSIMMEE RIVER TWENTY FIVE YEARS AGO AND ~~APPARENTLY THAT DID NOT SOLVE~~ THE PROBLEMS WHY CAN'T THE ENGINEERS AND SOUTH FLORIDA WATER MANAGEMENT DISTRICT GO BACK TO THE DRAWING BOARD AND DEVISE A NEW PLAN WHERE NO FAMILIES,HOMES,AND DAIRIES ARE LOCATED.ALSO IN IT'S PATH IS THE FLORIDA BAPTIST.CHILDREN'S HOME,A HAVEN FOR TROUBLED KIDS

THIS IS AMERICA WHERE DREAMS COME TRUE, NOT WHERE THEY ARE PULLED OUT FROM UNDER YOU!!!!!

YOUR CONSTITUENTS

Barry + Lesley Van Hassel

BARRY + LESLEY VAN HASSEL
6070 N.W. 154 AVE.
OKEECHOBEE, FLA. 34972

Ferry Walker
233 Rex Court
Lake Worth, FL 33461
11/6/91

Kissimmee River Res.:
Russ Reed, Study Mang.
U.S. Army Corp.

Dear Mr. Reed,

I am writing to urge the Corp to support and finance, at 75%, the "Modified Level II Backfilling Plan" for the rebirth of the Kissimmee River. This river is a vital link in the water chain to the Everglades National Park and the water needs for millions of people and farms "downstream". Already 'water wars' are a happening in south Florida. The estimated cost of $425 mil for the restoration of the Kissimmee River is but small change compared to what is at risk.

Thankyou,
Ferry Walker

Clean River = Clean Water

345 Canoe Trail Lane
Orlando, FL 32825

November 7, 1991

Russ Reed
Study Manager, U.S. Army Core of Engineers
ATTN: CESAJ-PD-F, Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Reed:

I am writing to tell you that I am in favor of the restoration of the Kissimmee River and to urge you to do everything within your power to assure that it is accomplished. My reasons for supporting this project are many, but the most important are:

1. The Kissimmee River is the headwaters of the Everglades and there is only one ecosystem of this type in the world. Much of the deterioration of this system is related to the ditching of the Kissimmee River and restoration will enable the River to function again as nature intended - to cleanse the water flowing to the Everglades.

2. Lake Okeechobee has also been degraded, in part, by the poor water quality of the Kissimmee River. This great lake is dying and cleaning up the water in the River by allowing it to filter through marshes along its course would assist in cleaning it - if the restoration occurs.

3. I believe that humans should right the wrongs they have done to the environment when it is within their power to do so and that the greater good that would come from this restoration outweighs the interests of the few who oppose it. There is much more at stake here in the long run than the interests of the people who live in the areas which would be affected by the restoration.

Again, I urge you most strongly to present a favorable recommendation for the restoration of the Kissimmee River.

Sincerely,

Blanche M. Wallace

Blanche M. Wallace

Samuel R. Wallace
5108 Lazy Lake Cir.
Orlando, FL 32821
4 November 1991

Mr. Russ Reed

Dear Sir,

I am requesting that you endorse and approve the Level II Backfilling Plan as one means of aiding Lake Okeechobee and the Everglades.

I am 77 years old and for the past 25 years I have witnessed the acceleration of the destruction of the Florida enviroment. I am sure that most informed caring individuals are aware of the rapid approach of the point of no-return and the destruction of the ecological system that has made Florida.
The Everglades are a national treasure and no individuals or developments should be permitted to adversely affect it to any degree.

Thank You,

Samuel R. Wallace

1 of 2

Oct 17th, 1991

State & Federal Legislators

Re: Kissimmee Restoration

Dear Legislators:

Please consider priorities important for the state, its citizens & future citizens when voting to spend hundreds of millions of tax dollars.

The "ditch" with its locks was a monumental mistake years ago. It did, indeed, devastate the ecosystem of the Kissimmee.

35 Now nature, who is wiser by far than man, has compensated & has in place a new ecosystem succoring flora & fauna.

Instead of tearing up everything as was done before, think!

With the increase in population the displaced species may have no place to go & will indeed die out & be unable to return.

Instead of attacking the root of the Everglades pollution; some self-serving, very vociferous interests want to throw hundreds of millions of dollars at pruning a few leaves off the top. This is not where big business (i.e. sugar, truck farms) are leaking nutrients into the marshes & canals at the very edge of the Everglades.

Meanwhile we can't educate future generations who will one day have to manage the ecology. The [illegible] much better spent on teachers & text

a-179

2 of 2

This whole world will never be as it was before man in his ignorance encroached & destroyed so much of it. Man has become too numerous even without considering greed.

The only way to manage is to learn from the mistakes of the past & attempt to mitigate the damage that must follow the population explosion.

Sincerely
Elizabeth K. Ware.

ARNIE WELBER
5001 N.W. 17TH PLACE
APT. 208
SUNRISE, FL 33313

Nov 3, 1991

Mr. Reed,

I'm concerned over Kissimee River restoration. I am for, I repeat for restoration. I'm also for compensating those residents a bit more than what gov't. offers. At very least they should be compensated well.

In any event it is best for protection of all concerned and all will benefit with Kissimee restoration project. Such a restoration is essential to our survival.

Sincerely

Mr. Arnold J. Welber

Nov. 4, 1991

Dear Mr. Reed,

I am in favor of the restoration of the Kissimmee River. As this river is the headwaters of the Everglades, the entire system needs to be restored and protected.

Sincerely,

Jane N. Whitney
2208 21st Street N.W.
Winter Haven FL 33881

Dear Mr Reed,
Please help restore the Kissimmee River I'd like to see it returned to its natural state.
Since I have spent many [illegible] canoeing & fishing on the Kissimmee River I would like to see it returned to its natural state. We need to insure the future water quality of Lake Okeechobee.
This will be the premier [illegible] & restoring [illegible] in the nation.
Please help us.
Sincerely yours
Missy [illegible]

HAL WIEDEMANN
901 Lake Shore Dr. #101
Lake Park, Fl. 33403-2847

November 6, 1991

Mr. Russ Reed, Study Manager
US Corps of Engineers
CESAJ-PD-F
Box 4970
Jacksonville, Fl. 32232-0019

Greetings-

Subject: Kissimmee River Restoration

I definitely want the Kissimmee River restored. It is needed for the well being of the area, Lake Okeechobee, and the Everglades. The wetlands must be restored. Nothing less than a Level 2 restoration, 70% of the river, will be needed.

Sincerely,

Hal Wiedemann

Richard T. Whitebrother
10901 Johnson Blvd.
Apartment 201
Seminole, Fl. 34642

November 3, 1991

Mr. Russ Reed,
Study Manager
U.S. Corps of Engineers
Jacksonville, Fla.

It seems to me the responsibility of the Corps to rectify the damage done when the Kissimmee River was channelized earlier by the Corps. The damage to the water quality of Lake O Keechobee has now become evident and restoration of the river channel would correct this materially. The lake was once a great fishing spot and could be returned to earlier productivity by improving the river water running into it.

Florida must not waste any more of its natural resources, so I urge you to move ahead on the Restoration Project.

Thank you,
Richard T. Whitebrother

Hidden Acres Estates

October 8, 1991

Barbara Williams
964 C.R. # 721
Hidden Acres #52
Lorida, Florida 33857

To Who it May Concern:

People don't like to talk much about the problems of being old. But one day when the kids are gone or finances or health aren't what they used to be you may have to make up your mind about where you're going to spend your remaining years.

From the moment we pulled into Hidden Acres in our motor home, we found the people here warm and helpful. In a few weeks we felt as though we had lived here all of our lives. After spending three winters here at Hidden Acres we sold our home and moved to Hidden Acres as full time residents. We invested our money into a mobile home, added a 14' X 34" room to give us more living space. We have everything we need. I am 65, my husband is 74. For myself we have a swimming pool, shuffleboard, and a clubhouse that is open 7 days a week, 24 hours a day. At the clubhouse we have card playing every night, in the day time the women have arts and crafts everyday.

For my husband his only hobby is fishing. He doesn't have to take his boat out of the water. All he has to do is get on his bike and go to the water. we have no crime here, so he doesn't have to take his fishing gear out of the boat. Where in the State of Florida can you find this or in any other state. The river is full of fish (this will not be after the restoration plan).

We found this paradise on earth we don't want to lose it. We don't want our land turned into swamp land. We want to live the rest of our lives in peace.

A member of the Sierra Club said "There are thing more important than a few home's", THERE ARE MORE THAN 100 HOMES, peoples lives are important.

Here age is nothing 2 at 65 have a dear friend of 33. We don't want to go and live with our children or a nursing home. We have all we need here.

A friend of my once said, " When I die and go to heaven it won't be a great adjustment as I have lived in Hidden Acres.

Sincerely,

Barbara Williams

Mr. Ross Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 ATTN: CESAJ-PD
32232 CK19

Dear Mr. Reed

I am in favor of the restoration of the Kissimmee River

There is only one Florida Everglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely,
Mary Williams

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn: CESAJ-PD
32232-0019

Dear Mr. Reed

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system.

Sincerely,
Robert Williams

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn: CESAJ-PD
32232-0019

Dear Mr. Reed

I am in favor of the restoration of the Kissimmee River.

There is only one Florida Everglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely,
Bobby Williams
Bobby Williams

RUSS REED 11-7-91
U.S. CORP. OF ENG.

DEAR SIR:
PLEASE SUPPORT LEVEL 2
RESTORATION OF KISSIMMEE
RIVER TO 70%.

THANK YOU.

Edward Wilson

Mr. Russ Reed, Study Manager
U.S. Army Corps of Engineers
Box 4970 Attn: CESAJ-PO-F
Jacksonville, Florida 32232-0019

Dear Mr. Reed:

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely,
Steve Windish

Steve Windish

Howard & Freda
Wise
1590 S.W. 28 St
Okeechobee Fla
34974

Dear Mr President:
I have received Several Request from
You Over the Years. I am Now asking
a Facion of you -
I am a Land owner in the Kissimmee
River Valley of the State of Fla -
Have been Since 1948 -
I purchased 425 A. of Native Land
I have Spent the better part of my
Life making a pasture from this
I have seen the River in Flood Stage
Many times before the Corp of Engineers
Controlled the River. We Now have
Water in Dry Seasons. Before the
Engineers took Control of the River
the Marshes Were so Dry Untill
They Would Catch on fire & Burn For
Weeks - In places the River Was so
Low it Was only a trickle -
You could Walk accross it -
The Engineers have done, and are
doing a Good Job of Managing
the River. It Works perfect -

I cannot Under Stand Why the People
that have the power to convert this
perfect Working Project back to the
flooding or Bone Dry times -
People that Say they Wont to see the
Like it Was 100 yrs Ago, Wasnt here
100 yrs Ago - I can tell them What it
Was 60 yrs Ago - I assure You they
Wouldnt Wont any part of it -
Mosquitos Were so thick You could
Rake them from Your Horse by the
Hand full. We built Smokes &
63 Smudges for the Cattle & Horses to
Get around - I am afraid When the
Marshes are Flooded the Mosquitoes
Will return -
I am thinking When You hold Water
in these up land Marshes & ponds, in
real Dry times there Wont be any Water
there. There Will be more Water in the
the River 30 ft Deep & 300 ft Wide
There fore leave the River as is.
The back filling Will only fill places
that Will Hold Water -
The Water is Good - It surpasses State
qualifications -
The press has Miss Repersented

The quality of the Water Money times
It is known to be the best Water that
Goes into Lake Okeechobee.
There is Some of the best Land in the
World in the Kissimmee River
Valley, Don't take it Away from the
People that Live there & Make their Living there.
Use the $683 Million for Education, health
& Human Services where it is needed -
It Sure isn't need in the Kissimmee
River Valley - We have one of the best
Operating Progects in the U.S.A -
Thanks for reading this Letter -
Hope it Will do Some good

Howard & Freda Wise

Dear Mr Reed, Nov. 6, 1991

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely,
Veronika Woodruff

Nov. 2, 1991

Mr. Russ Reed
Study Manager
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Fl 32232-0019

Dear Mr. Reed,

I would like to express my support for the Backfill Plan to restore the Kissimmee River. The Kissimmee must be restored to its natural flow. This will provide the floodplain needed by wading birds. It will allow the wetland grasses to grow which provide shelter for fish and a place for snails to deposit their eggs. Perhaps then the snail kite will return to the area.

The natural marsh filtering system will help prevent agricultural runoff from reaching Lake Okeechobee. Water from the Kissimmee flows southward and eventually ends up in the Everglades. We must restore this natural flow so that the water will be cleaner and better able to support our wildlife.

I realize that people have settled in the floodplain area and I am sorry that they will be displaced. The government moves people when highways are built and the restoration of the Kissimmee is far more important.

Sincerely,

Susan Yorke

Susan Yorke

Nov. 6 1991

Dear Mr. Reed

I am in favor of the restoration of the Kissimmee River.

There is only one Everglades in the world and the Kissimmee River is the headwaters of the Everglades. We must restore and protect the entire system!

Sincerely

Mrs. C. Woodruff

120 S.W. 96th Terrace, #203
Plantation, Florida 33324
November 4, 1991

Mr. Russ Reed
Study Manager
U.S. Army Corps of Engineers
Attention: CESAJ-PD-F
Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Reed:

We am writing to indicate our support for the Restoration of the Kissimmee River based on the "Modified Level II Backfilling Plan". It is extremely important to restore the Kissimmee River, as this river is the headwaters of the Everglades, and there is only one Everglades in the world. Also, restoration will help insure future water quality to Lake Okeechobee. In addition, this project would be the premier wetlands restoration project in the nation. We urge you to support the Restoration of the Kissimmee River, since this action will help insure ecological and environmental quality for all of us.

Sincerely yours,

Ingrida Zebelins

Ingrida Zebelins, Ph.D.
James Kolze, R.Ph., M.B.A.

James Kolze

To Whom It May Concern:

I am one of many concerned Citizens that live on the Kissimmee River who feels the Corps of Engineers are trying to give us the shaft again.

I have lived through and seen the blunders and damage the Corps has done to the State of Florida. I have been a resident off and on since 1906. Have been retired here since 1971. Living in Georing for 18 years
41 before settling here at Hidden Acres. We felt this to be the ideal place the rest of our lives. If this plan of restoration of the river goes through, thousands of acres of taxable lands will be lost to County and State Governments, who cannot find Revenue enough now to carry on necessary services they are committed for.

The Hidden Acres R.V. Community where I bought my home was told the feasability study submitted by the
33 Corps, showed that we would loose 62 structures. That is nearly half of our park. The rest of the Park would have a hard time existing with that loss. If we wanted to get out, who would want to buy?

The Corps of Engineers track record certainly is not one to be proud of. After spending Millions on the Cross Florida Barge Canal. It was stopped when it was about half completed. The Kissimmee Big Ditch did not accomplish what it was supposed to do. Now Mother
35 Nature has about healed the damage this has done, as the wild life is finally coming back. Now They want to fill it all in and disrupt Mother Nature again.

Next the financing: Six Hundred Million Dollars Federal Funding. Two Hundred Million Dollars State Funding. Where is this money coming from? The State does not have enough money now to educate our children properly. President Bush says he will veto a bill to fund unemployment benefits to out of work people because they don't have the money.

My proposal is to leave the River alone and not give the Engineers a chance to screw up again.

Sincerely,

Charles Zimmerman

EMERALD ISLE
North Carolina

The B. Cameron Langston Bridge rises above Bogue Sound. The bridge connects the mainland with Bogue Banks and provides a broad scenic view of the intracoastal waterway. *Photo by Lou Clammer*

[redacted]

POST CARD

I want Kissimmee River restored to Level 2

Put it back like it was

E. K Jordan

Russ Reed - Study Mgr
US Corps of Engineers
CESAJ-PD-F
Jacksonville, Florida
32232-0019

Crystal Coast Post Card Co., P.O. Box 65, Swansboro, NC 28584

Plastichrome®
Boston, MA
02130-4598

Dear Mr. Reed,

The Kissimmee River must be restored. The historic floodplain needs to be restored if we are to be successful in insuring the future water quality to Lake Okeechobee.

Sincerely

Dear Engineers,

Restore the Kissimmee River!

to at least to level #2 - 70%
Don't let a small self serving interest group sway you now
We need to look at the total Florida environmentally for centurys to come.
Don't compound this man made catastrophy by changing level #2 - 70%
Restore Kissimmee River. Sincerely,
Ann [illegible]

Restore Kissimmee River
to level 2 which will restore
70% of the river -

Sincerely
Virginia Caron
1333 NW 4th Ave.
Delray Beach
FL 33444

Restore the Kissimmee River to level II, which will restore 70% of the river

Sincerely,
Florence Feustel
402 Lake Dr.
Delray Beach 33444
Fl.

Dear Mr. Reed:

The people of Florida want our Kissimmee River restored to its former beauty, before being destroyed by the ditch. This is a chance for the Corps to right one of the many destruction projects done by the corps.

There is only one Everglades, and we need to protect it, not make it into a sewer.

We need to restore the previous quality of the lake, and also insure a steady flow of water into the Everglades.

This would be the premiere project and would show the corps could be constructive, instead of destroying our country. G.R. Trollweiler

11/16/91

11/5/91

Please restore the Kissimmee River to level 2 which will restore seventy percent of the River!

Madelyn Gumpert
4234 Frances Drive
Delray Beach, FL
33445

Swallow-tailed kite and revived oxbow, representative of restored sections of the Kissimmee River.

Photographs © 1989 Jeff Ripple

Dear Mr Read,

Please help to insure future water quality to Lake Okeechobee by restoration —

Thank you —

Doris Handley

RESTORE THE KISSIMMEE

PETERSBURG, FL 337 24
PM
05 NOV
1991

[redacted]

Mr Russ Read
Study Manager
US Army Corp of Engineers
Box 4970
Jacksonville, FL
32232-0019

Attn: CE SAJ - PD - F

Florida Sierra Chapter
Kissimmee Restoration Committee
203 Lake Pansy
Winter Haven, FL 33881
(813) 956-3771

JOHN MILLER ©87

Kissimmee River restoration plan (modified level II backfilling). This restoration will insure future water quality to Lake Okeechobee, and help increase the headwater flow to the Everglades.

Dick Harrison
879 Shore Rd
Nokomis, FLA
34275

WHAT is THE hold-up ON THE RESTORATION of THE KISSMMEE RIVER? GET GOING WITH THE PROJECT! START BACKFILLING! TELL THE ARMY CORPS OF ENGINEERS TO START THE LEVEL II BACKFILLING PLAN INTO MOTION. THIS project WILL improve THE water quality in THE OKEECHOBEE AND INCREASE FLOW TO THE EVERGLADES.

PAUL K. HAWKINS
3428 MINEOLA DR.
SARASOTA FL 34239

BEGIN THE KISSMMEE RIVER RESTORATION project! IT WILL IMPROVE THE WATER QUALITY FOR THE OKEECHOBEE AND INCREASE WILDLIFE AND RECREATIONAL FISHING!

GEO. HERBST
4223 BOWLING GREEN CIRCLE
SARASOTA, FL 34233

~~Please~~ the Kissimmee River to Level 2 — (70% would ~~[illegible]~~ be completed)

Betty B. Kiszka
11913 Dunes Rd
Boynton Beach Fla
33431

Dear Mr. Reid:

Please continue your plans to restore the Kissimmee River. This should never have been done to the river in the first place. We love the Everglades and this will be a big help, also it will help the quality of water to Lake Okeechobee. This plan to restore the river has been going on for too long. We do want the Kissimmee River restored as please proceed as planned.

Sincerely,
Lou La Rue
450 SE 9th Ave
Pompano Bd, FL 33060

Nov. 2, 19[illegible]

Swallow-tailed kite and revived oxbow, representative of restored sections of the Kissimmee River.

Photographs © 1989 Jeff Ripple

SAINT PETERSBURG, FL 337 81

RESTORE THE KISSIMMEE

Mike Lund

Florida Sierra Chapter
Kissimmee Restoration Committee
203 Lake Pansy
Winter Haven, FL 33881
(813) 956-3771

JOHN MILLER ©87

[redacted] 11/5/91

US [redacted]

ATTN: CESAJ-[redacted]

JACKSONVILLE, FL 32232-0019

RE: "MODIFIED LEVEL II BACKFILLING PLAN"

DEAR MR REED:

AS A TAMPAN, BORN AND REARED, HAVING LEFT FOR COLLEGE AND NOT RETURNING FOR MANY YEARS, HAVING LIVED IN UTAH, NEBRASKA ILLINOIS BUT COLORADO MOSTLY, AND, HAVING MOVED BACK FIVE YEARS AGO, TO FLORIDA, I WOULD LIKE TO URGE IMPLEMENTATION OF THE US CORPS PLAN MENTIONED ABOVE.

SEEING AND HEARING OF THE VARIOUS THINGS HAPPENING IN MY STATE - FLORIDA, I'M CONVINCED OF THE NEED TO AT LEAST NOW PROTECT WHAT WE HAVE LEFT OF FLORIDA — AND ITS ESSENCE, THE EVERGLADES.

THE KISSIMMEE RIVER, ITS HEART-BEAT AND HEADWATERS, MUST BE RESTORED.

ITS HEALTH, LAKE OKEECHOBEE, MUST BE SUSTAINED WITH INSURED WATER QUALITY.

THE UNIQUE OPPORTUNITY TO GIVE LIFE BACK TO FLORIDA TO CARRY OUT ITS DESTINY — FLORIDA WOULD PROUDLY CARRY THE PREMIER WETLANDS RESTORATION PROJECT IN THE COUNTRY.

PLEASE MOST SERIOUSLY CONSIDER THIS VITAL COURSE.

SINCERELY,

J. Johnston

710 S ORLEANS AVENUE

TAMPA FL 33606

Swallow-tailed kite and revived oxbow, representative of restored sections of the Kissimmee River.

Photographs © 1989 Jeff Ripple

499 Sevierstone
Palm Harbor FL
Jacksonville
05 NOV
1991

Dear Mr. Russ Read,

Please help restore the Kissimmee River it is important both ecologically and aesthetically it would be a great service to all. Please help.

Caroline Mar

Florida Sierra Chapter
Kissimmee Restoration Committee
203 Lake Pansy
Winter Haven, FL 33881
(813) 956-3771

RESTORE THE KISSIMMEE

Mr. Russ Read
Study Manager
US Army Corp of Engineers
Attn: CESAJ-PD-F
Box 4970
Jacksonville, FL
32232-0019

South Carolina Department of Parks, Recreation & Tourism
1205 Pendleton Street, Suite 106
Columbia, South Carolina 29201

WEST PALM BEACH, FL 33
1991

We want Kissimmee River Restored to Level 2

Eugene Mara
1500 Lucerne ES
Lake Worth Fl 33460

Russ Read study Mgr
US Corps of Engineers.
CESAJ PD-F- Box 4970
Jacksonville, Fl-
32232-0019

Dear Mr. Russ Reed.

Restoration of the Kissimmee River would be the Premiere Wetlands restoration Project in the Nation. This Project is very important to the Ecology of the Everglades.

Sincerely
Joseph C Mante

Dear Mr. Reed,

Please advise the Army Corps of Engineers to proceed with the intended restoration of the Kissimmee River. This will be one of the most important national rehabilitation of a wetland area in the state, if not nationally.

The people of Florida want the Kissimmee River restored. The Kissimmee is the primary headwater to the Everglades. It's restoration will insure better water quality in Lake Okeechobee. Creating a floodplain will increase recreational fishing and promote the proliferation of native wildlife. Endangered species, such as the Bald Eagle, Snail Kite and wood stork, will find habitat to increase their numbers. The primary cause of decreasing animal species is the disappearance of available habitat. I'm for any effort to create more wild areas.

Ted Morris
1211 34th St., Sarasota, 34234

Swallow-tailed kite and revived oxbow, representative of restored sections of the Kissimmee River.

Photographs © 1989 Jeff Ripple

SAINT PETERSBURG, FL
PM
5 NOV
1991

RESTORE THE KISSIMMEE

The [redacted]

Mr. Russ Reed

Billy Murray

Florida Sierra Chapter
Kissimmee Restoration Committee
203 Lake Pansy
Winter Haven, FL 33881
(813) 956-3771

Swallow-tailed kite and revived oxbow representative of restored sections of the Kissimmee River.

Photographs © 1989 Jeff Ripple

Clwtr 34695

Dear
Mr. Russ Read
Please Help
restore (Save)
the Kissimmee river
Evonne Parker

RESTORE THE KISSIMMEE

Mr. Russ Read
Study Mngr.
U.S. Army Corp of Eng.
ATTN: CE-AJ-PD-F
Box 49-0
Jacksonville, FL
32232-0019

Florida Sierra Chapter
Kissimmee Restoration Committee
203 Lake Pansy
Winter Haven, FL 33881
(813) 956-3771

JOHN MILLER ©91

November 6, 1991

Please restore the Kissimmee River to at least level #2 so that 70% of the river will be restored.

Hester Hugh Park
520 Chapel Hill Boulevard
Boynton Beach, Florida
33435

Swallow-tailed kite and revived oxbow, representative of restored sections of the Kissimmee River.

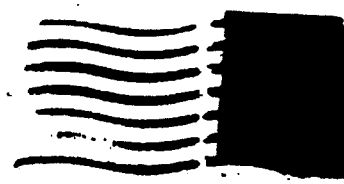
Photographs © 1989 Jeff Ripple

2970 Cinderwood Dr.
Clearwater, FL

SAINT PETERSBURG, FLA. 31
PM
03 NOV
1991

Dear Mr. Read,
I would like you to please restore the Kissimmee River to its natural state.
Thank You!
FLORINE RUNCOR

RESTORE THE KISSIMMEE



Mr. Russ Read
Study Manager
U.S. Army Corp of Engineers
ATTN: CESAJ-PD-F
Box 4970
Jacksonville, FL
32232-0019

Florida Sierra Chapter
Kissimmee Restoration Committee
203 Lake Pansy
Winter Haven, FL 33881
(813) 956-3771

JOHN MILLER

Swallow-tailed kite and revived oxbow, representative of restored sections of the Kissimmee River.

Photographs © 1989 Jeff Ripple

SAINT PETERSBURG, FLA.
PM
03 NOV
1991

RESTORE THE KISSIMMEE

Florida Sierra Chapter
Kissimmee Restoration Committee
203 Lake Pansy
Winter Haven, FL 33881
(813) 956-3771

JOHN MILLER

EMERALD ISLE
North Carolina
An aerial panoramic view of Bogue Sound at sunset. Twilight provides a tranquil setting [redacted] boats slip peacefully through the water.
Photo by Lou C[redacted]

Put Kissimmee back like it Was —

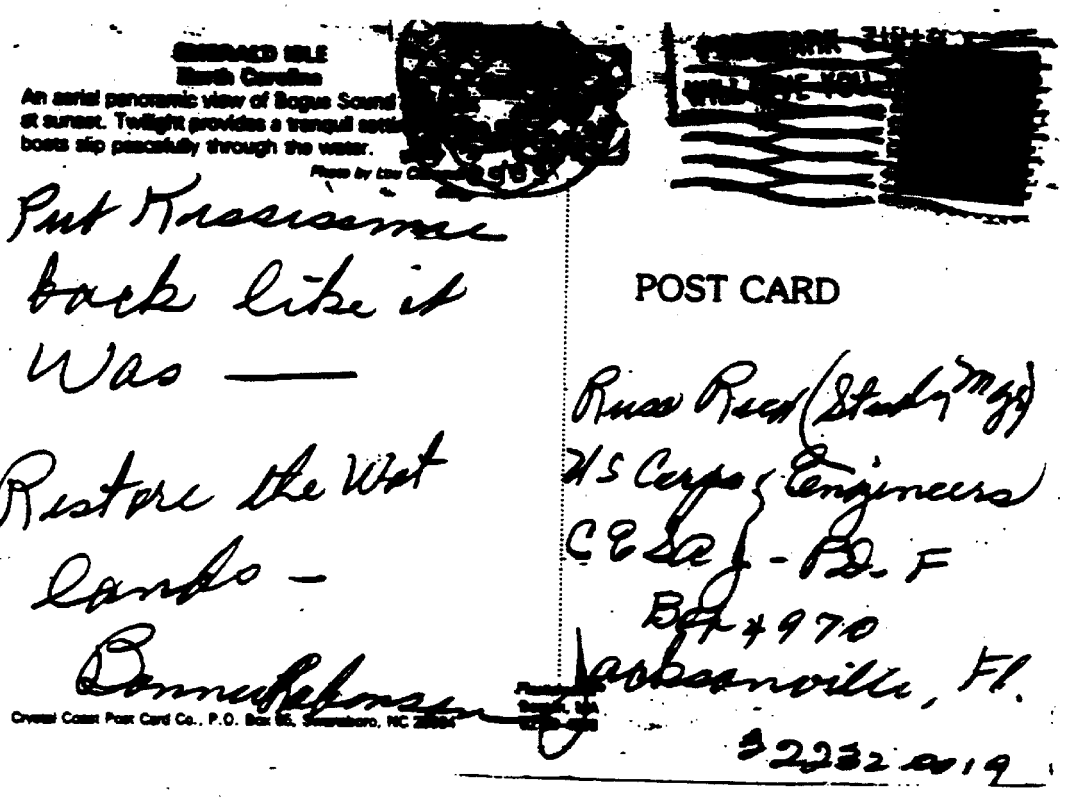
Restore the Wet lands —

Bonnie Robinson

Crystal Coast Post Card Co., P.O. Box 65, Swansboro, NC 28584

POST CARD

Russ Reed (Study Mgr)
US Corps of Engineers
CESAJ - PD-F
Box 4970
Jacksonville, Fl.
32232 0019



Dear Sir,

I support the Mud-Level II Backfilling Plan to restore the Kissimmee - please note this would involve almost 30,000 acres of wetlands, increasing habitat for many endangered species including bald eagle, woodstork, and snail kite. Thank you.

Barbara Relicke, 9495 Evergreen Pl #405
Ft. LaUderdale, FL 33324

PALM BEACH, FLORIDA
Breaking in Florida's sun, resort visitors lounge on Palm Beach's Clean Sand.

WEST PALM BEACH, FLORIDA
PM
6 NOV
1991

Put Kissimmee back like it was -
Restore the Wetlands -

Kellie Robinson

Post Card

Russ Reed - Study Mgr.
US Corps Engineers
CEDRJ-PD-F
Box 4970
Jacksonville, Fl.
32232-0019

D & M Postcard Company, 5011 Georgia Ave., West Palm Beach, FL 33

~~US Corp~~ of Army Engineers 11/6/91
Russell Reed

Mr. Reed Study Manager
The Corp of Engineers
Must restore the
Kissimmee River to
at least 70% of its
functioning level.

Stella Rossi
625 Whispering Pine Rd
Boynton Beach Fla
33435

Swallow-tailed kite and revived oxbow, representative of restored sections of the Kissimmee River.

Photographs © 1989 Jeff Ripple

DEAR RUSS Read,
PLEASE
SAVE THE
KISSIMMEE
RIVER. Thank You
Shira Sheppard

Florida Sierra Chapter
Kissimmee Restoration Committee
203 Lake Pansy
Winter Haven, FL 33881
(813) 956-3771

RESTORE THE KISSIMMEE

Mr. Russ Read
Study Manager
US Army Corps of
Engineers
ATTN. CESAJ-PD-F
Box 4970
Jacksonville, FL
32232-0019

MINNESOTA

Famous for its "10,000 Lakes" (which actually number over 15,000) and where the fishing is as great as the scenery.

3673

KY SIDES
34 PALLADIUM PLACE LAKE WORTH
33967

R RUSS, REED;
EASE RESTORE THE KISSIMMEE
VER. THE PEOPLE OF FLORIDA
ANT IT SAVED. SAVING IT
LL ALSO SAVE THE DYING
KE OKEECHOBEE AND THE
FFERING EVERGLADES. WE
VE HERE! SAVE OUR WATER
PPLY PLEASE.
THANK YOU;
Victoria Sides

Photo © Ken Dequaine
Printed in U.S.A. CP7174

Carnwheel Co. · 162 State St. · P.O. Box 7370 · St. Paul, MN 55107 USA

post card

Mr Russ Reed
U.S. Army Corps of Engineers
Attn CESAJ-PO-F
Box 4970
JACKSONVILLE, FL
32232-0019

Mr. Reed,
We support
the Kissimmee River,
being restored
to a level 2.
Go it please.
Sincerely
Heather Stewart
Michael Stack
125 Yucatan Dr.
Point Sprng, Fl
33461

Russ Reed
U.S. Corps of
Engineers
CESAJ-PDF
BOX 4970
Jacksonville,
Florida
32232-0019

Swallow-tailed kite and revived oxbow, representative of restored sections of the Kissimmee River.

Photographs © 1989 Jeff Ripple

Dear Mr. Reed,
My Compliments,
encouragements, on
the work, and restoration
already done.
I hear the
Kissimmee as a river
is gaining Worth.
I send you the Love
Alan Stewart

Florida Sierra Chapter
Kissimmee Restoration Committee
203 Lake Pansy
Winter Haven, FL 33881
(813) 956-3771

JOHN MILLER ©91

RESTORE THE KISSIMMEE

Mr. Russ Reed
Study Manager
U.S. Army Corps.
of Engineers
ATTN CESAJ-PD-F
Box 4970
Jacksonville, Fl.
32232-0019

[redacted]

Dear Russ Reed,

I strongly support the level 2 restoration of 70% of the Kisummee River project.

We definitely need to have this restoration to conserve some of the best of our natural resources in the State of Florida.

Please use your good influence to bring about this restoration.

Thank you so much for your help

The Rev. George P. Werner

Rev. George P. Werner

Swallow-tailed kite and revived oxbow, representative of restored sections of the Kissimmee River.

Photographs © 1989 Jeff Ripple

7970-4[illegible] N.
Pinellas Park, FL

Dear Mr. Read,

Please help restore the Kissimmee River. It will help keep Lake Okeechobee alive and well. This will be the premiere wetlands restoration project in the nation, and possibly, the world.

Deborah Kaspersen

Florida Sierra Chapter
Kissimmee Restoration Committee
203 Lake Pansy
Winter Haven, FL 33881
(813) 956-3771

RESTORE THE KISSIMMEE

Mr. Russ Read
Study Manager
U.S. Army Corp of Engineers
ATTN: CESAJ-PD-F
Box 4970
Jacksonville, FL
32232-0019

Dear Sir: -
We want
Kissimmee Restored
to Level II -
to save Everglades
Edith Woeber
321 Fordham Dr
Suite 1
Fla 33460

RIVIERA BEACH, FLA.
Bridge over intercoastal waterway connecting Singer Island mainland of Riviera Beach.

D & M POST CARDS, WEST PALM BEACH, FLORIDA

ADDRESS

Russ Reed study mgr.
U.S. Corp of Engineers
C ESAJ PDF
P.O. Box 4970
Jax,
Fla 32232-
0019

I request you Restore the Kissimmee River to level 2 which will restore ~~the~~ 70% of the River

Florence Willett
4325 Shallowpoke Ln.
Boynton Beach, Fl.
33436

U.S. Corp Engineers, Please
Restore the Kissimmee
river to level 2 which will
restore seventy percent of
the river.

M. J. Woodfield
3619 Royal Fern Cir.
Boynton Bch. Fl. 33436

Swallow-tailed kite and revived oxbow, representative of restored sections of the Kissimmee River.

Photographs © 1989 Jeff Ripple

Florida Sierra Chapter
Kissimmee Restoration Committee
203 Lake Pansy
Winter Haven, FL 33881
(813) 956-3771

RESTORE THE KISSIMMEE

Mr. Russ Read
Study Manager
U.S. Army Corp. of Engineers
ATTN: CESAJ-PD-F
Box 4970
Jacksonville, FL
32232-0019

Swallow-tailed kite and revived oxbow, representative of restored sections of the Kissimmee River.

Photographs © 1989 Jeff Ripple

Florida Sierra Chapter
Kissimmee Restoration Committee
203 Lake Pansy
Winter Haven, FL 33881
(813) 956-3771

RESTORE THE KISSIMMEE

Mr. Russ Read
Study Manager
U.S. Army Corp of Engineers
ATTN: CESAJ-PD-F
Box 4970
Jacksonville, FL
32232-0019

1412

Dear Mr. Reed,

I have mailed two other petitions to you that declare support for the U.S. Army Corps of Engineers' restoration plans for the Kissimmee River.

I realize these petitions may not carry as much weight as letters from each of the individuals on the petitions, but I wanted you to know that they are a very real indication of support, in this part of Florida at least, for restoring the Kissimmee River.

These petitions were placed in different convenience stores in Winter Haven and were all signed within a few hours. The attendants on duty didn't ask people to sign, they each said that all of those who signed, without exception volunteered their support with enthusiasm.

Sincerely,

Karen W. Kaplan
2930 Plantation Rd.
Winter Haven FL.
33884

WE NEED YOUR SUPPORT

I SUPPORT THE KISSIMMEE RIVER RESTORATION PROJECT. THE KISSIMMEE RIVER IS THE HEADWATERS OF THE EVERGLADES AND WITHOUT ITS RESTORATION, THE CONSEQUENCES TO THE EVERGLADES COULD BE DEVASTATING. RESTORATION EFFORTS WILL ALSO HELP INSURE FUTURE WATER QUALITY TO LAKE OKEECHOBEE. THE KISSIMMEE RIVER MUST BE RESTORED.

NAME	ADDRESS	PHONE
1. Mrs. Karen W. Kaplan	2930 Plantation Rd. Winter Haven, Fl 33884	813 324-1292
2. Maurice N. Sion	410 Alachua Dr S.E. W.H. Fl	
3. Jim Evans	1901 Manor Cir. SE	
4. Jean S Reed	27 Lk. Eloise Dr W.H.	324-0702
5. Dave Zellers	368 Pasco Ct. WH	324 4203
6. Mary Caldwell	1922 Cypress Gardens Blvd W.H.	422-7618
7. Gregory Dixon	1116 Ave B Haines City	
8. Mr & Mrs Ken Ellison	109 PEDLER'S POND LAKE WALES FLA 33853	
9. Stanley Cramer	116 Hillcrest Dr. W.H.	324-4440
10. Mr. Mrs John Gregg	Winter Haven Fl.	
11. Marie Mell	1210 Helena Dr W.H 33884	
12. [illegible]	PO Box 5735 Eloise FL 33880	
13. [illegible]	PO Box 1495 Winter Haven, Fl 33883	
14. Diane Butler	410 W. Lk. Summit Dr. 33884	
15. Florence Cloud	156 Lake Roy Dr. SE. WH	3244745
16. [illegible]	205 DeSoto Rd SE WH	33884
17. [illegible]	[illegible]	

I SUPPORT THE KISSIMMEE RIVER RESTORATION PROJECT. THE KISSIMMEE RIVER IS THE HEADWATERS OF THE EVERGLADES AND WITHOUT ITS RESTORATION, THE CONSEQUENCES TO THE EVERGLADES COULD BE DEVASTATING. RESTORATION EFFORTS WILL ALSO HELP INSURE FUTURE WATER QUALITY TO LAKE OKEECHOBEE. THE KISSIMMEE RIVER MUST BE RESTORED.

NAME	ADDRESS	PHONE
1. Tracey Fletcher	4638 Weston Rd, Barlow	533-5852
2. [illegible]	2930 Plantation Rd	324-7662
3. [illegible]		
4. D.A. Moore	590 Moore Club Rd Barlow	533-7565
5. [illegible] King	110 2nd ST Davenport Fl	421-2612
6. [illegible]		
7. [illegible]	2969 [illegible] Rd.	324-[illegible]
8. Jill Storck	4704 Hammond Dr.	293-6639
9. Edna M Turville	1625 Dickens Rd.	439-6312
10. Robert McKinney	116 Akron Ave	324-5482
11. [illegible]	129 Chavers	324-8533
12. [illegible]	WINTER HAVEN	324-1696
13. [illegible]	Winter Haven	324-9557
14. Cynthia Wedding	P.O. Box 2003 Auburndale, Fla	965-1210

WE NEED YOUR SUPPORT

I SUPPORT THE KISSIMMEE RIVER RESTORATION PROJECT. THE KISSIMMEE RIVER IS THE HEADWATERS OF THE EVERGLADES AND WITHOUT ITS RESTORATION, THE CONSEQUENCES TO THE EVERGLADES COULD BE DEVASTATING. RESTORATION EFFORTS WILL ALSO HELP INSURE FUTURE WATER QUALITY TO LAKE OKEECHOBEE. THE KISSIMMEE RIVER MUST BE RESTORED.

NAME	ADDRESS	PHONE
1. Perie Powers	2940 Silver Spur Loop S. Lake Wales	678-1392
2. Jim Pearson	58 Morningside Rd. Winter Haven	299-1582
3. Andrew Nicholson	58 Morningside Rd Winter Haven	299-1582
4. Mimi Tadeyeske	2000 Dundee Rd Winter Haven	297-9150
5. Evonne Corthell	119 Beck St SE. Winter Haven	324-6177
6. Edward Freeman	2404 Adair Rd Davenport	422-7982
7. Michelle Sozi B		676-8545
8. [illegible]	4000 Country Club Rd Winter Haven	325-0942
9. Walt Grulke	Lake Wales	696-8003
10. Sheri Cook	339 Sterling Dr. Winter Haven	324-8578
11. [illegible]	4950 Fairmont RD Lake Wales	439-5530
12. Jerry L Powers	2940 Silver Spur Lp S Lake Wales	678-1392
13. [illegible]	1750 Crump Rd. W.H	324-1467
14.		

November 6, 1991

We, the undersigned, are strongly in favor of the restoration of the Kissimmee River. We feel that this is extremely necessary in order to protect Lake Okeechobee and the Everglades as well as to restore many of the lost wetlands in the lower part of Florida. Please do all that you can in order to insure that this project moves ahead as originally planned. Thank you.

Name	Address
Bridget Ausmus	4635 Ring Neck Road Orlando, Fla 32808
Kimberly Smith	1402 Kimberly St. Ocoee, Fl. 34761
Tonja Johnson	3737 Candlebber St Orlando, Fl 32812
[illegible]	5218 Via Alizar Dr #7 Orlando, Fl 32839
[illegible] Northcutt	1323 Carriage Drive Orlando, Fl 32837
Lyticia Emery	1932 Ok Fountain Dr. #628 Orlando, Fl. 32839
Shannon Taylor	442 N. Lakeview Ave. W. GRD, Fl 34781
Maria Figueroa	731 Burch Ave. Winter Garden, Fl
Richard Wright	3006 Lk Arnold Pl. Orlando, Fl 32806
Thomas C. Rodney	P.O. Box 616181, Orlando 32861

Name	Address
[illegible]	805 Dartmouth St. Orlando
[illegible]	[illegible] Orlando
[illegible]	2209 [illegible] Terrace, Orlando
[illegible]	[illegible] Berryhood Dr, Orlando
Luiz Trindade Jr.	10162 Brandon Cr. Orlando.
Glenda Roig	4236 Tymberwood Ln. Orlando, Fl

Name	Address
Janelle Mannon	725 Wilkinson St Orlando 32803
April Manning	346 Center St. Chuluota, Fl 32766
Wendy Jo Furr	8026 Granada Blvd Orlando 32836
Michael Powell	6820 Windstream Ter Orlando 32818
[illegible]	7681 Conroy Rd. Orlando, Fl. 32861
Rachel Bowers	815 E Lewis Ln Apopka, Fl 32703

Name	Address
[illegible]	[illegible]
Erica C. Hill	1704 Bruce St. Kiss., Fl 34741
Nichole M Smith	1271 Fifth St. Clermont, Fl. 34711
[illegible]	201 Orlando Drive [illegible]
[illegible]	[illegible]
[illegible]	[illegible] Orlando Fl [illegible]
[illegible]	[illegible] Ave, Orlando, Fl 32809
Jon Phillips	214 E Chester St Minneola, Fl 34755

Name	Address
Deborah Anderson	2525 Waterview Pl Windermere Fl 34786
Heather Arnold	2627 Central Ave. Kiss. Fl. 34741
Kim Nesler	2208 Villano Ave Orlando Fl 32818
Lynnelle Barreras	834 N. Jerico Dr. Casselberry, Fl. 32707
Kenny Venson	4717 S. Texas Ave. C Orlando Fl 32809
Carla Washington	1948 Lake Atrium Ct Orlando Fl. 32809
Sabena Deen	6500 Parson Brown Dr. Orlando Fl 32819
Sandra Brown	7624 Udine Ave Orlando, Fl 32819

Name	Address
[illegible]	[illegible]
Melissa Gray	1708 Windwillow Rd
Orville [illegible]	[illegible] Bon Air Dr
Dudley Smith	6323 Lakewood Court Orl. Fl 32818
Kimberly Robertson	6303 Westgate Dr
Shawn Carrasco	712 E. Lakeshore Dr. Orlando Fl 34761
Maria Veronica Nosti	126 Citrus Dr Kissimmee, FL 34743-5901
LARAMARIE ORTEGA	5901 TRADE WIND LANE Orlando, Fla 32819

Name	Address
Charles Hung	1908 Lake Heritage Dr. #328 Fl 32839
Louella Hall	1400 Lake Highland Orlando, Fla.
Nicole Aleandri	4408 Montauk St Orlando, FL 32808
Stephanie Kellyann	6460 Ridgeberry Dr. Orlando, Fla. 32819
Gina Klocko	8215 SUN SPRING CIR. #53 Orlando, FL 32825
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RESPONSES

The following section includes summaries of specific comments and our responses. The number of each comment-response corresponds to the numbers on the commenting letters that proceed this section.

1 - **Bird-aircraft strike hazards at Avon Park Air Force Range.**

Comment: Increased bird populations could increase the bird-aircraft strike potential at Avon Park; methods to minimize this hazard should be investigated.

Response: The Corps and SFWMD will continue to work closely with the Air Force to resolve this concern. Bird strikes to aircraft are potentially hazardous to pilots' lives and are of grave concern. Presently bird strikes at the Avon Park Bombing range are with vultures almost exclusively. Vultures, as well as bald eagles and wood storks, may soar to within the range of altitudes used by the training aircraft - 300 feet to 500 feet. Wading birds other than wood storks, and waterfowl feeding in the river basin ordinarily fly below 100 feet.

Migrating waterfowl, as differentiated from stopped-over, feeding flocks, commonly fly at higher altitudes, and could pose a threat to training aircraft at Avon Park. However, the restoration project is not expected to influence waterfowl migrations. At best, the restored flood plain may influence migrant birds to stop-over in the basin. Once down for feeding, resting and roosting, they would remain at low (ground-level to just over tree-top) altitudes until they leave. Arriving and leaving flocks are expected to be seasonal and to make their departures at dawn.

Although the restoration project is not expected to increase the incidents of bird strikes over the Avon Park Bombing Range, conditions will be monitored and close liaison with the Air Force will be maintained for purposes of detecting any problems that may arise, so that corrective actions can be taken. During phased construction, monitoring would be expected to reveal any problems, should they arise.

Corrective actions may require water level management in the vicinity of the range. Bird frightening techniques commonly cause birds to take flight or remain in the air near the place that holds an attraction such as food or roosting places. Usual techniques include explosive noises (compressed air or gun powder) and scarecrows. Unusual techniques include falcon releases. These

techniques do not appear feasible on the scale required in the Avon Park Bombing Range area, nor are they likely to have the desired effect of causing waterfowl to leave an area.

2 - **Security and public safety at Avon Park Air Force Range.**

Comment: Loss of spoil piles adjacent to the channel could reduce Avon Park boundary security and present a hazard to public safety by allowing uncontrolled access to targets and the impact area.

Response: We will continue to work closely with the Air Force to develop plans for fencing or other means to ensure that public safety and military security are maintained as required.

3 - **Effects on targets at Avon Park Air Force Range.**

Comment: Changes in surface and ground water conditions could impede maintenance of targets.

Response: Analyses of major tributaries to the Kissimmee River flood plain found that most have sufficient slope to localize high groundwater and backwater effects created by the restoration plan. Tributary drainage will be further analyzed during later preconstruction engineering and design studies, and any problems found in the Avon Park Air Force Range will be mitigated to the satisfaction of the Air Force.

4 - **Cattle grazing at Avon Park Air Force Range.**

Comment: How will the project affect cattle, grazing use, and grazing leases?

Response: Prechannelization effects of grazing was probably minor on about 75% of the flood plain because records show that this portion of the flood plain was inundated fairly continuously and dominated by broadleaf marsh and wetland shrub communities - conditions that are not amenable to heavy grazing use. Grazing probably did play an important role in the ecology of wet prairie that occurred primarily along the periphery of the flood plain.

Grazing pressure is expected to have a similar role in the restored system because restoration will produce similar hydrology as prechannelization (i.e., 75% of the flood plain typically will be continuously inundated and the peripheral 25% will undergo seasonal wet-dry cycles on an annual basis). This hydrology will lead to a similar distribution of plant communities as that which occurred in the prechannelization condition. This was verified by the Demonstration Project monitoring which showed reestablishment of broadleaf

marsh and wetland shrub on drained flood plain that had been subjected to grazing pressure since channelization was completed.

Grazing will be permitted on the restored flood plain but will be incorporated in a land management plan. Any impacts of increased grazing pressure on flood plains that are being reestablished as wet prairie will diminish as the wetland evolves over time. Moreover, these impacts primarily will involve plant species composition, whereas the hydrology of wet prairie and juxtaposition with other flood plain wetland habitats that confer most of the functional values of this habitat type for wildlife.

5 - **Real estate interest at Avon Park Air Force Range.**

Comment: The Air Force could not surrender control of its property in the project area due to the proximity of air-to-ground target areas and concerns for protecting public safety.

Response: As addressed in the final Real Estate Supplement, coordination with the Air Force is continuing to determine the appropriate method of providing the necessary lands for the project.

6 - **Florida National Scenic Trail (FNST) effects.**

Comment: Removal of an earth dike surrounding an impoundment known as "Boney Marsh" will render the FNST no longer available for public use; the dike should be retained or adjacent lands acquired for public access.

Response: Several alternatives to maintain the integrity and use of the Florida National Scenic Trail will be considered during later preconstruction engineering and design studies, including relocation to the edge of the flood plain and maintaining the existing dike.

7 - **Displacement of homes and related social effects.**

Comment: Affected families and homeowners should be consulted about mitigation options; every consideration should be given to appropriate mitigation to ensure that families are not unnecessarily displaced.

Response: Affected families and homeowners will continue to be informed of project developments, and provided opportunities to provide input to project design and implementation. Mitigation of effects on real estate will be developed in accordance with the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. We are currently investigating alternatives to acquisition of affected properties,

including dikes or other structures which will allow existing residential areas to remain in place.

8 - **Restoration of Paradise Run and Lake Kissimmee Outlet Reach marsh.**

Comment: Restoration of Paradise Run and construction of flow-through marsh facilities in Pool A are recommended.

Response: Although consideration was given to restoration of Paradise Run, it was not recommended because there is no non-Federal cost sharing sponsor for this feature at this time. The Recommended Plan includes, as a locally preferred feature, shallowing in Pool A and upper Pool B and gated weirs to divert flows into the original river channels. These measures will promote wetland inundation in Pool A.

9 - **Flood plain acreage.**

Comment: The 49,000 acres of flood plain should be qualified to the extent that it is between Lake Kissimmee and the bottom of Pool E.

Response: The text has been revised to indicate that there are 44,000 (rather than 49,000) acres of flood plain between Lake Kissimmee and the lower end of Pool E.

10 - **HEP unit clarifications.**

Comment: The HEP units in Tables 23, 30 and 31 should be footnoted to show which values came from the HEP update and which were estimated.

Response: The Table 23 footnote refers the reader to Annex G, where an explanation of all data is located. HEP data in Table 30 and Table 31 are from Table 23.

11 - **Endangered species monitoring.**

Comment: Endangered species should be added as a category for monitoring studies.

Response: Endangered species has been added as a category for monitoring studies.

12 - **Reference Fish and Wildlife Coordination Act Report.**

Comment: The 1986 Fish and Wildlife Coordination Act Report should be mentioned in the list of sources cited or used in the study.

Response: The 1986 Fish and Wildlife Coordination Act report has been included in the list of sources cited or used in the study.

13 - **Water quality effects.**

Comment: Table 18 should be revised to reflect more degraded water quality in the existing and without project conditions; and the importance of a potentially significant nutrient load reduction from the Kissimmee River into Lake Okeechobee is disregarded.

Response: Statements regarding nutrient loads carried by C-38 have ben revised to more accurately reflect the significance of the nutrient issue. Although dissolved oxygen concentrations are extremely low throughout the system and several pools have elevated nutrient levels, the Kissimmee River cannot be considered highly polluted. A high water pollution designation would be more appropriate for water bodies that are subjected to high inputs of industrial chemicals, sewage effluent, or other concentrated pollutants.

14 - **Navigation effects.**

Comment: The concern that low flows may reduce navigation because depths may be periodically less than three feet in four locations may be overstated.

Response: The restored section of the river would be similar to what existed prior to 1954. From historical records on conditions in the river at that time, a depth of 3 feet could not be insured at all times and particularly during the dry periods. In those records shoaling was a constant problem and the shoals apparently shifted from one area to another in the river and made navigation hazardous. Based on past experience, a return to pre-1954 conditions is not a non-issue.

Identifying four locations in the river with less than 3 feet of water as the only impact areas does not account for other factors influencing boating. The low flow conditions will also affect access points which will have shallow water making launching and retrieval difficult to accomplish. The occurrence and movement of shoals will make navigation difficult. The four shallow water locations will not be just bumps in the waterway to hop over but reaches of waterway that have shallow depths. Since the 10 percent time frame of low

flows causing low water occur primarily during the peak boating periods inthe area, the impact on boating becomes more significant not less.

15 - **Historic sites effects.**

Comment: Historical impacts are discussed with relatively shallow data bases. Very few Indian sites were identified from an apparent literature search with a statement that more may be found in the vicinity with anticipated adverse effects from the project. The original river course during the recent history (1950's) would have had the same effects had the C-38 never been constructed. The placement of fill material on top of the anticipated unrecorded sites may have protected the site from erosion and human disturbance, but the re-exposure should not be considered adverse unless they would be greater had the C-38 project never been completed.

Response: The Kissimmee River cultural resources data base is limited since the basin has received little systematic, professional cultural resources investigation to date. However, our literature search included archival research, an on-site visit, preliminary assessment of structures, bridges and vernacular architecture, interviews with persons knowledgeable about the area's history and prehistory, and coordination with the State Historic Preservation Officer.

Based on data collected during the archival and literature search, we believe that unrecorded archeological sites were covered by spoil during construction of C-38, and predict that removal of that spoil during restoration may create adverse effects. More to the point, spoil from C-38 construction covers portions of known, recorded archeological sites, including fragile, linear earth mounds that are likely to be adversely affected if spoil is removed. Mitigation plans will be developed in consultation with the State Historic Preservation Officer and the Advisory Council on Historic Preservation and executed prior to construction.

While the comment identifies erosion and human disturbance as sources of adverse effects to cultural resources, it does not consider effects from construction and changes in the hydrologic regime, which we predict will also create significant adverse effects. Effects to cultural resources from changes in the hydrologic regime will be based on a comparison to the without project condition, and not to the historical hydrologic condition or a hypothetical (without C-38) condition.

16 - **Clarification of the Kissimmee River ecosystem profiles.**

Comment: Figures 18 and 20 need to have Y-axis and identification of the flow.

Response: Figures 18 and 20 are graphic cross section views that show a profile, or "slice," of the Kissimmee River ecosystem in the central and northern areas of Pool B. Vertical (Y-axis) differences in the profile line display topographic differences across each section; the vertical differences are not to scale.

17 - **Project cost sharing.**

Comment: The Corps should work with the State of Florida and the SFWMD to work out a cost sharing agreement that incorporates significant Federal financial support; a Federal share of 75% of project costs should be recommended.

Response: For Kissimmee River restoration and any other proposal for modification of an existing water resources development by removal of one or more of the project features which would adversely impact the authorized project purposes or outputs, Corps policy requires that the non-Federal sponsor pay for: all lands, easements, rights-of-way, relocations, and disposal areas; 50% of the project's construction cost; and all future costs for project operation, maintenance, repair, replacement and rehabilitation.

18 - **Corrections and clarification of data.**

Comment - The report provides some data generated and contributed by Florida Game and Fresh Water Fish Commission biologists that are incorrect or misinterpreted.

Response: Suggested corrections have been incorporated into the final report, with the exception of the following:

II. The explanation for the use of the figure of 140 ducks is presented in Annex G under "Ducks." Several factors enter into selection of this estimate, and it remains controversial. The erroneous citing of Toland for this figure has been removed from the text.

III. We were aware of both occasional drawdowns above S-65 and the hydraulic energy gradient across lakes Kissimmee, Hatchineha and Cypress. These hydraulic characteristics were studied in 1961 surrounding the request by South Florida Water Management District to drop from the project a structure which had been proposed at the outlet of lake Hatchineha. These hydraulic

characteristics will be re-addresses in the Section 1135 study which will analyze the performance of new regulation schedules on Lake Kissimmee.

The Corps of Engineers has no gaging authority of responsibility in the Kissimmee River Basin. Meteorologic and hydraulic gaging falls within the purview of the South Florida Water Management District who owns and operates the project.

V. The explanation for quantities of ducks and waterfowl used in the report is presented in Annex G. There is room for professional disagreement over the numbers.

VI. The numbers of user days should indicate 136,600 "existing," 136,600 "without," and 134,500 "with project." These numbers are from Appendix E.

VII. The entire approach to monitoring criteria will continue to receive close study and interagency coordination.

19 - **Lake Kissimmee Outlet Reach shallowing.**

Comment: Shallowing of the reach from S-65 to the upstream limit of C-38 backfilling in Pool B should be included in the Recommended Plan.

Response: Shallowing of the Lake Kissimmee Outlet Reach is included in the Recommended Plan as a locally preferred feature.

20 - **Containment levees.**

Comment: The location and construction of the containment levees and associated borrow canals must be done with care and coordination; additional information is required for proper design of these levees.

Response: The location and construction of containment levees and associated borrow canals will be developed in coordination with all affected and interested parties.

21 - **Timing of Headwaters Revitalization Project.**

Comment: The Headwaters Revitalization project should be completed in a timely fashion; permit conditions may be requested to ensure that the project will be completed expeditiously.

Response: The Headwaters Revitalization Project is an essential component of the overall concept for Kissimmee River restoration, and necessary to achieve

the results expected of the Recommended Plan in the Lower Basin. We anticipate and intend to complete the Headwaters Revitalization Project expeditiously. Appropriate conditioning of a permit is accepted as probable, and the Corps may wish to enter pre-application discussions with the Florida Department of Environmental Regulation.

22 - **Effects on wetlands.**

Comment: How many acres of existing wetlands will be affected? There should be a demonstration that wetlands impacts have been minimized to the greatest extent practicable.

Response: While over 3,800 acres of the Kissimmee River Lower Basin's existing wetlands are not expected to change significantly, about 10,200 acres of other existing wetlands will be rejuvenated and will have increased functional values, and over 15,000 acres of new wetlands will quickly respond to restored river flows and will reestablish in the flood plain. An estimated 29,000 acres of wetlands will result. About 6.6 acres of existing wetlands will be lost by the construction of the containment levees and related structures. All measures will be taken in later design and subsequent construction to ensure that wetlands are avoided, and where unavoidable, effects are minimized or mitigated.

23 - **Excavating material to create potholes.**

Comment: We are concerned about excavation of material to create potholes if the quantity of backfill material in existing spoil piles is insufficient; material from the closest unused spoil mounds should be used.

Response: Backfill material will be taken from adjacent spoil piles until the supply is exhausted. If additional material is needed for a particular backfill reach, and additional spoil is not reasonable available, material will be excavated from the adjacent flood plain to create potholes adjacent to the channel. Potholes will vary in size and depth depending on the amount of material needed, but depths will not exceed ten feet and side slopes will be gradual, avoiding vertical or steep slopes.

24 - **Credit for LERRD.**

Comment: Crediting of LERRD costs (lands, easements, rights-of-way, relocations, damages) to the sponsor for the Headwaters Revitalization Project should be extended to include the Recommended Plan.

Response: For Kissimmee River restoration and any other proposal for modification of an existing water resources development by removal of one or more of the project features which would adversely impact the authorized project purposes or outputs, Corps policy requires that the non-Federal sponsor pay for: all lands, easements, rights-of-way, relocations, and disposal areas; 50% of the project's construction cost; and all future costs for project operation, maintenance, repair, replacement and rehabilitation.

25 - **Comprehensive study.**

Comment: No action should be taken until a comprehensive study has been completed, addressing: changes since completion of channelization, loss of drought prevention, flooding of adjacent property, environmental damage of the restoration project, "costs to benefits" of the restoration project, all alternatives, and other relevant factors.

Response: This integrated feasibility report and EIS, together with the South Florida Water Management District's restoration report and numerous other studies undertaken by various Federal, State and local agencies over the past twenty years, provide a comprehensive analysis of the water resource problems and opportunities in the Kissimmee River Basin, alternative means to address those problems and opportunities, and extensive evaluations of those alternatives.

26 - **Effects on property owners.**

Comment: The government should recognize property owners will be significantly damaged by the project; adversely affected property owners should be fully and fairly compensated.

Response: A preliminary estimate of possible effects on property owners is included in the final integrated feasibility report and EIS. Federal laws and regulations require that property owners be paid fair market value, any severance damages, and allowable relocation assistance payments. The Corps and the SFWMD will continue to evaluate project designs to minimize real estate needs, and work with affected residents and landowners to arrive at mutually acceptable solutions.

27 - **Full funding of the project.**

Comment: The government should commit to and commence the project only after fully funding all direct and indirect costs to prevent a nonfunctioning partially completed project, or a long term project.

Response: If authorized, project funding will be jointly secured by the Federal government and the participating non-Federal cost sharing sponsor. Federal funds are secured through the annual appropriations process, and it is anticipated that appropriations for the Recommended Plan would be provided over a period of about fifteen years. Federal water resource projects are not usually fully funded in advance of construction. The sponsor must provide real estate prior to construction, and cash contributions available as required for construction.

28 - **Flood and drought prevention.**

Comment: The project should not be commenced until it has been established that the restored river will have the same measure of water control for flood and drought prevention as exist today.

Response: The Recommended Plan will continue to provide existing level of protection.

29 - **Removal of water control structures.**

Comment: We are concerned that removal of water control structures could result in major environmental, flood, drought and water quality damage.

Response: Modeling results indicate that flood control will be maintained with the project. The anticipated environmental benefits are the restoration of 29,000 acres of wetlands and a viable ecosystem. No significant effects on water quality are expected. Effects are more fully described in the integrated feasibility report and EIS.

30 - **Economic benefits.**

Comment: The Corps study indicates that restoration will have no economic benefits.

Response: The Corps study was exempted from performing traditional economic analyses. However, it is anticipated that restoration will have beneficial effects that could be economically evaluated, such as recreation, navigation and flood damage reduction.

31 - **Project cost estimate.**

Comment: Revise the cost estimate to more closely reflect the Water Management District's original cost estimate of approximately $300 million.

Response: In developing the cost estimate included in the 1990 Restoration Report, the SFWMD recognized that the precision of its estimates was adequate for comparing and selecting plans, but that specific budgetary decisions should not be based on these costs. The SFWMD did not follow the same procedure as the Corps in developing cost estimates, and many of the features identified in the 1990 SFWMD Restoration Report were not included in its estimate. Therefore, the Corps estimate is higher than the SFWMD's original estimate because it accounts for all features of the project, it was developed using a more rigorous estimating procedure, and reflects cost escalations that have occurred since 1990.

32 - **Scheduling of Upper and Lower Basin work.**

Comment: We disagree with the Corps contention that all work in the Upper Basin must be complete before any work in the Lower Basin is started.

Response: As a consequence of the current construction schedule, construction of the Headwaters Revitalization Project will be complete before backfilling is started in the Lower Basin. If the schedule for Lower Basin construction can be accelerated, construction could begin prior to completion of the headwaters improvements. It is, however, critical to have the headwaters improvements in place prior to completing the first phase of Lower Basin construction to realize the restoration benefits.

33 - **Effects on ability to sell property.**

Comment: Public awareness of the Recommended Plan places an eminent cloud over any sales or lots and homes in the affected area due to the uncertainty of buy-out, condemnation and flooding, even before the project has been approved and authorized for construction.

Response: The integrated feasibility report and EIS has been revised to indicate that flood proofing will be implemented whenever feasible. This means that, where possible, we will try to prevent properties from being flooded by using ring levees, elevating homes or other means, instead of buying properties and relocating residents. Where purchase is necessary properties will be valued at the pre-project fair market value.

34 - **Acquisition property values.**

Comment: Properties needed for the Recommended Plan would be acquired at a token of their values. The State may even reclaim properties without any compensation.

Response: Federal laws and regulations require that property owners be paid fair market value, any severance damages, and allowable relocation assistance payments. The Corps also recognizes that the State may assert its claim to sovereign lands. The Corps and the SFWMD will continue to evaluate project designs to minimize real estate needs, and work with affected residents and landowners to arrive at mutually acceptable solutions.

35 - **Effects on existing ecosystem.**

Comment: Although the construction of C-38 significantly degraded the historic Kissimmee River ecosystem, a new ecosystem has developed in its place, with an abundance of fish and wildlife, including foxes, turkeys, wild hogs, alligators, and Florida panthers. It took years to reestablish this balance; the restoration project will change it again.

Response: The biological communities that currently occur on most of the Kissimmee River flood plain are composed of a limited number of upland species. The diversity of fish and wildlife values supported by the present channelized system is drastically lower than that which occurred in the prechannelization river and flood plain ecosystem. There is indisputable scientific evidence that channelization has led to tremendous losses of biological resources which continue to degrade (Perrin et al, 1982; Toth, 1990). The restoration project will lead to the return of those resources and displace the upland species that occur on the drained flood plain to adjacent upland habitats outside the flood plain.

36 - **Flood plain calculations and induced flooding.**

Comment: We are concerned with the calculations of the five year and one hundred year flood plains, and their accuracy and possible increase from historic measurements, which would create the possibility of induced flooding.

Response: The five year and one hundred year flood elevations are results of mathematical modeling which accounts for the discharge from the headwaters and the Lower Basin. These elevations represent storm events. The report fully describes the wetting of the historic flood plain under normal circumstances.

37 - **Effects on live oak trees.**

Comment: Hidden Acres Estates are shaded by in excess of four hundred centuries old live oak trees that do not grow on land that floods, all of which would be destroyed by induced flooding.

Response: Flooding outside the flood plain occurs only as a result of storm events of five years or greater. Impacts to live oak trees are not anticipated from flooding due to storm events of five years or greater.

38 - **Effects on Fort Basinger.**

Comment: The buried remains of the main outer stockade wall of Fort Basinger and Indian mounds, located on Hidden Acres Estates property, should be further investigated for registration and preservation.

Response: Cultural resources investigations will be conducted to locate, identify and assess the National Register of Historic Places eligibility of all potentially significant historic properties that may be affected by the project. Mitigation plans may be developed for those National Register eligible historic properties which will be adversely affected by the project. The Corps will implement the mitigation plans prior to any ground disturbing activities being initiated. If Fort Basinger and any associated aboriginal archeological sites will be affected by the project, these historic properties will receive consideration under these procedures.

39 - **Earthmoving and land acquisition cost estimate.**

Comment: Costs for earthmoving and land acquisition have been estimated so as to create unnecessary concern for the cost of the project.

Response: Costs have been estimated in accordance with the Corps' required procedures. The Corps is keenly aware of its responsibilities to provide accurate, reasonable cost estimates, and has undertaken new initiatives in recent years to ensure that cost estimates for water resource projects will better stand the tests of time and changing conditions. Costs are neither underestimated to falsely reduce costs, nor overestimated to include an unreasonable accounting for financial risk.

40 - **Creation of wetlands in new areas.**

Comment: The project will create wetlands in farm and residential areas that never were wetlands before. At Hidden Acres Estates, there are many live oak trees that do not grow in water - how could this area have been flooded, and why should it be wetlands now?

Response: The project will recreate 29,000 acres of wetlands within the historic flood plain. Flooding outside the flood plain occurs only as a result of storm events of five years or greater. Although flooding may be more frequent in the

area of Hidden Acres Estates, this area is outside of the historic flood plain and will not result is creating wetlands.

41 - **Effects on local tax base, jobs and businesses.**

Comment: Property losses will take millions of dollars off the tax rolls in Okeechobee County, and would lead to the loss of hundreds of jobs.

Response: The proposed project would require acquisition of residential and agricultural land in Okeechobee County. A total of 214 structures and 688 acres of land may be affected in Okeechobee County. This includes residential structures and land valued at $18,958,000 which may be removed from the tax rolls. Flood proofing, using ring levees or modifications to site and structure elevations, will be used whenever feasible to limit effects on properties.

The net effect of the project on employment in Okeechobee County has not been quantified. Jobs may be lost if dairy farms are affected by the project. Project construction would create jobs in the area; however, these jobs would be short-term and available only during the construction period.

42 - **Retaining flood control.**

Comment: What about the problem of flood control? The river was channelized for a reason. Historic storms all caused extensive flooding and great loss of lives.

Response: The existing level of flood protection will be maintained in both the headwaters and Lower Basin using either modifications of existing project features, ring levees or other localized flood protection improvements, or by compensation of affected landowners.

43 - **Alternative to backfilling.**

Comment: Opening a few obstructions and the use of weirs, on a much smaller scale than the ones now in use, would reactivate parts of the old river and help it to live again.

Response: Studies of a weir plan and other smaller scale alternatives demonstrated that such approaches would result in greater environmental degradation, and that only the contiguous backfilling included in the Recommended Plan would effectively restore the fish and wildlife values of the historic Kissimmee River ecosystem.

44 - Co-generation power plant.

Comment: A proposed $8 million co-generation power plant would lie within the five year flood plain. The potential loss of this power plant would cost Okeechobee County both in tax dollars and in hundreds of jobs.

Response: The power plant is presently in the design phase. Florida Power and Light, the plant developer, is working with the SFWMD to develop the site such that it will be compatible with the restoration project.

45 - Effects on five dairies.

Comment: Another five dairies lie in the five year flood plain, but are not listed for purchase.

Response: The five dairies have been identified; possible effects will be further evaluated during later studies.

46 - Effects on Lake Okeechobee water quality.

Comment: Since the project does not specifically address a solution to the agricultural problem, the conclusion that improvement of Kissimmee River waters will benefit the cleanup of Lake Okeechobee is not valid as it relates to this project.

Response: Even without eliminating the high intensity agricultural activities, reestablishment of the flood plain wetlands could lead to as much as a 20% reduction of phosphorus and nitrogen loads carried by the river system.

47 - Increase in annual fishing days.

Comment: In Table 31 the annual fishing days in the without project condition shows a current level that is already 120% of the prechannelized condition and, as such, any additional improvement to be provided by the Recommended Plan is welcome but should not be given substantial weight.

Response: The increase that was reflected in Table 31 was due to increased sportfishing activity while the actual fishery is expected to decline. Table 31 has been revised to include fish biomass as an indicator of fish and wildlife values in place of fishing, a more appropriate indicator of recreational activity.

48 - **Effects on navigation.**

Comment: The study shows that between 80 to 85% of the vessels that currently use C-38 require at least a three-foot channel, so it is unreasonable to conclude that the impact to current boating activity is not considered significant given the fact that the Recommended Plan would result in four shallow areas that would impede such navigation in dry periods. Taken together with the statements that there would be no provision in the future for the clearing of silted over areas, it would seem that the intent of the Federally authorized project in 1902 will be subverted by the present plan and, as such, would require deactivation of the 1902 project.

Response: The analysis of effects on river navigation reflects a worst case condition in which possibly up to ten per cent of the time four locations along the river may have water depths less than three feet. Actual boating conditions are expected to be less severe. Although little silting and related maintenance is expected, the project's non-Federal sponsor will be responsible for maintaining the authorized channel. The report does not recommend deauthorization of the project's navigation purpose, which will be maintained as an integral element of the comprehensive plan for the Kissimmee River.

49 - **Effects on future uplands development.**

Comment: With the Henderson Act, the State of Florida has one of the most effective wetland laws in the nation and, as a result, effectively all of the future growth of the state will be in upland areas. The Recommended Plan calls for the removal of over 18,000 acres of existing uplands and shrub habitat that, added to those current areas of upland that have emerged as a result of the channelization project that will be inundated by the proposed project, will produce a substantial reduction in actual and potential upland habitat. The study treats both the existing and created uplands as having little value in a state where the only future development pressure will be on our remaining uplands.

Response: The "uplands" referred to in the integrated feasibility report and EIS are functional uplands only insofar as fish and wildlife habitat is concerned. They are actually in the flood plain protected by the existing C-38 project. The flood protection level of these lands is about 30 percent of the Standard Project Flood (SPF). Furthermore, the "uplands" are historic wetlands, and development upon them might require a Section 404 permit from the State and from the Corps of Engineers. Executive Order 11988, Floodplain Management, issued August 10, 1966, requires the Corps to provide leadership and take action to:

a. Avoid development in the base flood plain unless it is the only practicable alternative;

b. Reduce the hazard and risk associated with floods;

c. Minimize the impact of floods on human safety, health and welfare; and

d. Restore and preserve the natural and beneficial values of the base flood plain.

The base flood plain is the one percent chance flood plain (the 100-year flood plain).

Clearly the Recommended Plan fulfills the requirements of this Executive Order and is in compliance with the Clean Water Act prohibition against filling wetlands (development would require fill to elevate structures above the SPF).

50 - **Flowage easement values.**

Comment: The study indicates that flowage easements in the Lower Basin are expected to cost no more than 10% of the value of the fee interest of the property; this is considerably optimistic.

Response: Preliminary Corps analyses have found that effects of such infrequent flooding as that which can be expected by affected landowners will only marginally affect land uses, and that a 10% estimate will adequately compensate for impacts of the project.

51 - **Effects on prime and unique farmlands.**

Comment: The report states that none of the lands to be acquired are considered prime and unique farmlands. I suggest that as there would be nearly eight hundred families displaced by both portions of the restoration project that they would probably not agree with this conclusion.

Response: "Prime and unique farmlands," as used in the integrated feasibility report and EIS, is a term of environmental compliance regulation based on the requirements of Farmland Protection Policy Act of 1981 (Public Law 97-98). By letter of August 29, 1991, the Soil Conservation Service stated "the proposed activities on the Kissimmee River will not adversely affect prime farmland or unique farmland." Notwithstanding this regulatory conclusion, the project will affect 15,000 acres of upland, largely agricultural lands by increasing the frequency of inundation.

52 - **Selling property in the buy-out zone.**

Comment: We have been told that we cannot sell our land if it is in the buy-out zone; is that true?

Response: No; properties can continue to be bought and sold.

53 - **Land acquisition alternative.**

Comment: Land along the canal should be bought to restore habitat, improve water quality, and enhance waterfowl hunting, fishing and recreational boating.

Response: Although there would be some benefits to land acquisition, degradation of the existing ecosystem would continue without implementation of the project.

54 - **Hydrilla in the restored river.**

Comment: If the hydrilla infestation cannot be overcome it will most likely spread to and completely block the restored Kissimmee River.

Response: Aquatic plant control is included as a part of the maintenance program for the Recommended Plan.

55 - **Project maintenance.**

Comment: The channel is to be marked initially, but who will maintain the markers and who will see to removal of bars and snags?

Response: The non-Federal project sponsor will be responsible for all operation, maintenance, repair, rehabilitation and replacements necessary for the completed project, including channel markings and removal of bars and snags in the channel.

56 - **Weir and oxbow alternative.**

Comment: Opening up more oxbows and including more weirs should be explored further; the cost would be minimal compared to removing all of the structures, displacing people from their homes, and could be done in less time.

Response: Studies of a weir plan and other smaller scale alternatives demonstrated that such approaches would result in greater environmental degradation, and that only the backfilling included in the Recommended Plan

would effectively restore the fish and wildlife values of the historic Kissimmee River ecosystem.

57 - **Alternatives to save lands and homes.**

Comment: Nowhere have I seen any alternative plans which might save the land and homes of the people who live along the river.

Response: The integrated feasibility report and EIS has been revised to indicate that flood proofing will be implemented whenever feasible. This means that, where possible, we will try to prevent properties from being flooded by using ring levees, elevating homes or other means, instead of buying properties and relocating residents.

58 - **Replacement of lost industry.**

Comment: I have not seen plans to provide industry of any kind to replace the livelihood of the people being affected by these plans.

Response: Mitigation of effects on real estate, including effects on any industrial properties which may be affected, will be developed in accordance with the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

59 - **Structures in Hidden Acres Estates.**

Comment: The Hidden Acres Estates figures are not accurate; anything that affects one structure will affect over 137 structures plus 61 lots.

Response: Effects on the residents of Hidden Acres Estates are recognized and discussed in the integrated feasibility report and EIS. Such effects would result if it is necessary to acquire properties. However, where possible, we will try to prevent properties from being flooded by using ring levees, elevating homes or other means, instead of buying properties and relocating residents.

60 - **Effect on Highway 98.**

Comment: If our park (Hidden Acres Estates) is to be flooded, the Corps will have to build a bridge from Sebring, Florida to Okeechobee; Highway 98 will be under water.

Response: Although the Highway 98 causeway will be modified, the highway will not be under water and will continue to carry traffic as designed.

61 - **Early relocations.**

Comment: If this project is approved, we feel that all property owners should be given the opportunity to sell as soon as it is approved; if we must move we would like to be able to begin our relocation search now.

Response: The construction of the project has been phased over fifteen years. This allows for monitoring of the project's results, fine tuning the construction, and minimizing effects. Also, funding appropriations will be stretched over an extended period. Therefore, acquisitions have been prioritized based on construction phasing and available funding.

62 - **Recovery of county incomes.**

Comment: How will the Counties of Okeechobee and Highlands recover their loss of income as a result of the impact of the restoration?

Response: Mitigation of effects on real estate, including effects on any industrial properties which may be affected, will be developed in accordance with the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

63 - **Effects on mosquitoes.**

Comment: I am afraid when the marshes are flooded the mosquitoes will return.

Response: The Center for Disease Control for the Public Health Service of the Department of Health and Human Services has indicated that there are no anticipated adverse public health impacts to result from the project.

ANNEX B

SECTION 404(b)(1) EVALUATION

ANNEX B

SECTION 404(b)(1) EVALUATION

PROJECT DESCRIPTION.

A. Location.

The project is located in Polk, Osceola, Highlands and Okeechobee Counties, Florida.

B. General Description.

The work will involve:

- backfilling 29 miles of Canal 38 (C-38) from middle of Pool B to the middle of Pool E.

- removing spillways, boat locks, auxiliary structures and tieback levees at Structures S-65B, S-65C and S-65D,

- creating approximately 11.6 miles of new river channel as needed to provide linkage between restored river reaches,

- building temporary bypasses as needed,

- constructing two containment levees,

- constructing a water control structure and bypass canal adjacent to S-65, the Lake Kissimmee outlet,

- constructing 2-foot gate extensions on S-65,

- changing the water control schedule for Lakes Kissimmee, Cypress and Hatchineha to raise the upper water level from 52.5 to 54.0 feet NGVD, and

- dredging the canals that connect the lakes, C-34, C-35, C-36, and C-37, to flatten the flood profile through the Upper Basin chain of lakes and prevent excessive flood impacts; disposal of dredged material on non-wetlands to be identified.

C. Authority and Purpose.

Under the Water Resource Development Act of November 28, 1990 (PL101-640) Section 116(h) the Corps of Engineers was authorized to conduct:

> *"... a feasibility study of the Kissimmee River ... for the purpose of determining modifications of the flood control project for central and southern Florida ... necessary to provide a comprehensive plan for the environmental restoration of the Kissimmee River. The study shall be based on implementing the Level II Backfilling Plan specified in the Kissimmee River Restoration, Alternative Plan Evaluation and Preliminary Design Report, dated June 1990, published by the South Florida Water Management District".*

The purpose of this study is to determine the Federal interest in the Level II Backfilling Plan developed by the South Florida Water Management District for the restoration of the Kissimmee River and flood plain ecosystem.

D. General Description of Dredged or Fill Material.

(1) General characteristics of material.

Backfill material is mounded dredgings from the C-38 cut and consists of sands, silty sands and clayey sands with some silts, clays and shell fragments. Small amounts of organic materials may be encountered at the lower levels of the spoil mounds, and on the surface. The grain-size of backfill materials ranges from clay/silt size (.001mm) to gravel size (75mm). Sand (.075-5mm) will be the predominant grain size.

(2) Quantity of material. Approximately 45,562,000 cubic yards.

(3) Source of material. Refer to 404(b)(1) table.

E. Description of the Proposed Discharge Site.

(1) Location.

The discharge site (29 miles of Canal 38 from the middle of pool B, all of pools C and D to the middle of pool E) is in the Lower Kissimmee River Basin, Central Florida, between Lakes Kissimmee and Okeechobee. An additional 16 miles may be partially filled to shallow pool A and half of pool B. No discharge or placement of materials in waters of the United States located in the Upper Basin is proposed.

(2) Size.

Approximately 1626 acres of C-38 will be partially or completely backfilled.

-962 acres - (29 miles completely backfilled)
-664 acres - (16 miles partially filled)
Refer to 404(b)(1) table.

(3) Type of site.

Dredged deep water (30 feet) canal (C-38).

(4) Type of habitat. Open water.

(5) Timing and duration of discharge.

Any time of year during construction.

F. Description of Disposal Method.

High capacity earth moving equipment such as bulldozers, dump trucks and front-end loaders will be used to degrade approximately 20 disposal areas along C-38. The general construction technique will be to use D-9 dozers and 21-31 c.y. scrapers to fill across C-38. This sequence of operations should allow all the work to be done in the dry. Four hardened earth plugs will be required in C-38. The upstream side of the plug will receive 145 lb. stone. As the plugs are put in place and the backfill progresses, the flow will be diverted back into the old river channel.

Approximately 11.6 miles of new river channel will be excavated through the existing flood plain to mimic the gradient and cross-section of the original river meanders which were eliminated during C-38 construction. Acreage affected has not yet been determined.

The Highway 98 and CSXT railroad causeways in Pool D will be modified to provide flood plain and river flow-ways. This will require temporary embankments for diversion of traffic. These embankments will be constructed on spoil material which was originally placed in wetlands adjacent to Highway 98 during construction of C-38 and to build the causeway for the CSXT railroad bridge. Portions of these spoil mounds which are adjacent to wetlands support saltbush Baccharis halimifolia, willow Salix caroliniana and wax myrtle Myrica cerifera. The temporary embankments will eliminate this vegetation. When the work is completed these embankments will be excavated to restore any wetland substrate affected by the bypasses.

The 404(b)(1) table gives the approximate amount of material needed and acreage affected (as available) for each work task.

FACTUAL DETERMINATIONS.

A. Physical Substrate Determinations.

(1) Substrate elevation and slope.

Thirty feet deep canal bottom with 2H:1V side slopes.

(2) Sediment type.

Alluvial silts and organic material.

(3) Dredged/fill material movement.

Material will be confined within the canal by hardened earthen plugs and the canal walls.

(4) Physical effects on benthos.

No effect as anoxic bottom conditions preclude habitation by benthic organisms within C-38.

B. Water Circulation and Fluctuation Determination.

(1) Water column effects.

In backfilled portions of C-38 the present water column will be physically diverted into historic and/or recreated river channels.

(2) Current patterns and circulation.

Eliminated in backfilled portions of C-38. Pre-channelization Kissimmee River hydrologic flow would be restored in the project area.

(3) Normal water level fluctuations.

Water level fluctuations will be eliminated in backfilled portions of C-38. Water fluctuations restored in portions of the Kissimmee River and flood plain will essentially respond to natural climatological cycles.

C. Suspended Particulate/Turbidity Determinations.

(1) Expected changes in suspended particulate and turbidity levels in the vicinity of the disposal site.

There will be temporary increases in these parameters during construction.

(2) Effects on chemical and physical properties of the water column.

(a) Light penetration.
Reduced during elevated turbidities, restored in the river.

(b) Dissolved oxygen.
Levels will increase and seasonally fluctuate in the restored river system.

(c) Toxic metals, organics, and pathogens.

Fill material contains no toxic metals, organics or pathogens.

(d) Aesthetics.

The natural aesthetic quality of the original Kissimmee River system will be restored in that portion of the historic river system affected by C-38 backfilling.

(3) Effects on biota.

(a) Primary productivity and photosynthesis.

In that portion of the river system restored to natural hydrologic characteristics by backfilling C-38, primary productivity and photosynthesis should occur at pre-channelization levels.

(b) Suspension/filter feeders. Same as (3)(a).

(c) Sight feeders. Same as (3)(a).

D. Contaminant Determinations.

No contaminants have been identified in either the material to be discharged nor at the discharge site. However, this aspect of the project will

be continually monitored and appropriate action taken if contaminants are discovered.

(1) **Endangered and threatened species.** It is the Biological Opinion of the U. S. Fish and Wildlife Service that implementation of this project will either benefit or not significantly affect the continued existence of endangered and threatened species which occur in the project area.

E. Proposed Disposal Site Determinations.

(1) **Mixing zone determination.** Not applicable.

(2) **Determination of compliance with applicable water quality standards.**

The clean fill will not result in violation of any standards.

(3) **Potential effects on human use characteristics.**

(a) **Municipal and private water supplies.**
No effect.

(b) **Recreational and commercial fisheries.** Improved

(c) **Water related recreation.**
Improved for most categories of water related recreation.

(d) **Aesthetics.**
The natural aesthetics of the Kissimmee River system will be restored.

(e) **Parks, national and historic monuments, national seashores, wilderness areas, research sites, and similar preserves.**

No such areas are designated in the project area. Opportunities for use of the project area to study natural systems and/or the restoration of such areas will be enhanced.

F. Determination of Cumulative Effects on the Aquatic Ecosystem.

The cumulative effects from the restoration of hydrology and extensive wetland acreage in the Kissimmee River Basin will substantially benefit the aquatic ecosystem.

FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE.

a. No significant adaptations of the guidelines were made relative to this evaluation.

b. No practicable alternative exists which meets the study objectives that does not involve discharge of fill into waters of the United States.

c. The discharge of fill materials will not cause or contribute to, after consideration of disposal site dilution and dispersion, violation of any Florida water quality standards. The discharge operation will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

d. The placement of fill material will not jeopardize the continued existence of any species listed as threatened or endangered or result in the likelihood of destruction or adverse modification of any critical habitat designated under the Endangered Species Act of 1973, as amended.

e. The placement of fill materials will not result in significant adverse effects on human health and welfare, municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife, wetlands and special aquatic sites. The life stages of aquatic species and other wildlife will not be adversely affected. Significant adverse effects on aquatic ecosystem diversity; productivity and stability; and recreational, aesthetics, and economic values will not occur.

f. Appropriate steps to maximize positive impacts on aquatic systems are included in project plans.

g. On the basis of the guidelines, the proposed disposal sites for the discharge of fill materials are specified as complying with the requirements of these guidelines.

TABLE 404(b)(1)

TOTAL VOLUME OF CHANNELS TO BE BACKFILLED

	Quantity (c.y.)
1626 acres (filled or partially filled)	48,999,000
-962 acres - (29 continuous miles of C-38 backfilled)	
-664 acres - (16.5 continuous miles of Pools A & B partially filled [shallowed] and retention of shallow open water environmental sloughs and potholes within C-38 backfill area)	8,116,000
Environmental Sloughs (approx. 80 acres) (approx. 16, 5 acre shallow open water sloughs retained within main C-38 backfill area)	- 1,100,000
Environmental Potholes (approx. 87 acres) (approx. 58, 1.5 acre shallow open water potholes retained within main C-38 backfill area)	- 560,000
TOTAL BACKFILL REQUIRED	55,455,000

SOURCE OF BORROW MATERIALS FOR BACKFILL

	Quantity (c.y.)
20 Disposal Mounds Adjacent to C-38 Level II Backfill (approx. 4,000 acres regraded to wetlands)	40,573,000
10 Disposal Mounds Adjacent to C-38 Shallowing	8,116,000
Degraded Tieback Levees	
S-65A (el. 48.0 ft.)	86,000
S-65B (to existing ground)	97,000
S-65C (to existing ground)	134,000
S-65D (to existing ground)	143,000
Degraded Structure Sites	
S-65B (to existing ground)	97,000
S-65C (to existing ground)	128,000
S-65D (to existing ground)	96,000
Recreation of Original River (11.6 miles) (acreage undetermined)	2,800,000
Additional Shallow Borrow Areas in adjacent C-38 flood plain	4,491,000
TOTAL BORROW	48,645,000

ADDITIONAL PROJECT EARTHWORKS

	Quantity (c.y.)
Lake Istokpoga Containment Levee (approx. 1.1 wetland acre filled, 3-5 wetland acres created from upland in the borrow canal)	44,300
Yates Marsh/Chandler Slough Containment Levee (approx. 5.5 wetland acres filled, 15-20 wetland acres created from upland in the borrow canal)	253,300
Excavation for S-65 Bypass Weir Channel	68,000
TOTAL	365,600

Temporary Embankments

Highway 98 bypass (no wetlands affected)	
East Railroad bypass (approx. 6.7 acres temporarily affected)	113,000
West Railroad bypass (approx. 3.4 acres temporarily affected)	45,000
	158,000
East channel excavation (approx. 2 wetland acres restored)	-63,000
West channel excavation (Kissimmee River channel restored)	-12,600
	-75,000

ANNEX C

FLORIDA COASTAL ZONE MANAGEMENT PROGRAM FEDERAL CONSISTENCY EVALUATION

ANNEX C

FLORIDA COASTAL ZONE MANAGEMENT PROGRAM FEDERAL CONSISTENCY EVALUATION

1. Chapter 161, Beach and Shore Preservation.

The intent of the coastal construction permit program established by this chapter is to regulate construction projects located seaward of the line of mean high water and which might have an effect on natural shoreline processes.

Response: This statute is not applicable to the Kissimmee River Project.

2. Chapters 186 and 187, State and Regional Planning.

These chapters establish the State Comprehensive Plan which sets goals that articulate a strategic vision of the State's future. It's purpose is to define in a broad sense, goals, and policies that provide decision-makers directions for the future and provide long-range guidance for an orderly social, economic and physical growth.

Response: The project is compatible with the State's policy of environmental conservation, and makes a positive contribution to orderly growth patterns by protecting and enhancing wetlands.

3. Chapter 252, Disaster Preparation, Response and Mitigation.

This chapter creates a state emergency management agency, with the authority to provide for the common defense; to protect the public peace, health and safety; and to preserve the lives and property of the people of Florida.

Response: This statute is not applicable to the Kissimmee River project.

4. Chapter 253, State Lands.

This chapter governs the management of submerged state lands and resources within state lands. This includes archeological and historical resources; water resources; fish and wildlife resources; beaches and dunes; submerged grass beds and other benthic communities; swamps, marshes and other wetlands; mineral resources; unique natural features; submerged lands; spoil islands; and artificial reefs.

Response: The project contributes positively to the preservation of cultural, water, fish and wildlife and wetlands resources. The river-flood plain is a unique natural resource, as described in the EIS, and will be partially restored in structure and function by the project.

5. Chapters 253, 259, 260, and 375, Land Acquisition.

This chapter authorizes the state to acquire land to protect environmentally sensitive areas.

Response: The project comprises environmentally sensitive areas that could be acquired by the State. No encumbrance of the State's rights under this chapter is established under the project.

6. Chapter 258, State Parks and Aquatic Preserves.

This chapter authorizes the State to manage State parks and preserves. Consistency with this statute would include consideration of projects that would directly or indirectly adversely impact park property, natural resources, park programs, management or operations.

Response: The project would not impact State parks or aquatic preserves.

7. Chapter 267, Historic Preservation.

This chapter establishes the procedures for implementing the Florida Historic Resources Act responsibilities.

Response: The project has been coordinated with the Florida State Historic Preservation Officer. Historic preservation compliance will be completed to meet all responsibilities under Chapter 267.

8. Chapter 288, Economic Development and Tourism

This chapter directs the State to provide guidance and promotion of beneficial development through encouraging economic diversification and promoting tourism.

Response: Contribution from the project area to the State's tourism economy will not be compromised by the project.

9. Chapters 334 and 339, Public Transportation.

This chapter authorizes the planning and development of a safe balanced and efficient transportation system.

Response: No public transportation systems would be long-term impacted by this project. Highway bridges will be protected, and railroad traffic will be detoured on temporary bypass berms during construction of trestles for water passage on the flood plain.

10. Chapter 370, Saltwater Living Resources.

This chapter directs the state to preserve, manage and protect the marine, crustacean, shell and anadromous fishery resources in state waters; to protect and enhance the marine and estuarine environment; to regulate fisherman and vessels of the state engaged in the taking of such resources within or without state waters; to issue licenses for the taking and processing products of fisheries; to secure and maintain statistical records of the catch of each such species; and, to conduct scientific, economic, and the studies and research.

Response: This statute is not applicable to the Kissimmee River Restoration Project.

11. Chapter 372, Living Land and Freshwater Resources.

This chapter establishes the Game and Fresh Water Fish Commission and directs it to manage freshwater aquatic life and wild animal life and their habitat to perpetuate a diversity of species with densities and distributions which provide sustained ecological, recreational, scientific, educational, aesthetic. and economic benefits.

Response: Coordination with the Florida Game and Fresh Water Fish Commission indicates that the project is compatible with State policies and practices in this subject area.

12. Chapter 373, Water Resources.

This chapter provides the authority to regulate the withdrawal, diversion, storage, and consumption of water.

Response: The project sponsor is the South Florida Water Management District, the State agency responsible for implementing this statute in the

project area. Coordinated planning has been done with this agency to ensure compatibility with established policies.

13. Chapter 376, Pollutant Spill Prevention and Control.

This chapter regulates the transfer, storage, and transportation of pollutants and the cleanup of pollutant discharges.

Response: This project does not involve the transportation or discharging of pollutants. Environmental protection measures will be enforced during construction to avoid inadvertent spills or other sources of pollution. These include erosion and drainage control for the protection of streams and soils.

14. Chapter 377, Oil and Gas Exploration and Production.

This chapter authorizes the regulation of all phases of exploration, drilling, and production of oil, gas, and other petroleum products.

Response: This project does not involve the exploration, drilling or production of gas, oil or petroleum products.

15. Chapter 380, Environmental Land and Water Management.

This chapter establishes criteria and procedures to assure that local land development decisions consider the regional impact nature of proposed large-scale development.

Response: The project does not adversely impact this authority or violate strictures under this law.

16. Chapter 388, Arthropod Control.

This chapter provides for a comprehensive approach for abatement or suppression of mosquitoes and other pest arthropods within the state.

Response: The project would not produce arthropod pest problems, and will foster high populations of insectivorous fishes.

17. Chapter 403, Environmental Control.

This chapter authorizes the regulation of pollution of the air and waters of the state by the DER.

Response: All regulations to prevent such pollution will be complied with. Permits will be acquired as required under this statute and under the federal Clean Water Act.

18. Chapter 582, Soil and Water Conservation.

This chapter establishes policy for the conservation of the State's soil and water through the Department of Agriculture. Land use policies will be evaluated in terms of their tendency to cause or contribute to soil erosion or to conserve, develop, and utilize soil and water resources both on site or in adjoining properties affected by the project. Particular attention will be given to projects on or near agricultural lands.

Response: In its intended purpose to conserve soil and water resources in a natural state, the project conforms to this statute. Measures to prevent significant soil erosion will be implemented where natural re-vegetation does not suffice.

ANNEX D

ECOSYSTEM PERSPECTIVE ON RESTORATION BENEFITS

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SOUTH FLORIDA WATER MANAGEMENT DISTRICT

PRO-KRR

June 7, 1991

Mr. Dick Macomber
Environmental Resources Branch
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

Dear Dick:

I have completed the attached draft on the restoration goal, objectives, assumptions, relationships between measures of restoration benefits, a detailed ecosystem perspective of restoration benefits, and benefits/area relationships. I feel strongly that all of this material needs to be included in the EIS and/or main feasibility report, although it may be appropriate to divide various paragraphs of this draft among different sections. Perhaps we can discuss placement of this information and any comments that you might have during my trip to Jacksonville next week.

Sincerely,

(signed)

Louis A. Toth
Senior Environmental Scientist
Environmental Sciences Division
Department of Research and Evaluation

c: Patricia Sculley
Maura Merkal

Evaluations of restoration plans requires predictive, quantitative measures of restoration success, but projections of potential benefits must reflect the restoration goal. The most appropriate and meaningful measure of the success of the Kissimmee River Restoration program is the amount of ecosystem that will be restored. This can be quantified a *priori* by determining the area over which the lost or altered determinants of ecological integrity are reestablished. Because this restored area will be driven by the same forces that formed and maintained the pre-channelization river/floodplain, the affected (restored) ecosystem can be expected to reorganize with an ecological structure which provides the same environmental values and supports a similar complement of species as the original Kissimmee River ecosystem. Thus, benefits of "ecosystem restoration" will involve all species within this geographic area (including transient or migratory species) which utilize habitats provided by the natural river and floodplain. In addition, "ecosystem restoration" will have implicit functional benefits, including attributes relating to water quality, energy flow and other ecosystem processes and interactions.

Other quantitative measures of restoration benefits presented in this report are subsets of those included in the ecosystem restoration analysis (Figure 1) and are based upon similar assumptions. All of these projections of restoration benefits assume that provision of appropriate habitat or select habitat parameters will result in beneficial responses by the biological components that utilize that habitat. The most comprehensive of these other measures is the Habitat Evaluation Procedure (HEP) analysis which projects restoration benefits for 25 of the species given in Tables 1-10. Another measure, winter water, quantifies favorable habitat for select waterfowl species. Although these and other measures of restoration benefits provide indicators of likely responses by select biological components, the only valid means of evaluating restoration alternatives is through comparisons of the amount of ecosystem over which ecological integrity will be restored. The restoration goal is not to maximize habitat for select groups of species. The goal is to reestablish ecological integrity by restoring a naturally functioning, Kissimmee river/floodplain ecosystem, which will provide habitat for all species that typically would occur in this ecosystem.

The Level II Backfilling Plan will reestablish ecological integrity by restoring prechannelization physical form and stage (hydroperiod) and discharge characteristics over 50 square miles of river/floodplain ecosystem. The restored ecosystem will include 56 continuous miles of rejuvenated and/or re-created river channel, which will flow through 28286 acres of reestablished floodplain wetlands. Within this restored area, existing obstructions (e.g., levees and spoil) to movements of water, energy and biological components will be removed, and biological, chemical, and hydrological interactions between the river and its floodplain will be reestablished. Restoration of physical form and

hydrology will lead to reestablishment of the dynamic food webs, habitat heterogeneity, water quality, energy flow and other complex physical, chemical and biological interrelationships and processes that gave the prechannelization ecosystem high levels of resilience, and allowed for persistence of highly diverse, biological communities. As a result, most of these diverse communities will redevelop and the restored river/floodplain ecosystem can be expected to support

* a mosaic of nine distinct emergent, shrub, an forested wetland communities, including several threatened plant species

* endangered wood stork and 14 species of resident and migratory wading birds (Table 1)

* 19 species of resident and migratory ducks and waterfowl (Table 2)

* 7 other wetland bird species (Table 3)

* endangered Bald Eagle, crested caracara, snail kite and 19 other birds of prey species (Table 4)

* 20 species of shore birds and diving birds (Table 5)

* 78 species of resident and migratory perching birds (Table 6)

* 17 other bird species including turkey, quail and woodpeckers (Table 7)

* endangered Florida panther, river otter and 31 species of other mammals (Table 8)

* 21 species of frogs, toads, and salamanders (Table 9)

* alligator and 35 species of turtles, lizards and snakes (Table 10)

* 10 game fish species and 38 other fish species (Table 11)

* trillions of snails, clams, crustaceans, insects and other invertebrates

As in the prechannelization system, these communities will be subjected to random, environmental (particularly hydrologic) fluctuations and likely will be in a continuous, transient state. Although individual species populations will vary widely, any chance local extinctions will be overcome rapidly by reinvasion

from other habitats. A constant source of colonists will be large enough area of ecosystem to reestablish replicate habitat types, and hence "refuge" habitats.

The relationship between restoration benefits and area restored is a function of the goal. A narrow goal focusing on, for example, an endangered species, could have an asymptotic benefits/area relationship (Figure 2a) if the species of concern has highly specialized habitat requirements which are found in only a limited portion of the system. Once this habitat is restored, incremental benefits of further restoration will be zero for this species. If the goal is to maximize densities of a select group of species, a linear benefits/area relationship (Figure 2b) is likely, because the carrying capacity of the system will continue to increase with each unit of habitat restored. However, because a variable size (according to species) minimum area would be needed to provide habitat conditions required by each species, no benefits would accrue until this minimum area is restored. Nutrient assimilation values (benefits) of wetland restoration could be expected to show a similar relationship. The Kissimmee River ecosystem restoration goal requires a minimum area that is at least large enough to reestablish the range of habitat types that supported the diverse biological communities that were present prior to channelization. The area needed to reestablish a complete complement of habitats is defined best by the area required to reproduce the mosaic of vegetation communities types which were found on the prechannelization floodplain. Analysis of prechannelization floodplain vegetation maps (Pierce et al., 1982) indicates that approximately 25 square miles of river/floodplain is required to restore this mosaic of plant communities, and hence, begin to restore the ecological integrity of the Kissimmee River ecosystem. Beyond this minimum area, the benefits/area relationship will increase at least linearly (as in Figure 2b), because carrying capacities of species that can be supported by this minimum area will continue to increase with each unit of increment of restored habitat. However, additional benefits will accrue as more area of ecosystem is restored, because numbers of species will increase. This relationship between species richness and area has been demonstrated repeatedly by island biogeography studies. Moreover, because the Level II Backfilling Plan will restore a naturally functioning ecosystem, including the complex physical, chemical and biological processes and interactions that led (in the prechannelization system) to temporal and spatial habitat heterogeneity, diverse food webs, and stable energy flow, additional, ecosystem-level benefits will emerge. Perhaps the most important of these emergent properties will be resilience, which will enable all species to withstand both natural and anthropogenic disturbances and persist in a highly variable environment. The ecosystem will have an intrinsic buffering capacity which will preserve species and their interrelationships. Because species richness and the ability of natural ecosystems to provide resilience and buffering capacity both increase with the size of the ecosystem,

the benefits/restored area relationship for Level II Backfilling will tend to increase exponentially (Figure 2c).

Table 1

Wading bird species likely to occur in the restored Kissimmee River ecosystem.

American bittern	*Botaurus lentiginosus*
Least bittern	*Ixobrychus exilis*
Great blue heron	*Ardea herodias*
Great egret	*Casmerodius albus*
Snowy egret	*Egretta thula* - SSC
Little blue heron	*Egretta caerulea* - SSC
Tricolored heron	*Egretta tricolor* - SSC
Reddish egret	*Egretta rufescens*
Green-backed heron	*Butorides striatus*
Black-crowned night heron	*Nycticorax nycticorax*
Yellow-crowned night heron	*Nycticorax violacea*
White ibis	*Eudocimus albus*
Glossy ibis	*Plegadis falcinellus*
Roseate spoonbill	*Ajaia ajaja* - SSC
Wood stork	*Mycteria americana* - E,HEP

E - Endangered
T - Threatened
SSC - Species of Special Concern
HEP - Used in Habitat Evaluation Procedure Analysis

Table 2

Waterfowl species likely to occur in the restored Kissimmee River ecosystem.

Fulvous whistling duck	*Dendrocygna bicolor*
Wood duck	*Aix sponsa*
American black duck	*Anas rubripes*
Green-winged teal	*Anas crecca*
Mottled duck	*Anas fulvigula* - HEP
Mallard	*Anas platyrhynchos*
Northern pintail	*Anas acuta*
Blue-winged teal	*Anas discors*
Northern shoveler	*Anas clypeata*
Gadwall	*Anas strepera*
American widgeon	*Anas americana*
Canvasback	*Aythya valisineria*
Redhead	*Aythya americana*
Ring-necked duck	*Aythya collaris* - HEP
Lesser scaup	*Aythya affinis*
Common goldeneye	*Bucephala clangula*
Bufflehead	*Bucephala albeola*
Hooded merganser	*Mergus cucullatus*
Red-brested merganser	*Mergus serrator*
Ruddy duck	*Oxyura jamaicensis*

HEP - Used in Habitat Evaluation Procedures Analysis

Table 3

Other wetland bird species (Gruciformes) likely to occur in the restored Kissimmee River ecosystem.

Black rail	*Laterallus jamaicensis*
King rail	*Rallus elegans*
Virginia rail	*Rallus limicola*
Sora	*Poranza carolina*
Purple gallinule	*Porphyrula martinica*
Common moorhen	*Gallinula chloropus*
American coot	*Fulica americana*
Limpkin	*Aramusguarauna*-SSC,HEP
Sandhill crane	*Grus canadensis*-T,HEP

Table 4

Birds of prey species likely to occur in the restored Kissimmee River ecosystem.

Barn Owl	*Tyto alba*
Eastern screech owl	*Otus asio*
Great horned owl	*Bubo virginianus*
Barred owl	*Strix varia*
Black vulture	*Coragyps atratus*
Turkey vulture	*Cathartes aura*
Osprey	*Pandion haliaetus*
American swallow-tailed kite	*Elanoides forficatus*
Black-shouldered kite	*Elanus caeruleus*
Snail kite	*Rostrhamus sociabilis* - E
Mississippi kite	*Ictinia mississippiensis*
Bald eagle	*Haliaeetus leucocephalus* - T,HEP
Northern harrier	*Circus cyaneus*
Sharp-shinned hawk	*Accipiter striatus*
Cooper's hawk	*Accipiter cooper*
Red-shouldered hawk	*Buteo lineatus*
Short-tailed hawk	*Buteo brachyurus*
Red-tailed hawk	*Buteo jamaicensis*
Broad-winged hawk	*Buteo platpterus*
Audubon's crested caracara	*Polyborus plancus* - T
American kestrel	*Falco sparvarius*
Merlin	*Falco columbarius*
Peregrine falcon	*Falco peregrinus*

E - Endangered
T - Threatened
HEP - Used in Habitat Evaluation Procedure Analysis

Table 5

Shore bird and diving bird species likely to occur in the restored Kissimmee River ecosystem.

Pied-billed grebe	*Podilymbus podiceps*
Double-crested cormorant	*Phalacrocorax auritus*
Anhinga	*Anhinga anhinga*
Killdeer	*Charadrius vociferus*
Black-necked stilt	*Himantopus mexicanus*
Greater yellowlegs	*Tringa melanoleuca*
Lesser yellowlegs	*Tringa flavipes*
Solitary sandpiper	*Tringa solitaria*
Spotted sandpiper	*Actitis macularia*
Semipalmated sandpiper	*Calidris pusilla*
Western sandpiper	*Calidris mauri*
Least sandpiper	*Calidris minutilla*
White-rumped sandpiper	*Calidris fuscicollis*
Pectoral sandpiper	*Calidris melanotus*
Short-billed dowitcher	*Leminodromus griseus*
Common snipe	*Gallinago gallinago* - HEP
American woodcock	*Scolopax minor*
Ring-billed gull	*Larus delawarensis*
Forster's tern	*Sterna forsteri*
Black tern	*Chlidonias niger*

HEP - Used in Habitat Evaluation Procedure Analysis.

Table 6

Perching bird species likely to occur in the restored Kissimmee River ecosystem.

Acadian flycatcher	*Empidonax virescens*
Great crested flycatcher	*Myiarchus crinitus*
Eastern phoebe	*Sayornis phoebe*
Eastern kingbird	*Tyrannus tyrannus*
Purple martin	*Progne subis*
Tree swallow	*Tachycineta bicolor*
Northern rough-winged swallow	*Stelgidopteryx serripennis*
Bank swallow	*Riparia riparia*
Barn swallow	*Hirundo rustica*
Blue jay	*Cyanocitta cristata*
American crow	*Corvus brachyrhynchos*
Fish crow	*Corvus ossifragus*
Carolina Chickadee	*Parus carolinensis*
Tufted titmouse	*Parus bicolor*
White-breasted nuthatch	*Sitta carolinensis*
Carolina wren	*Thryothorus ludovicianus*
House wren	*Troglodytes aedon*
Sedge wren	*Cistothorus platensis*
Marsh wren	*Cistothorus palustris*
Ruby-crowned kinglet	*Regulus calendula*
Blue-gray gnatcatcher	*Polioptila caerulea*
Eastern bluebird	*Sialia sialis*
Veery	*Catharus fuscescens*
Gray-cheeked thrush	*Catharus minimus*
Swainson's thrush	*Catharus ustulatus*
Hermit thrush	*Catharus guttatus*
American robin	*Turdus migratorius*
Gray catbird	*Dumetella carolinensis*
Northern mockingbird	*Mimus polyglottos*
Brown thrasher	*Toxostoma rufum*
American pipit	*Anthus rubescens*
Cedar waxwing	*Bombycilla cedrorum*
Loggerhead shrike	*Lanius ludovicianus*
White-eyed vireo	*Vireo griseus*
Solitary vireo	*Vireo solitarius*
Red-eyed vireo	*Vireo olivaceus*
Tennessee warbler	*Vermivora peregrina*
Orange-crowned warbler	*Vermivora celata*
Northern parula	*Parula americana*

Table 6 - continued

Yellow warbler	*Dendroica petechia*
Cape May warbler	*Dendroica tigrina*
Black-throated blue warbler	*Dendroica caerulescens*
Yellow-rumped warbler	*Dendroica coronata*
Black-throated green warbler	*Dendroica virens*
Yellow-throated warbler	*Dendroica dominica*
Pine warbler	*Dendroica pinus*
Palm warbler	*Dendroica palmarum*
Blackpoll warbler	*Dendroica striata*
Black-and-white warbler	*Mniotilta varia*
American redstart	*Setophaga ruticilla*
Prothonotary warbler	*Protonotaria citrea*
Worm-eating warbler	*Helmitheros vermivorus*
Ovenbird	*Seiurus aurocapillus*
Northern waterthrush	*Seiurus noveboracensis*
Louisiana waterthrush	*Seiurus motacilla*
Common yellowthroat	*Geothlypis trichas* - HEP
Summer tanager	*Piranga rubra*
Scarlet tanager	*Piranga olivacea*
Northern cardinal	*Cardinalis cardinalis*
Indigo bunting	*Passerina cyanea*
Painted bunting	*Passerina ciris*
Rufous-sided towhee	*Pipilo erythrophthalmus*
Chipping sparrow	*Spizella passerina*
Field sparrow	*Spizella pusilla*
Vesper sparrow	*Pooecetes gramineus*
Savannah sparrow	*Paserculus sandwichensis*
Grasshopper sparrow	*Ammodramus savannarum* - E
Henslow's sparrow	*Ammodramus henslowii*
Song sparrow	*Melospiza melodia*
Swamp sparrow	*Melospiza georgiana*
Bobolink	*Dolichonyx oryzivorus*
Red-winged blackbird	*Agelaius phoeniceus*
Eastern meadowlark	*Sturnella magna*
Boat-tailed grackle	*Quiscalus major*
Common grackle	*Quiscalus quiscula*
Bronzed cowbird	*Molothrus aeneus*
Brown-headed cowbird	*Molothrus ater*
American goldfinch	*Carduelis tristis*

E - Endangered
HEP - Used in Habitat Evaluation Procedure Analysis

Table 7

Other bird species likely to occur
in the restored KissimmeeRiver ecosystem.

Wild turkey	*Meleagris gallopavo*
Northern bobwhite	*Colinus virginianus*
Common ground-dove	*Columbina passerina*
Mourning dove	*Zenaida macroura* - HEP
Smoth-billed ani	*Crotophaga ani*
Chuck-will's-widow	*Caprimulgus carolinensis*
Whip-poor-will	*Caprimulgus vociferus*
Common nighthawk	*Chordeiles minor*
Belted kingfisher	*Ceryle alcyon*
Chimney swift	*Chaetura pelagica*
Ruby-throated hummingbird	*Archilochus colubris*
Pileated woodpecker	*Dryocopus pileatus*
Red-bellied woodpecker	*Melanerpes carolinus*
Yellow-bellied sapsucker	*Sphyrapicus varius*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Hairy woodpecker	*Picoides villosus*
Downy woodpecker	*Picoides pubescens*

HEP - Used in Habitat Evaluation Procedure Analysis.

Table 8

Mammal species likely to occur in the restored Kissimmee River ecosystem.

Virginia opossum	*Didelphis virginiana*
Southern short-tailed shrew	*Blarina carolinensis*
Least shrew	*Cryptotis parva*
Eastern pipistrelle	*Pipistrellus subflavus*
Seminole bat	*Lasiurus seminolus*
Big brown bat	*Eptesicus fuscus*
Yellow bat	*Lasiurus intermedius*
Evening bat	*Nycticeius humeralis*
Brazilian free-tailed bat	*Tadarida brasiliensis*
Nine-banded armadillo	*Dasypus novemcinctus*
Eastern cottontail	*Sylvilagus floridanus*
Marsh rabbit	*Sylvilagus palustris*
Gray squirrel	*Sciurus carolinensis*
Fox squirrel	*Sciurus niger* - SSC
Southern flying squirrel	*Glaucomys volans*
Eastern woodrat	*Neotoma floridana*
Hispid cotton rat	*Sigmodon hispidus*
Eastern harvest mouse	*Reithrodontomys humulis*
Marsh rice rat	*Oryzomys palustris*
Florida water rat	*Neofiber alleni* - HEP
Norway rat	*Rattus norvegicus*
Nutria	*Myocastor coypus*
Black bear	*Ursus americanus*
Raccoon	*Procyon lotor* - HEP
Mink	*Mustela vison*
Long-tailed weasel	*Mustela frenata*
Striped skunk	*Mephitis mephitis*
Spotted skunk	*Spilogale putorius*
River otter	*Lutra canadensis* - HEP
Gray fox	*Urocyon cinereoargenteus*
Bobcat	*Felis rufus* - HEP
Florida panther	*Felis concolor* - E
Wild boar	*Sus scrofa*
White-tailed deer	*Odocoileus virginianus* - HEP

E - Endangered
SSC - Species of Special Concern,
HEP - Used in Habitat Evaluation Procedure Analysis

Table 9

Amphibian species likely to occur in the restored Kissimmee River ecosystem

Oak toad	*Bufo quercicus*
Southern toad	*Bufo terrestris*
Florida cricket frog	*Acris gryllus*
Green treefrog	*Hyla cinerea*
Pinewoods treefrog	*Hyla femoralis*
Barking treefrog	*Hyla gratiosa*
Squirrel treefrog	*Hyla squirella*
Little grass frog	*Limnaoedus ocularis*
Southern chorus frog	*Pseudacris nigrita*
Eastern narrowmouth toad	*Gastrophryne carolinensis*
Eastern spadefoot toad	*Scaphiopus holbrookii*
Florida gopher frog	*Rana areolata* - SSC
Bullfrog	*Rana catesbeiana*
Pig frog	*Rana grylio* - HEP
Southern leopard frog	*Rana utricularia*
Two-toed amphiuma	*Amphiuma means*
Dwarf salamander	*Eurycea quadridigitata*
Eastern newt	*Notophthalmus viridescens*
Dwarf siren	*Pseudobranchus striatus*
Greater siren	*Siren lacertina*
Eastern lesser siren	*Siren intermedia*

SSC - Species of Special Concern
HEP - Used in Habitat Evaluation Procedure Analysis.

Table 10

Reptile species likely to occur in the restored Kissimmee River ecosystem

American alligator	*Alligator mississipiensis* - SSC, HEP
Florida snapping turtle	*Chelydra serpentina*
Florida chicken turtle	*Deirochelys reticularia*
Peninsula cooter	*Pseudemys floridana* - HEP
Florida redbelly turtle	*Pseudemys nelsoni*
Florida box turtle	*Terrapene carolina*
Striped mud turtle	*Kinosternon baurii*
Florida mud turtle	*Kinosternon subrubrum*
Stinkpot	*Sternotherus odoratus*
Florida softshell turtle	*Trionyx ferox*
Eastern glass lizard	*Ophisaurus ventralis*
Green anole	*Anolis carolinensis*
Southeastern five-lined skink	*Eumeces inexpectatus*
Ground skink	*Scincella lateralis*
Southern black racer	*Coluber constrictor*
Southern ringneck snake	*Diadophis punctatus*
Eastern indigo snake	*Drymarchon corais* - T
Corn snake	*Elaphe guttata*
Yellow rat snake	*Elaphe obsoleta*
Eastern mud snake	*Farancia abacura*
Southern hognose snake	*Heterodon simus*
Florida kingsnake	*Lampropeltis getulus*
Banded water snake	*Nerodia fasciata*
Florida green water snake	*Nerodia floridana*
Brown water snake	*Nerodia taxispilota*
Rough green snake	*Opheodrys aestivus*
Striped crayfish snake	*Regina alleni*
South Florida swamp snake	*Seminatrix pygaea*
Florida brown snake	*Storeria dekayi*
Peninsular crowned snake	*Tantilla relicta*
Peninsular ribbon snake	*Thamnophis sauritus*
Eastern garter snake	*Thamnophis sirtalis*
Eastern coral snake	*Micrurus fulvius*
Florida cottonmouth	*Agkistrodon piscivorus*
Dusky pygmy rattlesnake	*Sistrurus miliarius*
Eastern diamondback rattlesnake	*Crotalus adamanteus*

T - Threatened SSC - Species of Special Concern,
HEP - Used in Habitat Evaluation Procedure Analysis.

Table 11

Fish species likely to occur in the restored Kissimmee River ecosystem

Longnose gar	*Lepisosteus osseus*
Florida gar	*Lepisosteus platyrhincus*
Bowfin	*Amia calva*
American eel	*Anguilla rostrata*
Gizzard shad	*Dorosoma cepedianum*
Threadfin shad	*Dorosoma petenense*
Redfin pickerel	*Esox americanus*
Chain pickerel	*Esox niger*
Grass carp	*Ctenopharyngodon idella*
Common carp	*Cyprinus carpio*
Golden shiner	*Notemigonus crysoleucas* - HEP
Pugnose minnow	*Notropis emiliae*
Taillight shiner	*Notropis maculatus*
Coastal shiner	*Notropis petersoni*
Lake chubsucker	*Erimyzon sucetta*
White catfish	*Ictalurus catus*
Yellow bullhead	*Ictalurus natalis*
Brown bullhead	*Ictalurus nebulosus*
Channel catfish	*Ictalurus punctatus* - HEP
Tadpole madtom	*Noturus gyrinus*
Walking catfish	*Clarias batrachus*
Pirate perch	*Aphredoderus sayanus*
Atlantic needlefish	*Strongylura marina*
Golden topminnow	*Fundulus chrysotus*
Banded topminnow	*Fundulus cingulatus*
Lined topminnow	*Fundulus lineolatus*
Seminole killifish	*Fundulus seminolis* - HEP
Flagfish	*Jordanella floridae*
Bluefin killifish	*Lucania goodei*
Mosquitofish	*Gambusia affinis* - HEP
Least killifish	*Heterandria formosa*
Sailfin molly	*Poecilia latipinna*
Brook silversides	*Labidesthes sicculus*
Tidewater silversides	*Menidia beryllina*
Everglades pgymy sunfish	*Elassoma evergladei*
Bluespotted sunfish	*Enneacanthus gloriosus*
Redbreast sunfish	*Lepomis auritus*

HEP - Used in Habitat Evaluation Procedure Analysis

Table 11 - continued

Warmouth	*Lepomis gulosus*
Bluegill	*Lepomis macrochirus*
Dollar sunfish	*Lepomis marginatus*
Redear sunfish	*Lepomis microlophus*
Spotted sunfish	*Lepomis punctatus*
Largemouth bass	*Micropterus salmoides* - HEP
Black crappie	*Pomoxis nigromaculatus* - HEP
Swamp darter	*Etheostoma fusiforme*
Blackbanded darter	*Percina nigrofasciata*
Blue tilapia	*Tilapia aurea*
Striped mullet	*Mugil cephalus*

HEP - Used in Habitat Evaluation Procedure Analysis

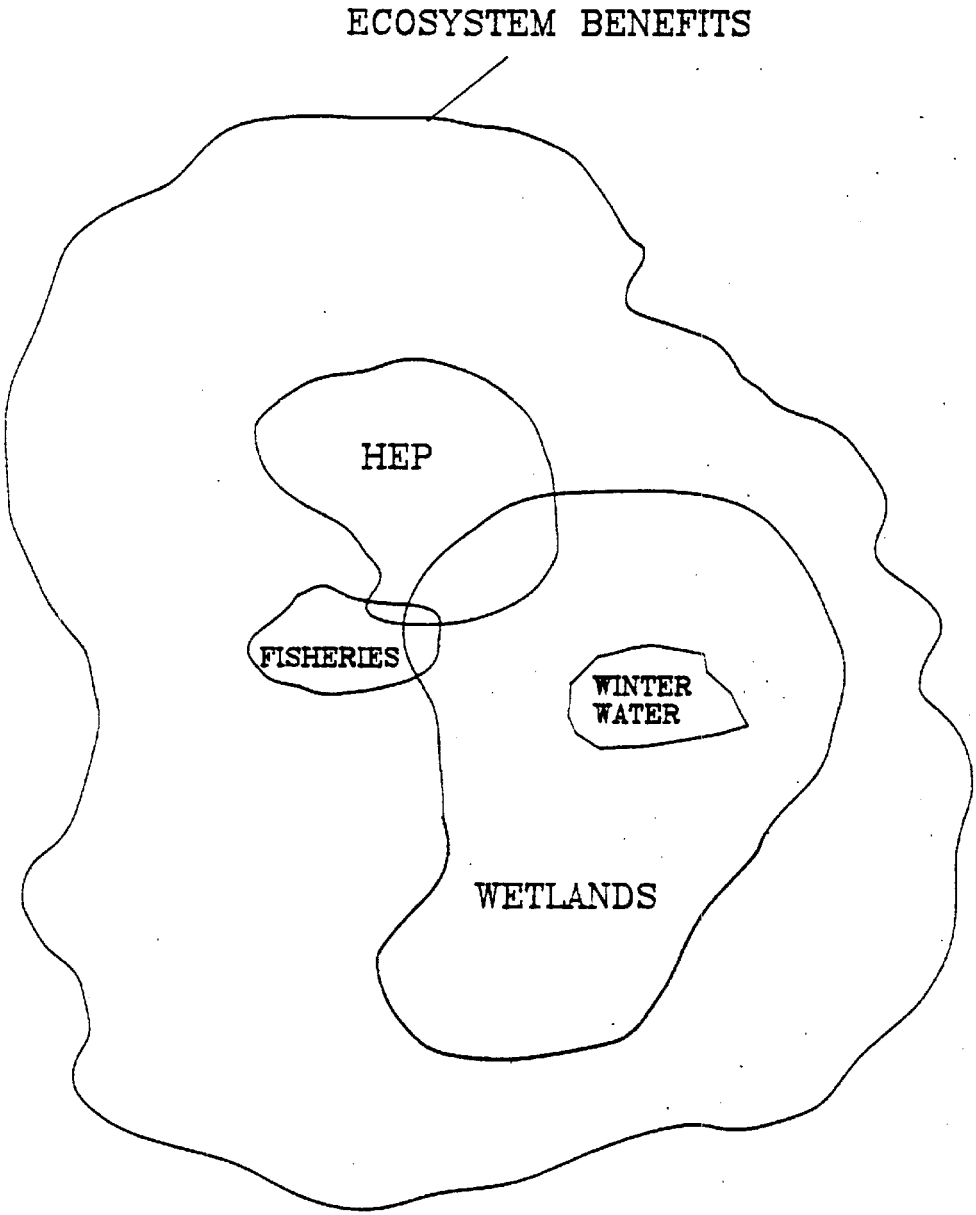


Figure 1. Conceptual comparison of relative scope of measures of restoration benefits.

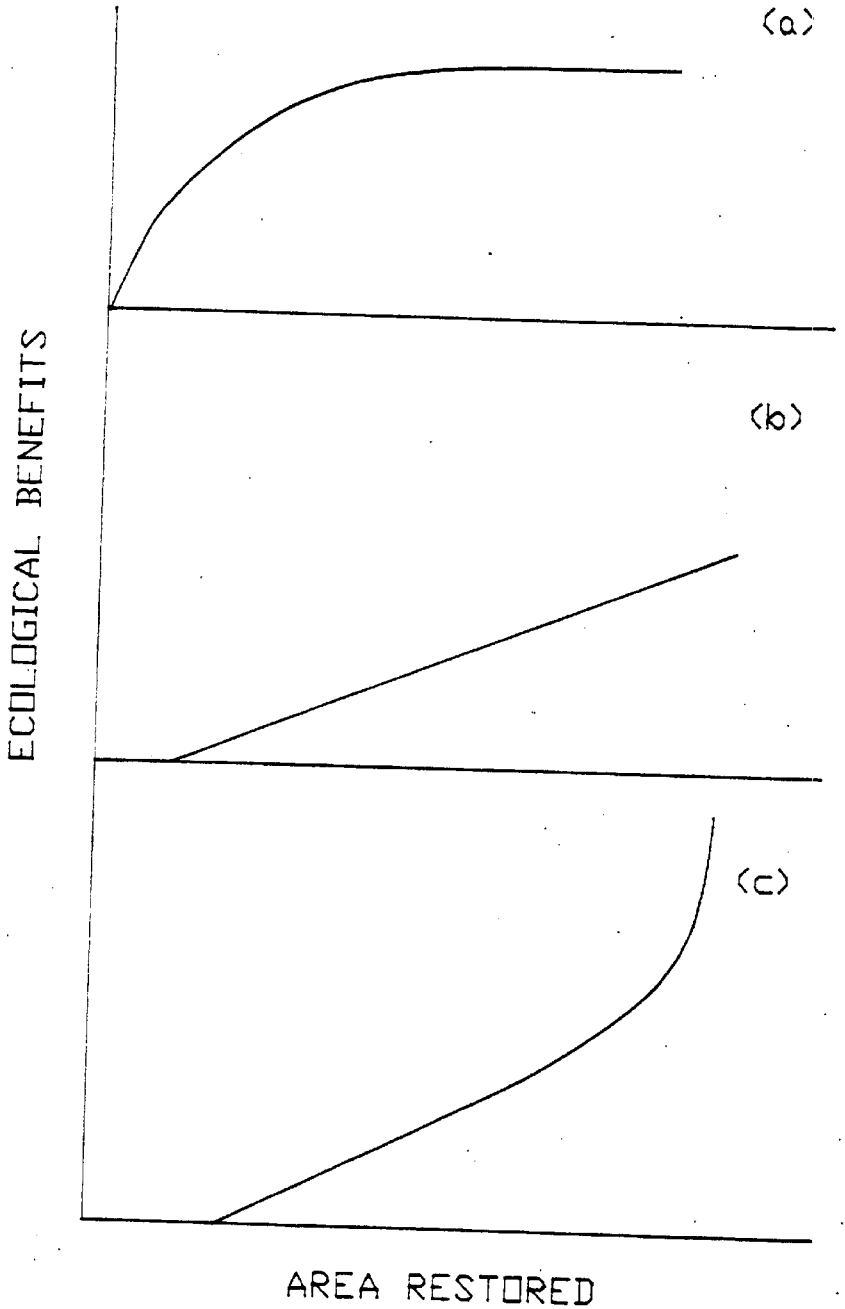


Figure 2. Theoretical Benefits/Area Relationships for Different Restoration Goals.

ANNEX E

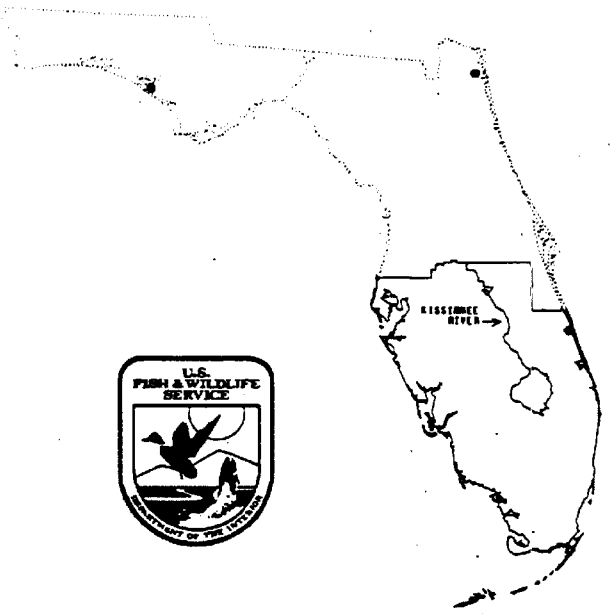
FISH AND WILDLIFE COORDINATION ACT REPORT

KISSIMMEE RIVER RESTORATION PROJECT

Fish and Wildlife Coordination Act Report

Submitted to:

Jacksonville District
U.S. Army Corps of Engineers
Jacksonville, Florida



U.S. Fish and Wildlife Service
Southeast Region
Atlanta, Georgia

October 24, 1991

United States Department of the Interior
FISH AND WILDLIFE SERVICE
75 SPRING STREET, S.W.
ATLANTA, GEORGIA
30303

October 24, 1991

Colonel Terrence C. Salt
Attn: Planning Division
District Engineer
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Dear Colonel Salt:

The Fish and Wildlife Service has prepared this Fish and Wildlife Coordination Act (FWCA) Report based on your plans to restore the Kissimmee River (Canal 38). This restudy was authorized by the Water Resources Development Act of 1990. This report is submitted pursuant to our 1991 Funding Agreement and in accordance with the provisions of the FWCA (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and the Endangered Species Act of 1973, as amended.

This report is a final FWCA Report with a coordination letter from the Florida Game and Fresh Water Fish Commission, and represents the Secretary of Interior's report to Congress as required by Section 2(b) of the FWCA.

The Fish and Wildlife Service recommends that the Federal government take action to restore the Kissimmee River by backfilling of Canal 38 to the fullest extent possible to achieve restoration of the river's original functions and attributes and to mitigate for damages to the fish and wildlife resources as a result of C-38's construction. We also recommend that the Paradise Run reflooding and other flow-through measures in Pool A be incorporated in the Final Feasibility Report as project design features.

We view the restoration of the Kissimmee River basin as a precedent-setting milestone in the Federal government's committment to protecting and conserving our Nation's Fish and wildlife resources.

This report represents the views of the Department of the Interior and should accompany the Final Feasibility Report and Environmental Impact Statement when it is submitted to Congress.

Sincerely yours,

W. T. Olds Jr.

Warren T. Olds, Jr., C.W.B.
Assistant Regional Director

Enclosure

cc:
FWE, Vero Beach, FL
EPA, Atlanta, GA
NMFS, Panama City, FL
FG&FWFC, Tallahassee, FL
FG&FWFC, Vero Beach, FL
FGFWFC, Okeechobee, FL
FG&FWFC, Kissimmee, FL
DER, Tallahassee, FL
SFWMD, West Palm Beach, FL
FWS, Jacksonville, FL

KISSIMMEE RIVER RESTORATION PROJECT

Fish and Wildlife Coordination Act Report

Submitted to: Jacksonville District

U.S. Army Corps of Engineers
Jacksonville, Florida

Prepared by: Joseph D. Carroll, Senior Field Biologist
and Arnold Banner, Senior Field Biologist

Vero Beach Field Office
U.S. Fish and Wildlife Service
Vero Beach, Florida

October 24, 1991

FLORIDA GAME AND FRESH WATER FISH COMMISSION

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August 16, 1991

Mr. David L. Ferrell
Field Supervisor
United States Department of the Interior
Fish and Wildlife Service
P.O. Box 2676
Vero Beach, Florida 32961-2676

RE: Kissimmee River Restoration Project, Fish and Wildlife Coordination Act Report, August 1991

Dear Mr. Ferrell:

The Office of Environmental Services of the Florida Game and Fresh Water Fish Commission has reviewed your draft report on the referenced project, and concurs with your findings and recommendations.

Sincerely,

Brian Barnett

Brian S. Barnett
South Florida Section Leader
Office of Environmental Services

BSB/BT/rs
ENV 2-6/7

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
9450 Koger Boulevard
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August 26, 1991

AUG 2

Mr. David L. Ferrell
U.S. Fish and Wildlife Service
P.O. Box 2676
Vero Beach, FL 32961-2676

Dear Mr. Ferrell:

The National Marine Fisheries Service has reviewed your Draft Fish and Wildlife Coordination Act Report for the Kissimmee River Restoration Project as requested by your letter dated August 1, 1991.

We concur with your recommendation that the Federal government take action to restore the Kissimmee River by back-filling Canal 38 to the fullest extent possible to achieve restoration of the river's original function and attributes and to mitigate for damages to fish and wildlife resources as a result of C-38's construction. A healthy upstream ecosystem is important to the downstream estuary.

We appreciate the opportunity to review this report. If we can be of any assistance in having your recommendation incorporated into the Corps' restoration plan, please contact Mr. Mark Thompson of our Panama City Branch Office at 904/234-5061.

Sincerely,

Edwin J. Koppie

Andreas Mager, Jr.
Assistant Regional Director
Habitat Conservation Division

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EXECUTIVE SUMMARY

The Kissimmee River was dredged as a Federal flood control project in the 1960's, channelizing the 103-mile long Kissimmee River to a 52-mile long canal from the Kissimmee Chain of Lakes to Lake Okeechobee, in south central Florida. As a result, what was historically a one- to two-mile wide floodplain with a meandering river within, was reduced to a 30-foot deep canal (Canal 38) and an estimated 50,000 acres of drained floodplain and pools behind 5 structures.

Today, Canal 38 and Pools A, B, C, D, and E are not functioning as a healthy, dynamic ecosystem. Fish and wildlife populations are depressed compared to historic conditions. Hydrologically, water levels do not fluctuate and spill over onto the floodplain. The remaining oxbows have become stagnant and less productive. It is estimated that overall fish and wildlife habitat values have declined by 90 percent from historic values.

In an effort to demonstrate that the Kissimmee River could be restored, the State of Florida initiated a Demonstration Project in 1984 to reflood portions of Pool B. Monitoring of this effort demonstrates that fish and wildlife values can be restored; however, these restored values fall short of what is predicted under the Level II Backfilling Plan.

In concert with the State of Florida, the Fish and Wildlife Service recommends that the Federal government take action to restore the Kissimmee River by backfilling Canal 38 to the fullest extent possible to achieve restoration of the river's original functions and attributes, and to mitigate for damages to fish and wildlife resources as a result of Canal 38's construction. The Selected Plan will act to restore 52 miles of river and 33,000 acres of flood plain which will quickly be useful to many species of fish and wildlife, including threatened and endangered species.

The Fish and Wildlife Service also recommends, based on the results of the Habitat Evaluation Procedures, that the Selected Plan be augmented by including, without compromising flood control purposes, structures necessary to create a flow-through impounded marsh using pool stage manipulation in Pool A at the north end of the project area, and facilities to allow flow into and out of the Paradise Run area at the south end of the project area. These two features would restore an estimated 8,000 acres of additional floodplain, culminating in the reflooding of slightly over 80 percent of the historic floodplain.

IDENTIFICATION OF PURPOSE, SCOPE AND AUTHORITY

Funding for the Feasibility Report Study is authorized by the Water Resources Development Act of 1990. The primary purpose of the proposal is environmental quality, including restoration of fish and wildlife resources of the Kissimmee River Basin lost to the previous channelization of the Kissimmee River. The South Florida Water Management District (SFWMD) requested and the Congress directed the Corps of Engineers (Corps) to consider a restoration plan for the Kissimmee River labeled the Level II Backfilling Plan. The authorization calls on the Corps to provide a feasibility report based on implementing the backfilling of Canal 38 of the Central and Southern Florida Flood Control Project. The plan calls for partial backfilling of the canal, and leaves the northern end (Pool A and part of Pool B), as well as, the southern end of Pool E unfilled for flood control purposes.

For purposes of this study, the Corps has asked that the Fish and Wildlife Service (Service) consider that all necessary lands to be reflooded will be purchased so that the upper basin of the Kissimmee Chain of Lakes can be operated to supply a continuous minimum flow at 250 cubic feet per second (cfs) to the restored Kissimmee River.

ACKNOWLEDGEMENT OF COORDINATION AND CONCURRENCE OF FLORIDA GAME AND FRESH WATER FISH COMMISSION

Attached you will find a letter, dated August 16, 1991, from the Florida Game and Freshwater Fish Commission, which concurs in the findings contained in this report. We have also received a concurrence letter dated August 26, 1991, from the National Marine Fisheries Service.

DISCUSSION OF RELEVANT PRIOR STUDIES AND REPORTS

The Kissimmee River was dredged as a Federal project in the 1960's resulting in a wide canal from the Kissimmee Chain of Lakes to Lake Okeechobee. In the late 1970's the State of Florida petitioned the Corps to restudy the channelized Kissimmee River, identified as Canal 38 (C-38). A primary concern at that time was that the canal was acting as a conduit for rich urban runoff from the Kissimmee Chain of Lakes, and agricultural runoff into the river itself. After resolutions were passed by Congress in 1978, the Corps responded with reconnaissance and feasibility reports and an environmental impact statement. These documents established that the original Federal project had severely depleted fish and wildlife resources. These reports reviewed several alternative restoration plans, including "partial backfill", which resembles the current selected plan. The report released in September 1985 concluded that there was "no Federal interest" in restoring the Kissimmee River, even though the report indicated that implementing many of the alternatives studied would result in significant benefits to fish and wildlife resources. The conclusion that no Federal action was justified was based on interpretation of the 1983 Principles and Guidelines of the Water Resources Council.

Fish and Wildlife Coordination Act Report, December 1958

Prior to channelization of the Kissimmee River, the Service provided findings and recommendations in a FWCA report concerning the Corps' plan to: (1) enlarge or create canals between the headwater lakes; (2) excavate a canal between Lake Kissimmee and Lake Okeechobee to replace the Kissimmee River; (3) place dredged material in the form of levees along this canal; and, (4) install water control structures and tieback levees along the canal to regulate pool stages.

The 1958 FWCA report comprehensively described the fish and wildlife resources of the river and its floodplain. Particular emphasis was placed on the importance of the recreational use of the river, primarily for largemouth bass fishing, and the significance of the system for wintering waterfowl. These findings were based on over a year of field surveys conducted throughout the basin. The report quantified existing public use of the river for fishing and hunting and predicted that there would be a reduction in sport fishing and a 40 percent decrease in waterfowl habitat.

As mitigation, the Service recommended seasonally varying the water levels in the headwater lakes, and substituting a leveed floodway for most of the canal. These recommended modifications were not implemented and the river was subsequently channelized.

Kissimmee River Restudy Planning Aid Report, August 1979

In August 1979, the Service prepared a Planning Aid Report comparing the pre-project conditions with 1979 conditions. That report noted the loss of over 75 percent of the original wetlands and over 50 percent of the original river channel. The report concluded that mitigation efforts in the form of "fish breeding" canals did not offer significant compensation for fish and wildlife resource losses caused by channelization. The Service concluded that overall habitat values declined 90 percent, and offered various restoration and management alternatives for investigation by the Corps.

Habitat Evaluation Procedure Report, August 1984

This report described fish and wildlife habitat values derived by the interagency Habitat Evaluation Procedures (HEP) team in 1979 and 1980. The report discussed the methods, assumptions, models, and results of the HEP analysis. Baseline conditions were established from surveying the existing system, and were extrapolated to pre-project and restoration alternatives.

Fish and Wildlife Coordination Act Report on Restudy, March 1986

This report recommended that the Federal government take action and provide assistance to mitigate damages to fish and wildlife resources resulting from the construction of the Kissimmee River Flood Control Project. The Service preferred the alternative of backfilling of C-38 Canal to the extent of achieving as complete a restoration of the river's original functions and attributes as is consistent with reasonable flood protection and navigation. The partial backfill alternative, as well as flow through marsh proposal in Pools A and B, and the Paradise Run proposals, were all supported by the Service.

LOCATION AND DESCRIPTION OF STUDY AREA

The Kissimmee River restoration study area includes portions of Polk, Osceola, Highlands, and Okeechobee Counties, Florida. Canal 38 (C-38) is 56 miles long extending from Lake Kissimmee to Lake Okeechobee in south-central Florida (Figure 1). The upper basin is a headwater lake system. The chain of lakes are connected by canals, and feed water to C-38.

The Kissimmee River Basin is sparsely populated, and consists of open prairie and pasture. Channelization caused drainage of the flood plain which is largely used as additional improved pasture. There are significant public holdings in the Kissimmee River Basin, such as the Avon Park Bombing Range owned by the U.S. Air Force, and the State-owned KICCO Wildlife Management Area managed by the Florida Game and Fresh Water Fish Commission.

The major feature in the basin is C-38, which is a box-cut ditch about 30 feet deep and 150 to 300 feet in width. Spoil piles are present along the canal; these have revegetated with grasses or are still sand and shell. Six gated water control structures and tie back levees cross the canal and divide it into a series of 5 pools. Each pool is about 6 feet lower as one proceeds downstream, and locks pass boaters from one pool to the next. The river remnants at the upstream end of each pool are shallow or exposed, whereas those in the lower end are rather deep. The authorized Federal navigation depth is 3 feet, but the locks can accomodate boats with up to 5-foot of draft.

In 1988, the SFWMD completed a Kissimmee River Demonstration Project, to test some restoration concepts. Three weirs were constructed across C-38, which reintroduced flows to three river runs in Pool B. The weirs have notches to allow continued navigation in C-38. A flow-through marsh also was constructed in Pool B, by connecting spoil areas and impounding water on the flood plain.

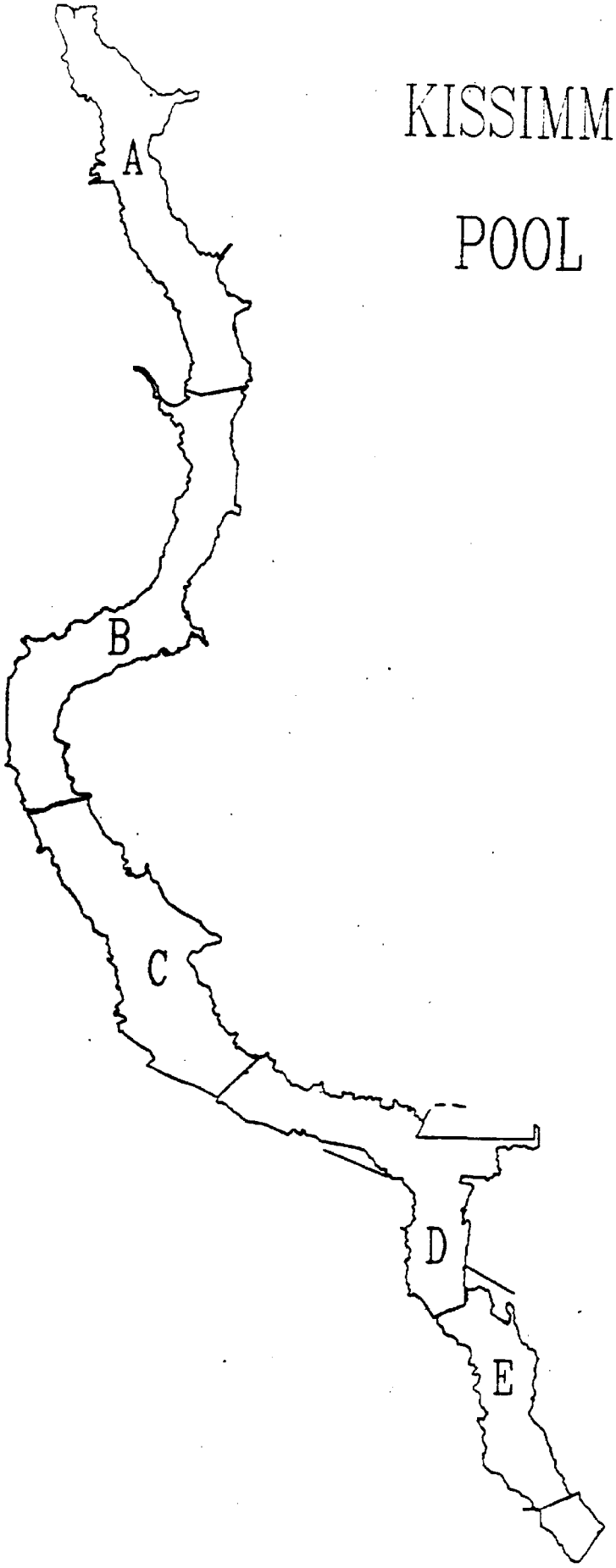


FIGURE 1

EXPLANATION OF FISH AND WILDLIFE CONCERNS AND PLANNING OBJECTIVES

Fish and wildlife resources of concern and of major Federal interest include migratory birds (especially waterfowl and wading birds), and threatened and endangered species (bald eagle, wood stork, snail kite, Florida grasshopper sparrow, Audubon's crested caracara, and eastern indigo snake). Most of these are dependent on wetland habitats, and all use the habitats associated with the upper and lower Kissimmee River Basin, which has been degraded by channelization. The primary planning objective of the Service is recovery and mitigation of habitat supporting these species. The Service also advocates public uses of fish and wildlife, including the observation of wildlife, hunting and sport fishing.

The Department of the Interior finds that the restoration of the Kissimmee River basin would greatly benefit and recover our trust resources and is, therefore, of major Federal interest in complying with laws we administer. A secondary concern is the need to maintain the quality and flow of water necessary to support these species, and maintain their habitats, in the 1 to 2-mile wide restored river floodplain.

DESCRIPTION OF EVALUATION METHODS

The fish and wildlife resources were evaluated by updating the previous 1980 Habitat Evaluation Procedures that had been carried out by an interagency team. A new team was formed consisting of members from the Corps, Service, Florida Game and Fresh Water Fish Commission, and SFWMD. Most of the original information was used and the suitability of the same 17 vegetative cover types for the same 25 species of wildlife was reevaluated. This reevaluation was based on the most recent studies, including the Kissimmee River Demonstration Project, and the combined expertise of the group. The interagency HEP team report is attached as Appendix 1 to this document.

In addition, a Geographic Information System (GIS) was used to first rectify and then to relate the maps of existing conditions to vegetation maps portraying historic conditions. The relative acreages of the 17 cover types were computed within a common study area boundary within the flood plain. The acreages were multiplied by habitat suitability index values to calculate Habitat Units within the river and restored wetlands for each evaluation species.

DESCRIPTION OF EXISTING FISH AND WILDLIFE RESOURCES

Existing Conditions (Pools A, C, D, E)

Canal 38 exists as a deep trench with river remnants leaving and entering the main stem. The five water-control structures comprise segmented pools. These constant, stable pools are governed by extremely narrow limits of water levels. Consequently, the remaining wetland vegetation occupies a narrow band around the edge of the canal, river oxbows, and the flood plain at the lower end of each pool.

Water does not overflow onto the flood plain in the central and northern ends of each pool. The relatively constant water levels without fluctuation do not have the seasonal pulses of high water

that allows a flush of growth of important forage species (fishes, crayfish) in the floodplain, which later are harvested by predators like largemouth bass and wading birds on the flood plain and in the river and canal. Thus, the remaining floodplain wetlands do not significantly contribute to the food chain.

Many of the meanders are stagnant and have become filled with floating vegetation and sediment despite vigorous aquatic weed control. A new habitat type named tussocks has formed from vegetation growing on these floating mats of vegetation. The banks of the canal have little vegetation, but some cattail and primrose willow are present.

The canal area provides little habitat for wading birds because of the lack of water fluctuation. Long-legged waders are found along the banks of the canal, but fewer numbers of short-legged waders like snowy egret, little blue heron, or tricolored heron are found there.

Waterfowl use of the project area is also limited. Surveys by the Florida Game and Fresh Water Fish Commission indicate some use of the floodplain pastures by the resident mottled duck, but use is likely to be associated with small wetlands within the pastures rather than a functioning floodplain system. There are many reasons for decreased waterfowl use in Florida because of Florida's position at the end of the flyway. However, in this case, it is primarily because the channelized river does not allow floodplain wetting very often, preventing development of marshlands attractive to waterfowl.

The canal is moderately useful for alligators because it supports large numbers of gar fishes and some suitable bank nesting areas. There are significant numbers of alligators in the present system.

Sandhill cranes and Audubon's crested caracara take advantage of the drained floodplain pastures for foraging. The cattle egret is the most abundant wading bird in these pastures.

The fisheries in Canal 38 and adjoining oxbows are depressed because of a lack of oxygen in the warm summer and fall months. This condition is chronic during the warm months, which causes game fishes to seek more favorable conditions in tributaries of the system. Sampling indicates a prevalence of younger largemouth bass because of these limiting conditions. In addition, the fish communities are skewed, being dominated by gar and bowfin.

Overall, C-38 and Pools A,C,D, and E are not a healthy, dynamic ecosystem. Fish and wildlife populations are depressed compared to historic conditions. Water levels do not fluctuate and spill over onto the floodplain. The remaining oxbows have become stagnant and less productive.

Pool B: Demonstration Project Area

To investigate the feasibility of restoration methods and success and environmental benefits of restoration methods, in 1984 the SFWMD constructed 3 sheet pile weirs in Pool B of C-38. The weirs were notched to allow navigation down the canal to continue; however, they were intended to force water to flow through river oxbows. In addition, the SFWMD connected some spoil areas together and added structures to enable construction of a "flow-through marsh". This

caused part of the flood plain to be reflooded by rainfall supplemented by culvert flow, and attracted certain wildlife, particularly wading birds such as the white ibis.

The river oxbows affected by flows diverted by the weirs were cleared of floating aquatic vegetation. Also, a sand bottom was established where flows moved organic sediments. This reestablished a more diverse benthic community, and provided better spawning conditions for largemouth bass.

The diverted flow was not sufficient to cure the chronic low oxygen condition in the river oxbows or parts of the canal. This is perhaps due to the relatively short length of the oxbows, the notches in the weirs not diverting enough of the flow, and most importantly, to upstream management of the Kissimmee Lakes. The Kissimmee Lakes do not provide a minimum downstream river flow, but instead water is discharged only when flood control lake regulation schedules are exceeded.

The weir systems do cause some floodplain inundation when sufficient flow occurs, but this occurs less than 20 percent of the time, and less than 30 percent of the distance to the tree line is normally inundated for only short periods up to 2 weeks. If, if water does accumulate in the floodplain pastures, it quickly recedes into the canal in a matter of a few days. This recession rate causes the water accumulated to sweep back into the canal with low dissolved oxygen and high biological oxygen demand. The recession rate off the flood plain is rapid, as water seeks the large deep canal.

Wading birds have responded well to reflooding occasioned by the "flow-through marsh", and other conditions in Pool B. The aerial surveys by the Florida Game and Fresh Water Fish Commission (Toland, 1991) show that 12 species of wading birds use the existing Kissimmee River C-38 system. The most abundant wading birds in the Kissimmee flood plain are the cattle egret, white ibis, and great egret. Flow-through marsh in Pool B exhibited the highest wading bird species diversity and richness in the system according to these studies. Pool B had the lowest percentage of cattle egrets in the wading bird population and the highest relative density of other wading birds, including white ibis.

The Florida Game and Fresh Water Fish Commission aerial surveys also included waterfowl (Toland 1991). The blue-winged teal was the most abundant duck in the Kissimmee system. Waterfowl species richness and diversity were as high or higher in Pool B than any other pool segment observed in the study. This is a reflection of the fact that pasture has been replaced by marshland in some of this area. Significantly, the "flow-through marsh" comprises 40 percent of the area in Pool B, and supports 70 per cent of the waterfowl and 66 percent of the wading birds in Pool B. Thus, the restoration potential for the Kissimmee River for wading birds and waterfowl appears substantial.

Finally, the Kissimmee Chain of Lakes are productive freshwater systems. They are used extensively by the endangered snail kite and bald eagle. Eutrophication is occurring with nutrient inflows resulting in aquatic weed production and muck deposition. Fishing is excellent to average depending on the time from the last drawdown to reverse this eutrophication process.

FUTURE WITHOUT THE PROJECT

This future condition assumes continuation of lock and dam operation and maintenance and aquatic weed control. This scenario would continue to have limited fish and wildlife productivity as described previously under existing conditions. Compared to historic conditions, a great percentage of habitat values would remain lost. Fisheries data suggest that, without restoration, progressive long-term degradation of fish stocks will occur because of a continuing decline of game fish and increased dominance by rough fish. There would be no positive or negative effects on the degraded wildlife in the river basin and flood plain.

In addition, even with revitalization of the headwaters impoundments upstream of Structures A, C, D, and E will gradually lose value to wading birds and waterfowl, because the vegetation will become more rank, as the stable pools accumulate nutrients. The closing vegetation will be dominated by cattails and shrubs limiting access to fishes by wading birds and eliminating valuable waterfowl food plants.

SUMMARY OF PLAN SELECTION PROCESS AND IDENTIFICATION OF EVALUATED ALTERNATIVES

Although various plans of differing intensity were evaluated in the 1985 Feasibility Report by the Corps, and the 1990 report by the SFWMD, the Congressional charge in this study authorization is to consider only the Level II Backfilling Plan. This plan was developed by the SFWMD after determining ecological and hydrological criteria for restoration of the Kissimmee River ecosystem. The objective is restoration of the ecological integrity of the river/flood plain.

The SFWMD determined that floodplain ecosystem restoration is dependent on replication of five hydrological criteria: (1) continuous flow with duration and variability characteristics comparable to pre-channelization measurements; (2) average flow velocities between 0.8 and 1.8 ft/second when flows are contained within the channel banks; (3) stage discharge relationship that results in overbank flow along most of the flood plain when discharges exceed 1,400 to 2,000 cubic feet/second; (4) stage recession rates on the flood plain that typically do not exceed 1 foot/ month; and, (5) stage hydrographs that result in floodplain inundation frequencies comparable to pre-channelization hydroperiods, including seasonal and long-term variability characteristics.

No physical structural alternatives are being considered, instead only separable items and incremental analysis are substituted. In order to perform incremental analysis of the basin restoration plan, three theoretical size increments, are being considered. The first is about 25 square miles of river/flood plain, which is equal in size to Pool C and 1/2 of Pool D. This theoretical alternative is thought to be the minimum size where a river and floodplain interacting system could be recreated (Minimum Increment Plan). The second increment is Level II Backfilling (the Selected Plan). The third theoretical increment is complete backfilling from Lake Kissimmee to the end of Pool E plus Paradise Run restoration (Total Restoration Plan).

DESCRIPTION OF SELECTED PLAN

The overall intent of the Level II Backfilling Plan is to provide pre-channelization hydrologic conditions to restore approximately 52 miles of river channel and about 33,000 acres of flood plain.

The C-38 canal would be backfilled for about 30 miles with material from the existing spoil piles from the middle of Pool B to the middle of Pool E (the remainder of the pools and Pool A would remain channelized to retain flood control capability). As necessary, "new" river channel reaches would be created to connect existing oxbows, where C-38 obliterated the river. The tie-back levees at each of the structure sites would be degraded to existing marsh elevations, and boat lock and structures S-65B, S-65C and S-65D removed.

In order to accomplish restoration, adequate river flows will be provided by changes in the regulation schedules of several of the upstream Kissimmee Chain of Lakes. This will increase the upper mean sea level (m.s.l.) elevation in the lake regulation schedules (from 52.5 feet to 54 feet m.s.l. for Lake Kissimmee) and allow the lake levels to drop to lower stages over a greater fluctuation range. This increased storage capacity will expand littoral zones of the upper basin lakes, increasing the habitat available for aquatic species of wildlife in Lake Cypress, Lake Hatchineha, and Lake Kissimmee. The plan assumes the purchase of land and changing of water regulation in Lakes Kissimmee, Cypress and Hatchineha to allow a minimum flow of 250 cfs for maintenance of the river system. Work in the upper chain of lakes will be funded by Section 1135 of the Water Resources Development Act as a separate project. Approximately 12,000 additional acres will be inundated in Lake Kissimmee, 7,700 acres in Lake Hatchineha, and 3,800 acres in Lake Cypress.

The Corps plan provides for a gate on the canal between the river and Lake Istokpoga to prevent interbasin flooding, as well as a levee on Yates Marsh drainage divide for the same purpose. During backfilling some potholes would be constructed to approximate to the existing open waters that occurred in the historic system.

The final Corps plan includes the shallowing of C-38 in the upper end of Pool B and Pool A as recommended by SFWMD. The preliminary conclusion is that this is a separable feature, not necessarily funded as part of this Federal project.

PLAN OPERATION

The operational plan is to allow the river to flood and dry as it did historically. No structures would be involved to accomplish this. The only maintenance would be the removal of shoals in the restored river to maintain 3 feet of navigation depth, which would prevail except during extreme droughts, and to maintain the channel by aquatic weed control, as needed. No decisions have been made about prescribed burning or allowing cattle grazing.

DESCRIPTION OF IMPACTS

The purpose of the project is environmental restoration, and to restore values lost from the historic Kissimmee River system. Therefore, to describe the fish and wildlife resources with the project in place, it is merely necessary to describe the historic conditions accurately, and then describe the limits on the restoration plan that prevent the full achievement of the ideal prechannelization conditions. The reason this is possible is that the parameters used to select the plan were to replicate similar hydrologic conditions, as existed historically. This was measured at known gauge locations using historical records to compare a period of record. The Service was involved in selecting these hydrologic criteria as the best way to achieve a biologically functioning ecosystem, which in this case is a river interacting with its flood plain.

The Selected Plan will restore the slope of the water over the basin. The climatological patterns will cause wide changes in water levels and conditions on the flood plain from year to year. This will mean that conditions will be ideal for any given species for short periods, but will not be ideal all the time. This will act to make a functioning ecosystem with seasonal hydrologic pulses and great species diversity.

Historically, the Kissimmee River was a meandering waterway with a frequently braided channel within a 1 to 2-mile wide flood plain. Water levels fluctuated in response to Florida's highly seasonal amounts of precipitation. During the summer and fall, wet prairies were inundated to depths from several inches to a few feet. The duration of flooding was such that amphibians, killifishes, crustaceans and insects could propagate abundantly over the newly available habitat. These organisms fed upon detritus, benthic microalgae, and plankton, which also proliferated in the warm shallow waters. The natural hydroperiod also favored the growth of certain macroalgae and vascular plants which were important food sources for waterfowl and other wetland fauna. Variability in depth and frequency of flooding insured the diversity of vegetation.

As water levels declined, forage organisms from the flood plain moved back into the river channel and potholes formed by old oxbows of the river, where predators such as wading birds, largemouth bass and alligators took advantage of concentrated forage. Residual pockets of water, perched in the floodplain, gradually evaporated, further concentrating forage organisms for such animals as wading birds, sport fishes and other species. These conditions were particularly beneficial to animals such as wood storks, herons and egrets. Overall, the Kissimmee River floodplain wetlands offered both habitat and immense food resources for species of Federal interest.

Channelization caused declines in several species. Declines, not necessarily all from the construction, have been estimated to be as high as 90 percent for waterfowl. Aerial counts of waterfowl in the prechannelization period of the late 1950's indicated about 6,000 ducks and coots were seen. Normally, counting efficiency of aerial counts is estimated to be 40 percent. Therefore, we can expect waterfowl carrying capacity of the flood plain to increase above 10,000 each season. If the conditions improved for these species in the nesting grounds, more of them are produced, and not short-stopped by attractive wetlands northward in the flyway, then 10,000 to 12,000 birds would likely use the restored flood plain of the Kissimmee River.

Wading birds have declined by estimates of about 90 percent in south Florida according to some experts. The restored Kissimmee River would offer near ideal conditions for wading birds as evidenced by the HEP. Therefore, we could expect an increase of wading birds of that magnitude (90 percent of historic) for all the pools except Pool B which has been shown to have become more attractive to wading birds already. All the HEP data for wading birds confirms this analysis.

Alligators are expected to increase only slightly because they have been able to adjust to the modified food chains present in the channelized conditions.

EVALUATION AND COMPARISON OF THE SELECTED PLAN AND EVALUATED ALTERNATIVES

The Service's calculations indicate that the Selected Plan would restore 32,963 acres of river and flood plain (See Appendix 1 Updated Habitat Evaluation Procedures on the Kissimmee River, Appendix 1, Table 3; lower Pool B to upper Pool E). The theoretical minimum size restoration plan in the incremental analysis (Minimum Increment Plan), would be slightly larger than 16,000 acres, if all the vegetation types in the historic flood plain were to be adequately represented. The total restoration plan would encompass 49,101 acres for Pools A through E, plus an additional 11,100 acres for Paradise Run or a total of 60,201 acres of restored river and flood plain.

The Service finds that the Selected Plan represents a reasonable and prudent restoration plan, because it meets the environmental purpose of restoring lost fish and wildlife values is taken to its limit without infringing on the flood control project purpose.

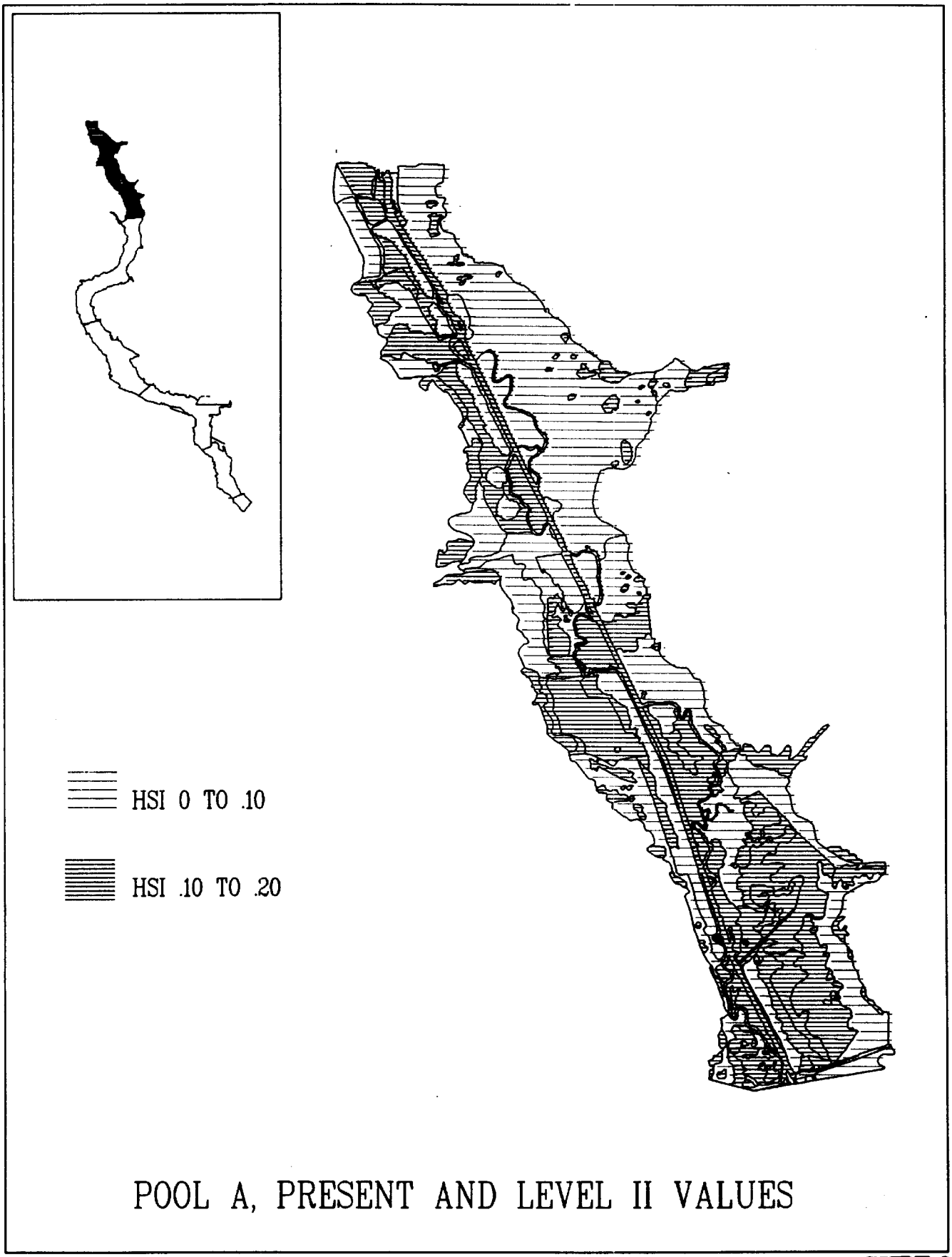
To geographically illustrate our findings, we have created maps of Habitat Suitability Index (HSI) values for the Selected Plan. The mean HSI for the 25 species was applied to each of the 17 habitat types found in each Pool area, as they exist now, and in the future after successful restoration. The higher average HSI values give a darker image to the maps when compared side by side. This clearly shows an overall improvement to the ecosystem and all its wildlife components. (Figure 2 through 10).

The Selected Plan could be improved by adding to it without compromising flood control purposes. This would be rather easily accomplished by placing a flow-through impounded marsh and "pool stage Fluctuation" in the Pool A area, and providing facilities to allow flow into and out of the Paradise Run area south of the project. The Pool A and Paradise Run features would add 3,214 acres of wetlands to Pool A and reflood 4,100 to 5,000 additional acres in Paradise Run, for a total of 7,314 to 8,214 acres of additional wetland restoration. Pool A features are those discussed in the earlier Corps feasibility study of Kissimmee River restoration under the "Combined Wetlands Alternative" (1986) (Figure 11).

The following table illustrates the Habitat Unit Values for Species Groups in the Kissimmee River flood plain under various scenarios as a result of our update of the HEP. The updated HEP study indicates that implementation of the Selected Plan would increase Habitat Units in the existing system project area between Lake Kissimmee and the bottom of Pool E. Sport fish habitat values would increase 9 times, waterfowl 6 times, and wading birds 2.8 times following restoration.

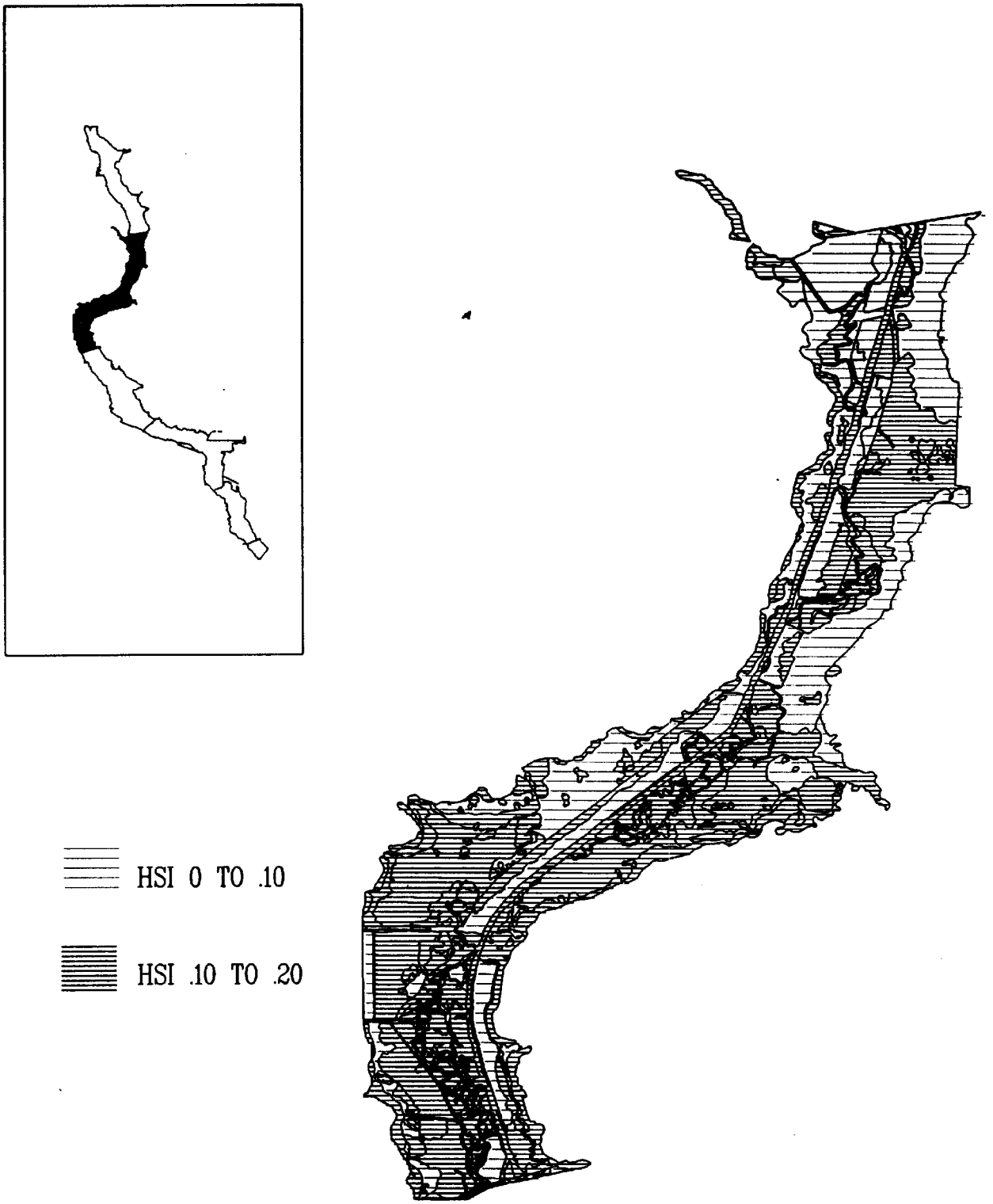
Table 1. HABITAT UNITS - POOLS A THRU E

SPECIES GROUP	HISTORIC	PRESENT	LEVEL 2 BACKFILL PLAN
Herons & Egrets, Wood Stork Bald Eagle	49,195	14,928	40,726
Florida Duck, Ringneck Duck, Dabblers	37,009	5,951	30,273
Sport Fishes	25,627	2,164	19,704



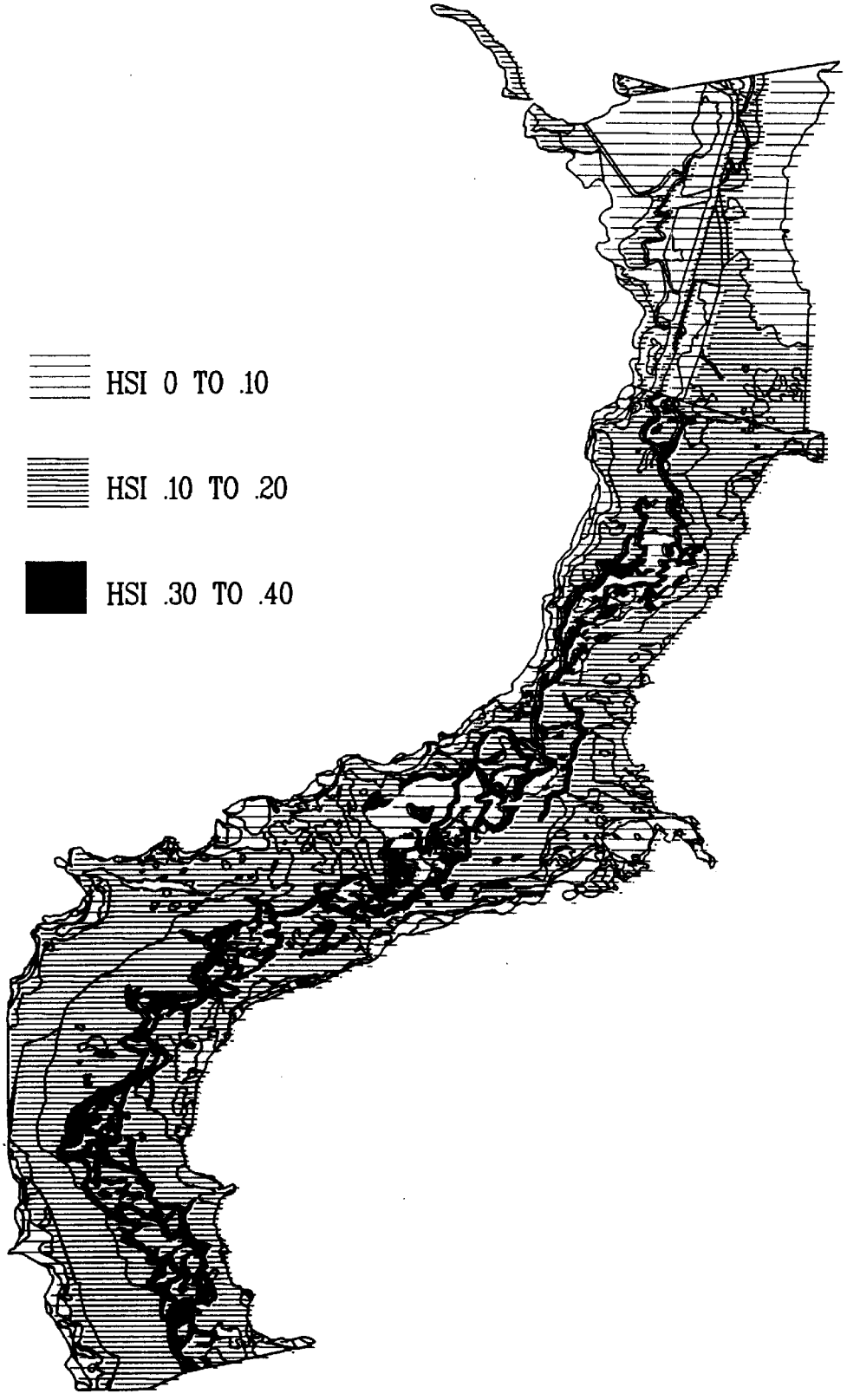
POOL A, PRESENT AND LEVEL II VALUES

FIGURE 2



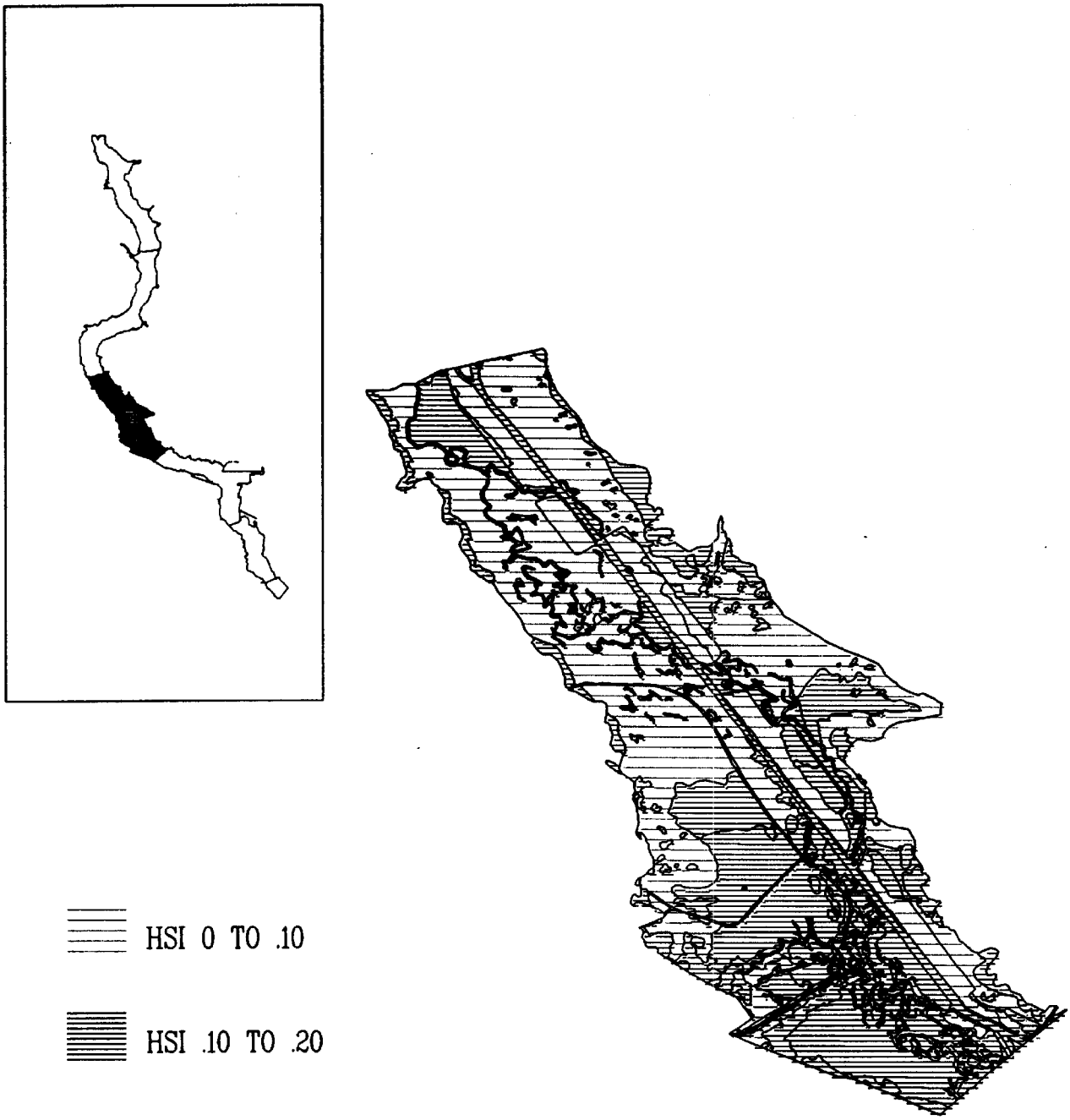
POOL B, PRESENT VALUES

FIGURE 3



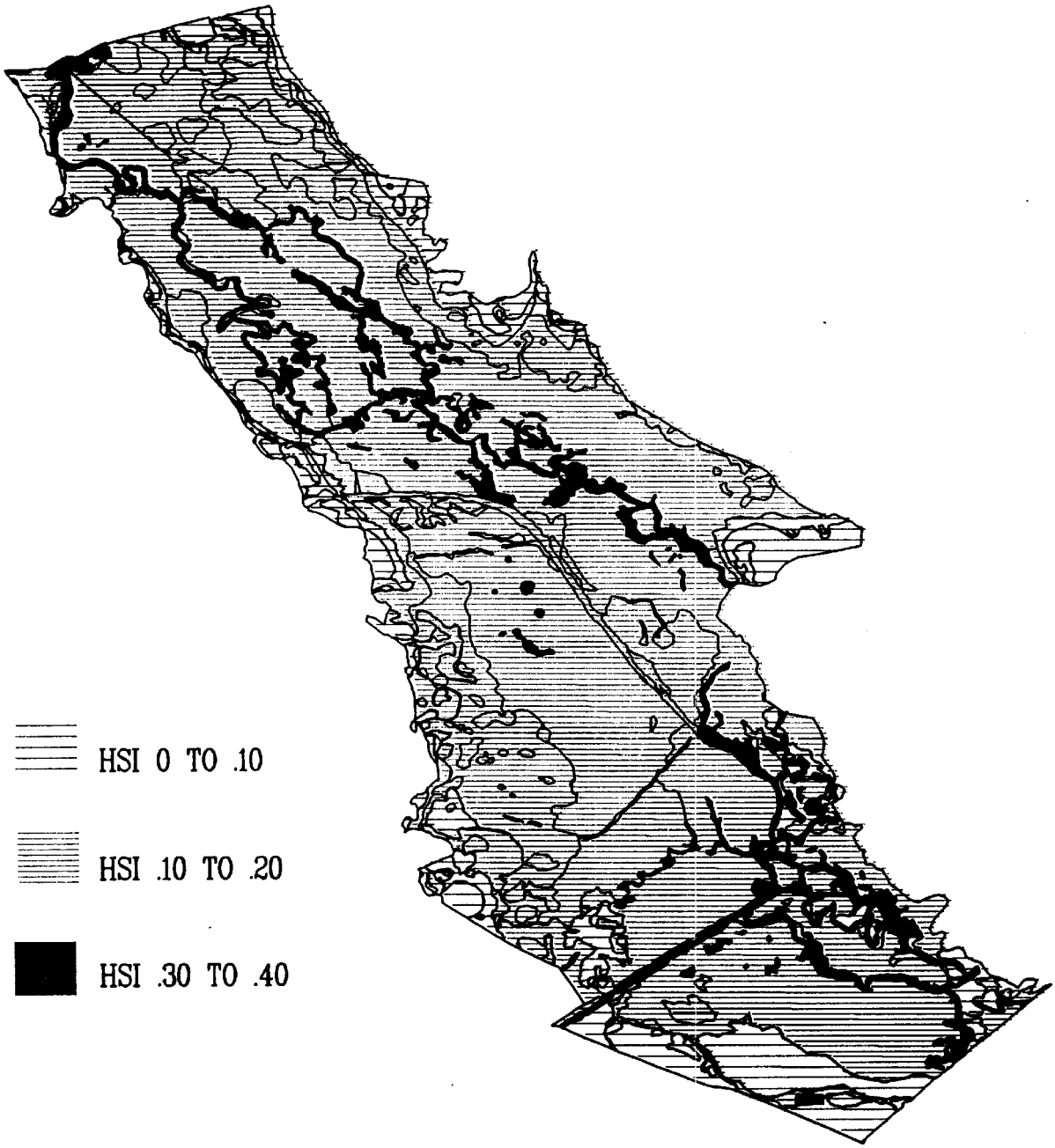
POOLB, LEVEL II VALUES

FIGURE 4



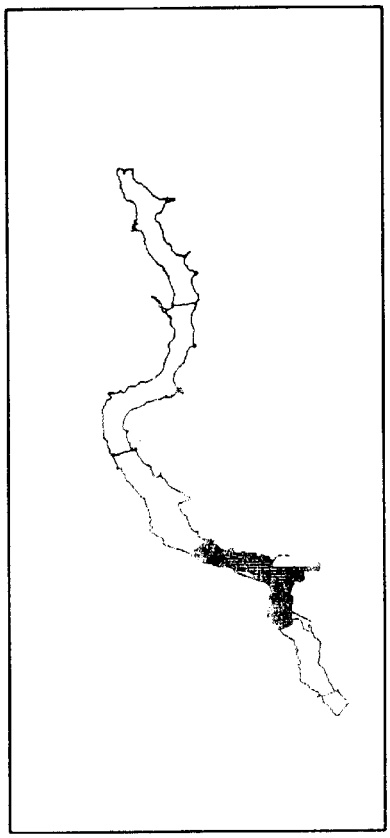
POOL C, PRESENT VALUES

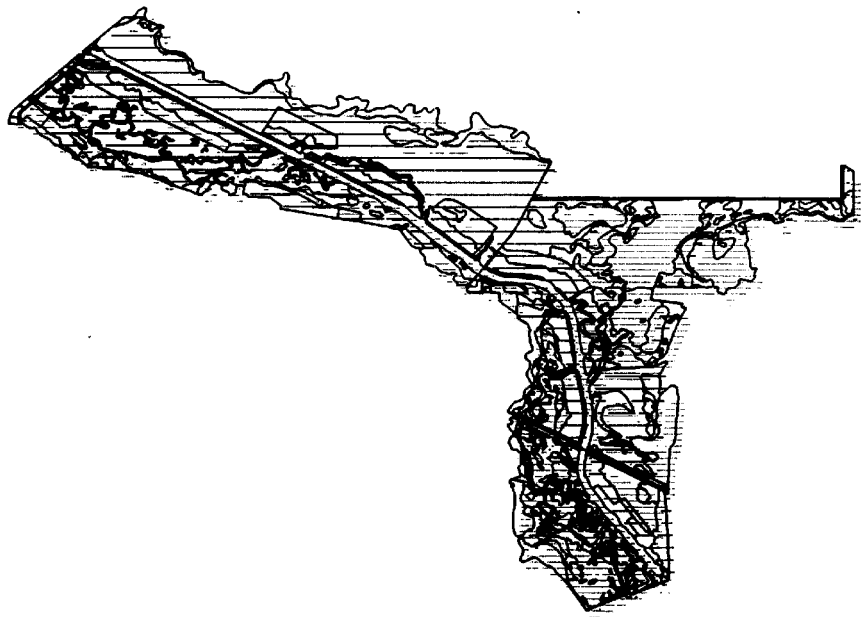
FIGURE 5



POOL C, LEVEL II VALUES

FIGURE 6



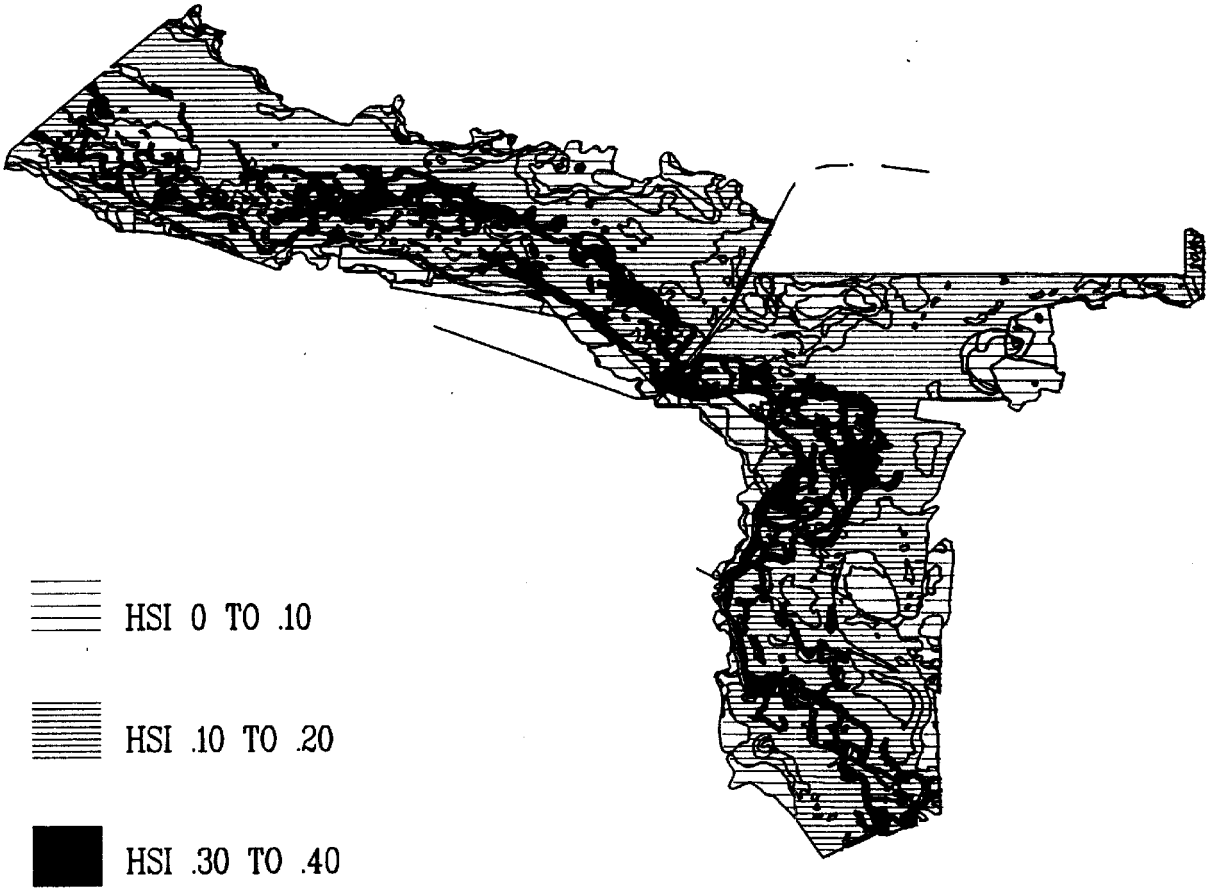


HSI 0 TO .10

HSI .10 TO .20

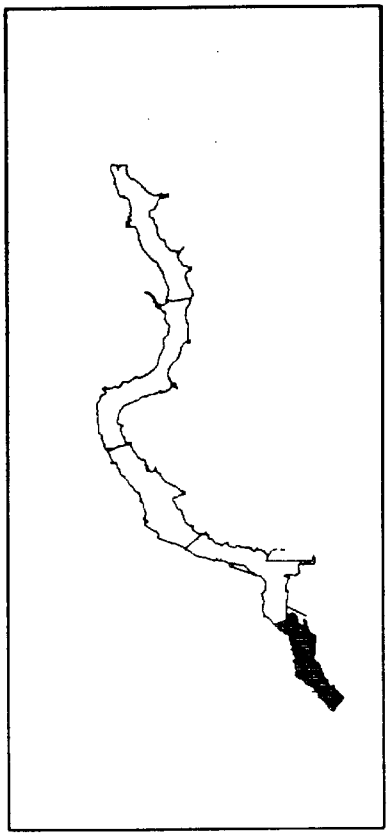
POOL D, PRESENT VALUES

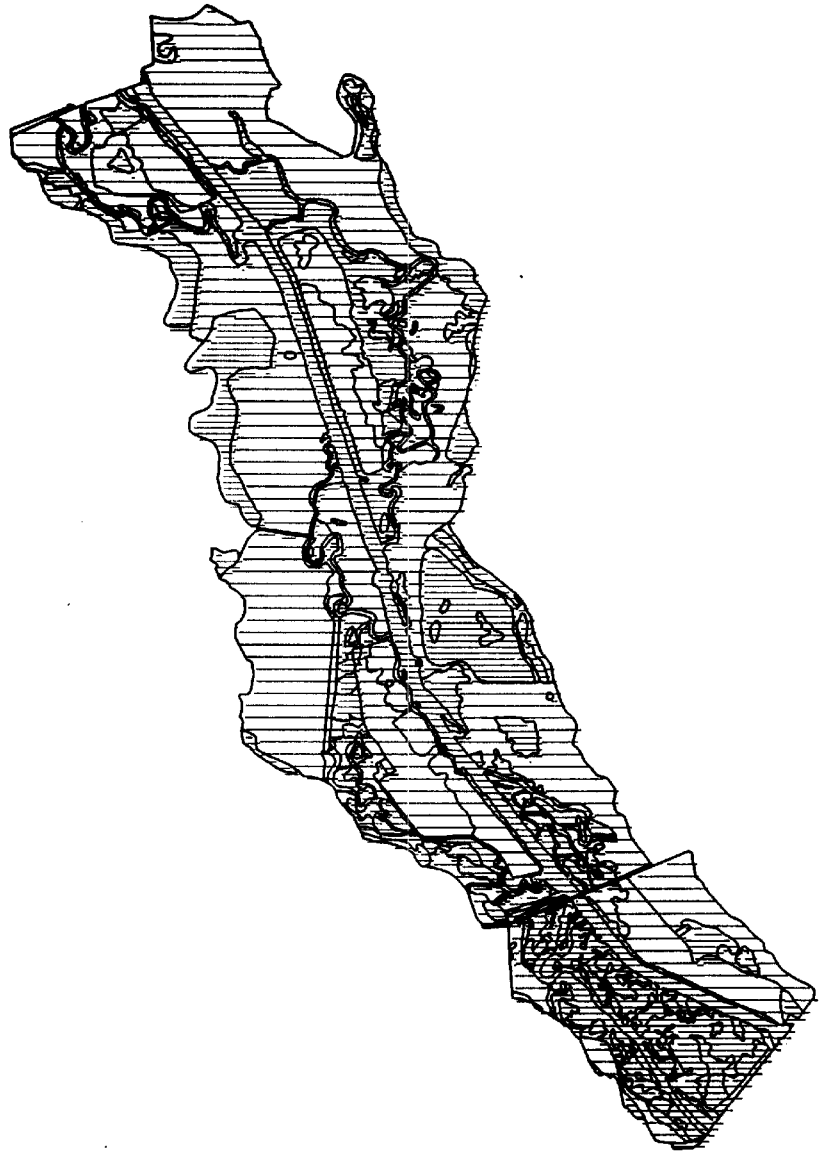
FIGURE 7



POOL D, LEVEL II VALUES

FIGURE 8



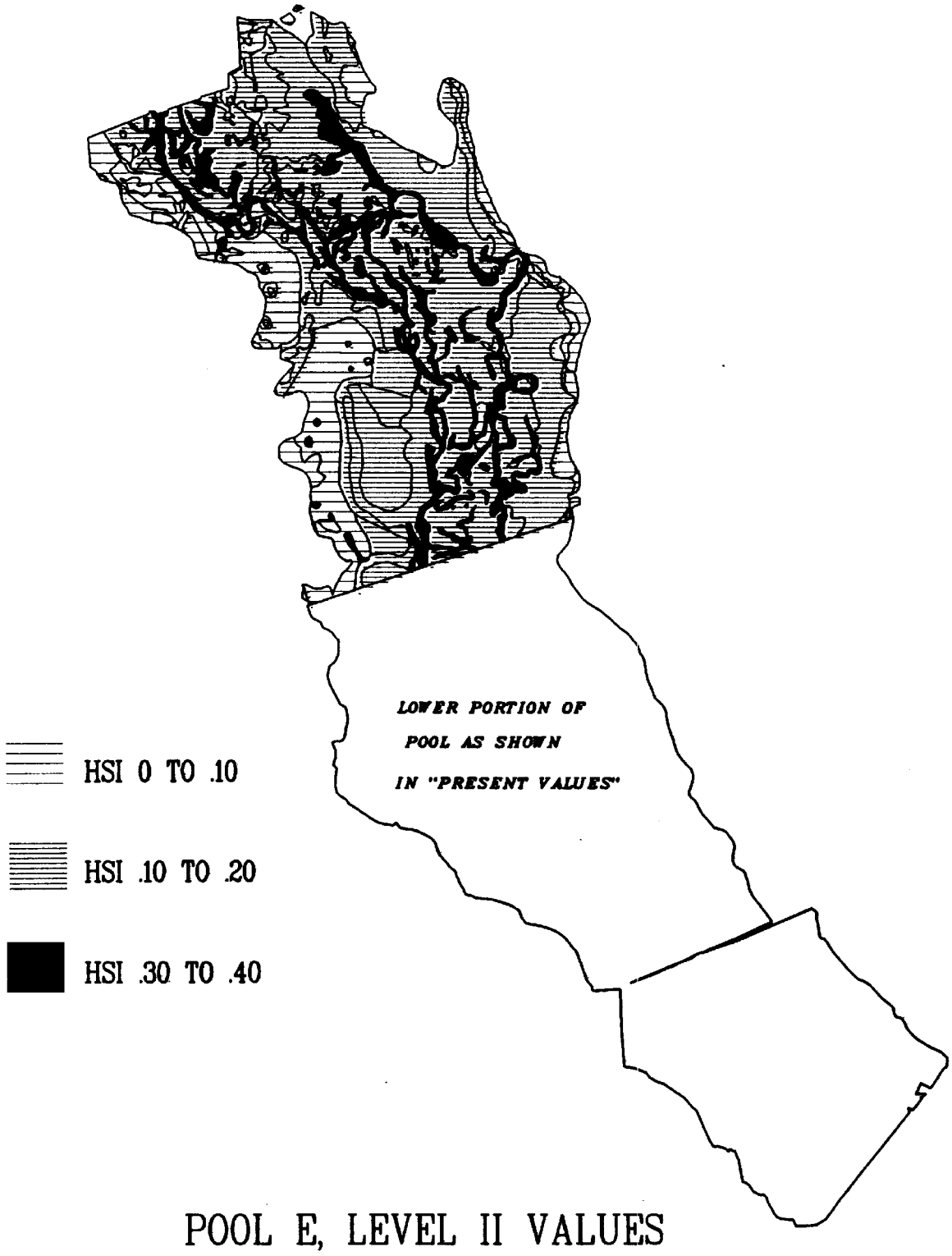


HSI 0 TO .10

HSI .10 TO .20

POOL E, PRESENT VALUES

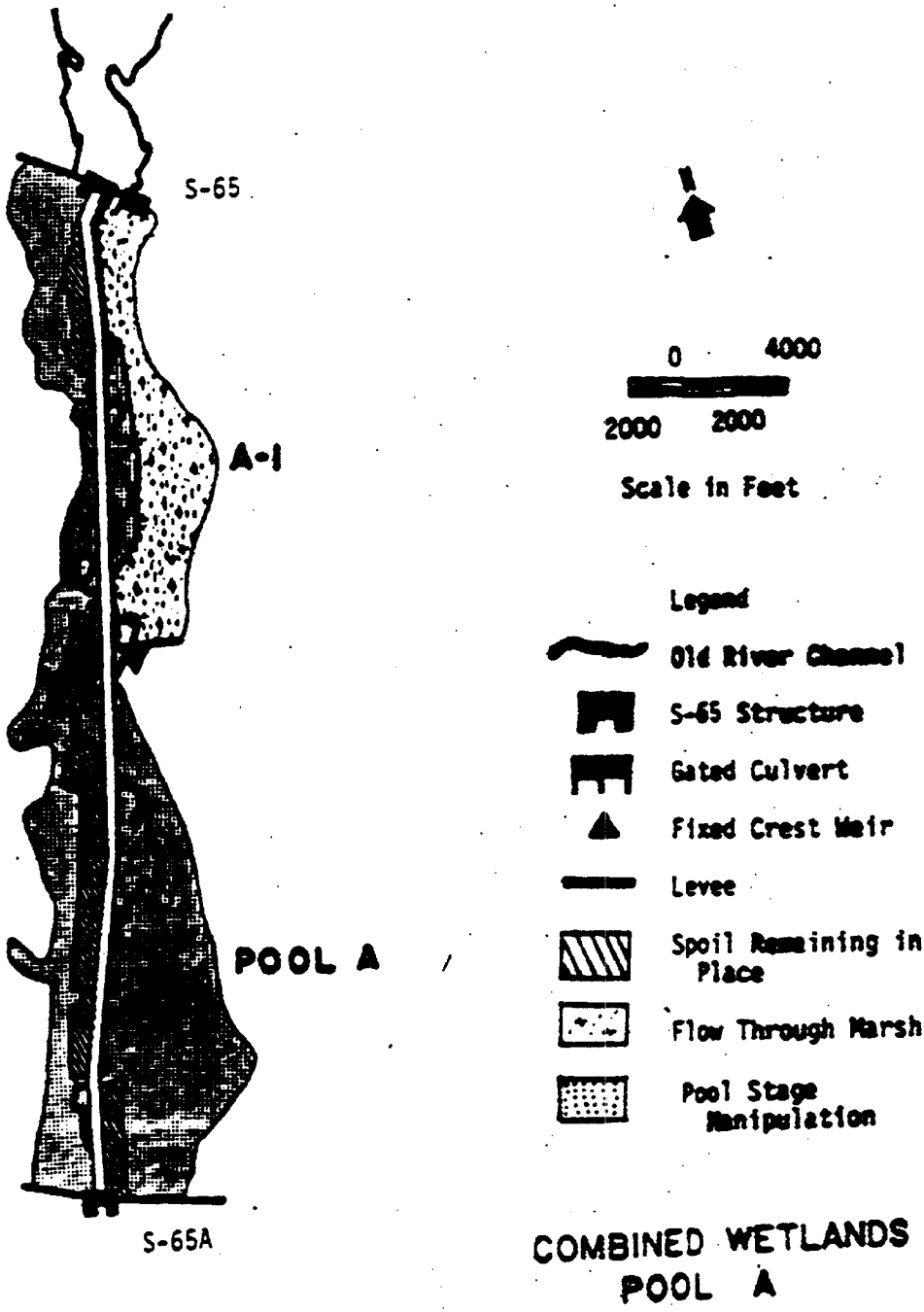
FIGURE 9



POOL E, LEVEL II VALUES

FIGURE 10

Figure 11.


S-65
A-1
POOL A
S-65A
0
4000
2000
2000
Scale in Feet
Legend
Old River Channel
S-65 Structure
Gated Culvert
Fixed Crest Weir
Levee
Spoil Remaining in Place
Flow Through Marsh
Pool Stage Manipulation
COMBINED WETLANDS
POOL A

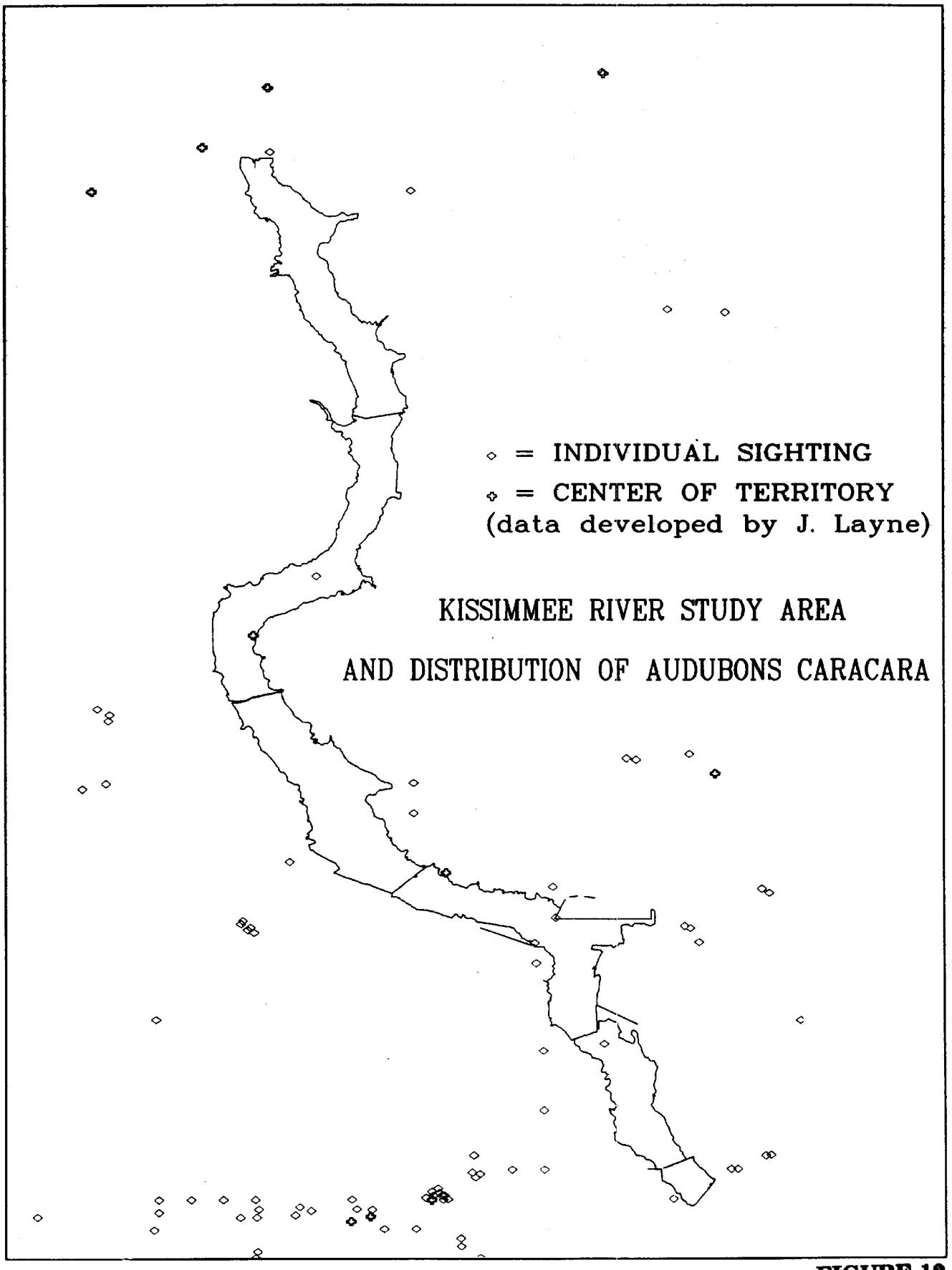

◇ = INDIVIDUAL SIGHTING
◆ = CENTER OF TERRITORY
(data developed by J. Layne)
KISSIMMEE RIVER STUDY AREA
AND DISTRIBUTION OF AUDUBONS CARACARA

FIGURE 12

Threatened and Endangered Species

During a meeting on April 12, 1991, at River Ranch, Florida, the Corps requested that the Service begin consultation on a Kissimmee River restoration plan as presented by the SFWMD and labeled Level II Backfilling.

On May 10, 1991, the Corps Planning Division formally provided a Biological Assessment and requested a Biological Opinion in accordance with Section 7(a)(1) of the Endangered Species Act (ESA) on the Level II Backfilling Plan and has determined that this action would "positively affect" the bald eagle, snail kite, wood stork, and eastern indigo snake. Also, the Corps determined the project would have "no effect" on the grasshopper sparrow and "no significant effect" on Audubon's crested caracara.

The Service concurs with the Corps determinations that the project is not likely to adversely affect the bald eagle, wood stork, and indigo snake, and no effect is expected for the grasshopper sparrow. We interperet the Corps' "no significant effect" finding on Audubon's crested caracara as a minimal adverse effect which requires a Biological Opinion for that species.

BIOLOGICAL OPINION

This represents the Biological Opinion of the Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act. This opinion satisfies the requirements of the Endangered Species Act. An administrative record of this consultation is on file in the Service's Vero Beach, Florida, Field Office.

Audubon's crested caracara (Polyborus plancus audubonii) is a raptor with opportunistic feeding habits; its diet consists of both carrion and living prey. The distribution of the Florida population of this subspecies was once more widespread, covering all of the prairie region of central Florida, but is now largely confined to several counties north and west of Lake Okeechobee.

Mated pairs occupy extensive ranges. An estimate of the size of the remaining population, based on data collected from 1973 to 1978, indicated about 150 active territories (300 adults) and about 200 immature birds, or an estimated Florida population of between 400 and 500 individuals (Layne 1985). The species was Federally listed as threatened in 1987.

The Kissimmee Prairie region is the core of the present range of the species. Sightings of caracara have been reported in the project area (Glen Reynolds, FG&FWFC personal communication). Nesting was also reported in the vicinity of the project near the edge of the floodplain, and a least two territories include parts of the project area (Figure 12).

The caracara prefers open dry prairie and pasture and scattered cabbage palm clumps for nesting. Usually live oak hammocks also exist in their preferred habitat. Caracaras fly over improved pasture lands and forage over shallow ponds and sloughs.

Conversion of pastures to wetlands will make the restored area less suitable as caracara habitat. Although some habitat will be lost to the project, the project restores wetland habitats in a thin linear strip which should be insignificant to the species, because it requires large territories and uses the entire Kissimmee River Basin far beyond the floodplain. The Service finds that the Kissimmee River restoration project will not jeopardize the continued existence of the Audubon's crested caracara.

CONSERVATION RECOMMENDATIONS

Conversion of unimproved pasture and improved pasture lands to wetland will make a small amount of habitat less suitable for Audubon's crested caracara. The Service is unable to recommend any actions that would avoid or rectify this minimal impact, given the purpose of the project. Wildlife management in the form of cattle grazing and prescribed burning would act to maintain suitable habitat near the edges of the floodplain. We recommend, however, that a caracara monitoring program be made a part of the project.

1. The Corps shall assure funding of a long-term monitoring program (during construction) for caracara nesting in the four county area surrounding the project. We recommend the Corps consult the Archbold Research Station which has conducted caracara studies in this area in the past.

2. The Corps or local sponsor shall provide yearly reports to the Vero Beach Field Office based upon these data to assess the impacts of the project on caracara population abundance and distribution.

3. The Corps shall fund development of a wildlife management plan which considers cattle grazing and burning to maintain caracara habitat.

Incidental Take

In meeting the provisions for incidental take in Section 7(b)(4) of the Act, we have reviewed the Biological Opinion and all available information relevant to this action. Based upon our review, incidental take is not authorized for the Audubon's caracara during implementation of this project. If an incident involving this species occurs, all work would cease and our office should be notified immediately (407-562-3909).

This concludes consultation under Section 7 of the Act, as amended. If there are modifications made in the project, or if additional information becomes available relating to threatened or endangered species, reinitiation of the consultation may be necessary.

Section 7(a)(1) of the Endangered Species Act

For the other listed species, formal consultation under Section 7(a)(2) of the ESA is not required when the Service concurs with the Federal action agency's determination that a project is not likely to adversely affect threatened or endangered species. In such cases, a Biological Opinion is not issued. However, in keeping with Section 7(a)(1) of the act, which states that Federal agencies shall "utilize their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of endangered species and threatened species....", we are providing the following analysis and recommendations as part of informal consultation to promote recovery and aid in the planning process for this project, by documenting expected effects on endangered or threatened species:

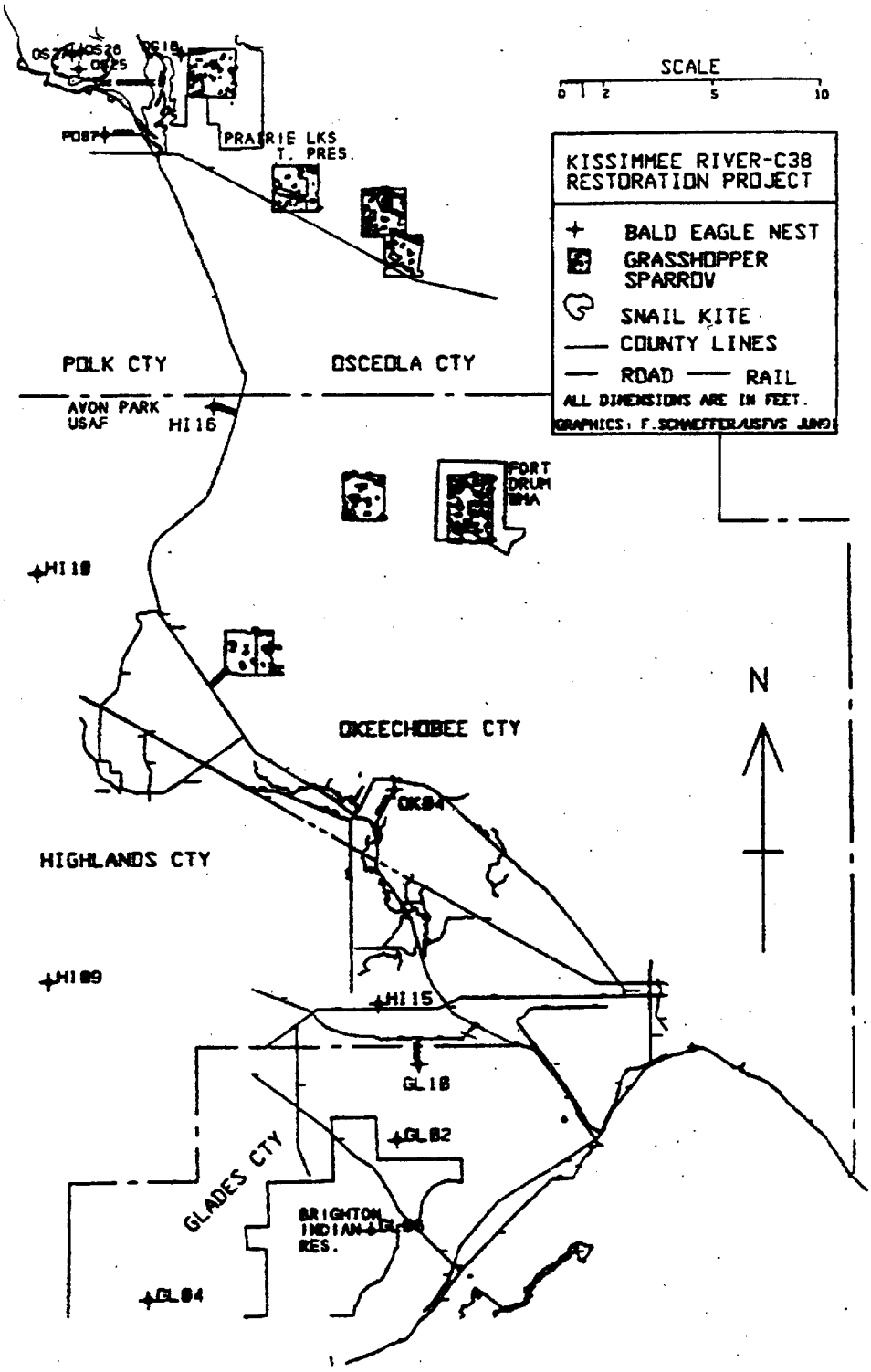
A. Bald Eagle

The bald eagle is Federally listed as an endangered species throughout the 48 contiguous States except for threatened populations in Washington, Oregon, Minnesota, Wisconsin, and Michigan. It is found throughout the United States and northward to the Arctic. Historically, the bald eagle was a common nesting species in the southeast on the coastal plain, and along major lakes and rivers. Currently in the southeast, nesting is limited to peninsular Florida and coastal areas of Louisiana, Mississippi, and South Carolina. The bald eagle is primarily riparian, associated with coasts, rivers, and lakes, usually nesting near bodies of water where they feed. Recent estimates place the number of active breeding territories in Florida at about 350, with 250 territories producing young each year.

Osceola County currently has 103 active bald eagle territories concentrated in the upper Kissimmee Chain of Lakes, with a cluster of active nests (OS25, OS26, OS27) on Brahma Island in Lake Kissimmee, located approximately 0.55 miles north-northwest of the beginning of the Kissimmee River. Polk County has 90 active bald eagle territories, with the closest active nest (PO87) located approximately 1.72 miles north-northwest of the north end of the Kissimmee River. Okeechobee County has 6 active bald eagle territories, with the closest active nest (OK4) located approximately 1.77 miles east of the Kissimmee River. Highlands County has 16 active bald eagle territories, with the closest active nest (HI16) located approximately 1 mile west of the Kissimmee River in the Avon Park Bombing Range property owned by the U.S. Air Force. (Figure 13).

The most significant factor in the decline of the bald eagle in Florida has been the loss of feeding and nesting sites, and human disturbance due to habitat alterations and human encroachment. The rapid increase in human population of Florida has resulted in extensive alterations in land use. Individual bald eagle pairs exhibit considerable variation in response to human activity,

Figure 13.


SCALE
0 1 2 5 10
KISSIMMEE RIVER-C38
RESTORATION PROJECT
BALD EAGLE NEST
GRASSHOPPER SPARROW
SNAIL KITE
COUNTY LINES
ROAD
RAIL
ALL DIMENSIONS ARE IN FEET.
GRAPHICS: F.SCHAEFFER/USFWS JUN91
N
PRAIRIE LKS T. PRES.
POLK CTY
OSCEOLA CTY
AVON PARK USAF
HI16
FORT DRUM BMA
HI18
OKEECHOBEE CTY
OK84
HIGHLANDS CTY
HI09
HI15
GL18
GL82
GLADES CTY
BRIGHTON INDIAN RES.
GL84

depending in part upon the type, frequency, and duration of activity; extent of modification of the environment; time in the bird's reproductive cycle; and various other factors not well understood. Disturbance is addressed in the "Habitat Management Guidelines for the Bald Eagle in the Southeast Region". The emphasis in the Guidelines is to avoid or minimize detrimental human-related impacts on bald eagles, particularly during the nesting season.

The Kissimmee River Restoration Project will involve a substantial amount of aquatic habitat restoration. Although the C-38 canal is suitable for feeding by eagles, our HEP Habitat Suitability Index average for all the 17 habitat types in the Kissimmee River for the bald eagle rises from an average of 0.154 for existing conditions to 0.245 for the types remaining after restoration. We anticipate an accompanying doubling in the number of nests and nesting pairs along the river from the current 3 (HI15, HI16, OK4) to 5 or 6 nests as the reflooded wetlands produce desirable prey species and the expanding eagle population takes advantage of this niche. In addition, eagles using nests located in and around Lakes Kissimmee, Hatchineha, and Cypress, will have a vastly improved foraging area with the additional lake littoral zone available to them by the upper basin plan.

The Service believes the project will increase feeding area for bald eagles, and that this project could beneficially affect the bald eagle by providing new foraging habitat that will accommodate more nesting.

B. Snail Kite

The snail (Everglade) kite (Rostrhamus sociabilis plumbeus) inhabits shallow, open, wetlands containing sufficient emergent vegetation to support its primary food source, the apple snail (Pomacea paludosa). Such communities are usually situated in large marshes of sawgrass, wet prairie or cattails with scattered shrubs, small trees or tree islands.

The snail kite once ranged throughout most of the Florida peninsula, but much of its habitat has been destroyed by drainage. Since the mid-1970's, kites have concentrated primarily in the SFWMD's Everglades Water Conservation Areas. However, in recent years, due to population expansion and fluctuating water levels, many kites have moved outward from recent traditional nesting and feeding areas in Conservation Areas 3A and 3B to lakes and ponds in central Florida. Snail kite numbers have fluctuated in the last 20 years from a low of 21 to a high of just over 600 individuals (U.S. population).

The snail kite nests over water in snags, trees, shrubs, or tall vegetation (Sykes 1987a, 1987c;, Bennetts et al, 1988). The nests become accessible to predators in the event of unseasonal drying (Beissinger 1986; Sykes 1987c).

Snail kites feed primarily on one species of freshwater mollusc, the apple snail. Apple snails inhabit shallow, open water marshes with emergent vegetation. Abundance of this prey species is closely linked to water regime (Kushlan 1975, Sykes 1979, 1983a). Higher population levels are attained under permanent water conditions in contrast to conditions in which surface water reaches low levels in the dry season (Kushlan, 1975). Periodic drought and drainage of wetlands, with the attendant loss of the prey base, appear to be the limiting factor for kites in Florida (Beissinger 1986; Sykes 1987b).

the attendant loss of the prey base, appear to be the limiting factor for kites in Florida (Beissinger 1986; Sykes 1987b).

Water levels in the three large lakes within the Kissimmee Chain will be affected positively by the Kissimmee River restoration project. Lakes Cypress, Hatchineha and Kissimmee are regulated by the S-65 structure on Canal 38. Lake Kissimmee will continue to provide suitable nesting and foraging habitat without as much of the "boom or bust" character of the present system of regulation, which has confined zones that create a need for an extreme drawdown every 7 or 8 years. Higher lake levels encourage use of more stable woody nesting sites, instead of cattail and bulrush, the majority of present nesting sites.

A significant threat to Florida snail kite survival is the elimination of drought-related habitats throughout the State. During drought years, kites are forced from major nesting and feeding areas in search of areas that have not dried up. Small lakes, ponds and isolated wetlands are used as habitat in these times. During times of sufficient water levels, kites will use historic habitats such as the Water Conservation Areas and Lake Okeechobee for nesting and feeding, but during times of drought, kites look elsewhere for habitat and must turn to these "emergency" sites for survival, such as East Lake, Lake Tohopekaliga and Lake Kissimmee.

Low kite numbers on Lake Tohopekaliga in 1983 and 1984 reflect years of sufficient water levels in Lake Okeechobee and the Water Conservation Areas when it was not necessary for kites to disperse to refugia habitats. Higher numbers in the years 1981, 1985 and 1989 reflect drought years, when water levels in Lake Okeechobee and the Water Conservation Areas lowered sufficiently to force kites into more northern drought refugia habitats such as Lake Kissimmee and Tohopekaliga. In 1989, a record 73 kites used Lake Kissimmee, because of the drought conditions in South Florida. In the 1991 season, only 33 nests were built (J. Rodgers, personal communication). A total of one hundred and forty-seven nests have been marked so far this nesting season on Lake Tohopekaliga (Jon Buntz, personal communication).

Kites will use any area that has sufficient submerged vegetation to support an adequate population of apple snails that can be reached by air. Snail kites are opportunists and will find new areas of suitable habitat, where there are sufficient populations of apple snails. Between Lake Kissimmee and Lake Okeechobee, the additional flooded wet prairies and other marshes and river runs will provide a feeding corridor area. Also, it is likely a few kites will find suitable nesting conditions, somewhere in the mosaic of floodplain vegetation types.

Snail kites tend to nest in low overhanging trees and shrubs. When this type of habitat is unavailable, kites will nest in cattails, often with poor results. The flimsy structure of cattails often does not provide sufficient support for the kite's nest.

Cattails and other vegetation types detrimental to kite feeding and nesting, such as pickerelweed, water primrose and smartweed, will limit the suitable foraging and nesting habitat. In the long-run, the vegetational changes that will occur in the Kissimmee River flood plain as a result of the restoration plan will be beneficial to snail kites by adding to their available nesting and feeding habitat, particularly in the grass marshes and river backwater marshes.

In addition, the littoral zone of Lake Kissimmee will be expanded which will allow nesting in firmer structure. It will also provide a greater forage base which should increase the number and success of nests on that Lake.

The proposed Level II Backfilling Plan will be beneficial to the continued existence of the endangered snail kite and will assist in recovery of the species.

C. Wood Stork

The wood stork (Mycteria americana) is a large wading bird. Originally more widespread in the southeastern United States, breeding is now restricted to Florida, Georgia, and marginally to South Carolina. Although experts disagree on exact figures, the United States wood stork population declined from a total of about 60,000 birds in the 1930's to the current estimate of about 4,000 to 5,000 nesting pairs. The wood stork was listed by the Federal government as endangered in 1984.

The wood stork's tactile feeding strategy requires concentration of fish in receding pools, and they are particularly dependent on the consistent availability of such feeding areas within range of the nesting colonies. Wood storks have been observed feeding 80 miles from their nesting colony (Ogden et al, 1978).

The population decline of the species as a whole is reflected, perhaps even more dramatically, in the active nesting colony at Corkscrew Swamp National Audubon Society Preserve. As recently as the 1960's, Corkscrew was the largest wood stork colony in the United States, with 6,000 pairs in 1961 and 1966, and 5,000 pairs in 1968. A severe decline began in the 1970's, with only 3,000 pairs in 1971 and 1975. Since 1980, the number of nesting pairs has ranged between 0 in 1987 and 1989, to 2,350 pairs in 1983. Rates of nesting success also declined in the 1980's, with failures in 8 years of the decade; only 1986 and 1988 had successful fledging (Ogden, 1989).

Mr. Ogden attributes the increased frequency of nesting failures in the Corkscrew Swamp and other wood stork nesting colonies in south Florida to a shift in timing of the formation of colonies. Colonies formed from November-January in years of high nesting success, and shifted to February-March in more recent years of lower nesting success. Mr. Ogden believes that the few remaining isolated and short hydroperiod wetlands no longer can sustain the energy demands of the nesting colony in the early months of the dry season (November-December), and that wood storks are now forced to wait until the deeper sloughs and swamps begin to dry before enough areas of concentration of fish are available to sustain the demands of nesting and rearing young birds.

The whole Kissimmee River basin area will be responsive to natural variations in climatological conditions and will provide adequate foraging areas throughout the wood stork nesting season. Wood storks and other wading birds will respond positively to the expected shallow and receding water levels during the dry season which concentrate prey.

In relation to the project area, the two nearest active wood stork rookeries are located in western St. Lucie County in reservoir areas within 5 miles of the Okeechobee County Line. These locations are approximately 25 miles from the Kissimmee River and C-38.

The historical record for the project area show actual water levels can vary widely depending on seasonal and year-to-year fluctuations in rainfall. Re-flooding will create islands in the floodplain and depressions that would hold water during drought. The Service considers that such action could increase the habitat diversity of the wetland areas. The HEP team evaluated the habitat suitability of the proposal for a variety of wildlife species, including the endangered wood stork. The Habitat Suitability Index for the wood stork for the 17 habitat types in the Kissimmee River flood plain under existing conditions averages 0.05, while the HSI for the wood stork under the postproject condition averages 0.27. This indicates a five-fold increase in average habitat values and several of the habitats are rated by the team as high as 0.6, with unity being ideal conditions. This indicates that fluctuating water levels will promote concentration of food resources and make them available to the wood stork. Studies on flow-through marshes during the Kissimmee River Demonstration Project show wood storks will take advantage of the reflooded area (Toland 1991). The reflooding of littoral zone in the upper chain of lakes also will provide a greater amount of foraging area.

In light of a detailed analysis of pre-project and post-project habitat suitability for the wood stork, the Service finds that the project is likely to greatly benefit the wood stork and aid in its recovery.

D. Florida Grasshopper Sparrow

The Florida grasshopper sparrow (*Ammodramus savannarum floridanus*) is a small inconspicuous bird which was discovered in the Kissimmee prairie area. It is an endemic subspecies that is a strictly non-migratory resident of central peninsular Florida. The Florida subspecies requires habitat with saw palmetto, and at times, dwarf scrub oak cover as well as, grasses. The status survey in 1984 (Delaney and Cox 1986) indicated the species has a limited range, low abundance, and was decreasing in abundance. The main cause of decline is considered to be conversion of native range to intensely managed improved pasture and other uses. The subspecies finds suitable habitat where a management plan includes grazing, chopping, and fire, inhibiting plant succession.

The total population is estimated to be less than 125 breeding pairs. The subspecies occurs in the Avon Park Bombing Range close to the Kissimmee River flood plain, but about 1/2 mile away from the river channel. Numerous sighting locations are east of the flood plain in Osceola and Okeechobee Counties; one of these is about 1/2 mile away from the river and close to the flood plain.

The grasshopper sparrow does not specifically occur, as far as is known, in areas scheduled for reflooding. Therefore, we anticipate no direct impact (beneficial or detrimental) on the species or its potential habitat.

E. Indigo Snake

The indigo snake (*Drymarchon corais couperi*) is a large black to glossy blue-black snake. Indigo snakes prefer sandy upland habitats, but can be found in many kinds of habitats, including canal banks. In much of Florida it uses gopher tortoise burrows for shelter. The collecting of tortoises for food, and gassing of burrows for rattlesnakes have diminished the population of indigo snakes.

However, outright collecting of this beautiful snake, which is popular as a pet, as well as habitat destruction, are thought to be the main causes for the reduction in their numbers.

Recovery of this threatened species seems to hinge on management of pinelands and other terrestrial habitats, as well as controlling collectors. The loss of pasture by reflooding as envisioned in this project should have no impact, either beneficial or adverse, on this species.

ADDITIONAL CONSERVATION RECOMMENDATIONS

To promote recovery of threatened and endangered species, the Service recommends the following:

A. Bald Eagle

1. The Corps shall assure funding of a long-term monitoring program (during construction) for eagle nesting in the four county area surrounding the project. This is currently carried out by the Florida Game and Fresh Water Fish Commission and need only be funded by project costs if their operation ceases.

2. The Corps shall provide yearly reports from these data to assess the impacts of the project on eagles to the Vero Beach Field Office.

B. Wood Stork

1. The Corps shall fund a long-term monitoring program (during construction at project cost) of wood stork habitat utilization on the project area, including prey abundance and concentration areas, and water level records at stations inside the various components of the flood plain. The Vero Beach Field Office will be provided with yearly reports on the results of this monitoring.

C. Snail Kite

The previous drawdown of Lake Tohopekaliga and Section 7 Consultation resulted in conditioning the permit to provide for a monitoring program for snail kites in Lake Tohopekaliga. The results from this monitoring effort have enabled the Corps and the Service to more effectively evaluate future proposals for drawdowns in other lakes of the Kissimmee chain of lakes. Therefore, we recommend a monitoring program be made a project feature. The monitoring program should consist of the following points:

1. The monitoring program will begin no later than January 1992, and will incorporate surveys of East Lake, Lake Toho, and Lake Kissimmee, with those of the Kissimmee River valley.

2. The monitoring progam will be conducted monthly, before, during, after the backfilling of Canal 38.

3. Monitoring will consist of surveys to determine numbers of kites and nesting success,if any, in the restored area. Surveys should also delineate nesting distribution, nest substrate, and water depths, and winter communal roost locations.

4. Results from the monitoring program will be provided annually to the Vero Beach Field Office.

DISCUSSION AND JUSTIFICATION OF FISH AND WILDLIFE CONSERVATION MEASURES

The Service endorses the Selected Plan. We believe that implementation of this plan will to restore 52 miles of river and 33,000 acres of flood plain which will quickly be useful to many species of fish and wildlife, including endangered species. We believe that the plan could only be improved by adding to it, without compromising flood control purposes. This would be rather easily accomplished by placing a flow-through impounded marsh and using pool stage manipulation in the Pool A area, and providing facilities to allow flow into and out of the Paradise Run area south of the project. Although these measures would not completely restore the river and floodplain, they would add almost 8,000 acres of wetlands to the project.

Our descriptions of existing conditions for wildlife in Pool B (subject to the Demonstration Project), also argue that a similar plan for Pool A would increase wildlife benefits. An impoundment in Pool A near Rattlesnake Hammock is newly placed and already supports a cattle egret rookery. The 1980 HEP report indicated that there were 3,779 acres of floodplain pasture lands in Pool A that could be flooded by Pool stage manipulation and flow through marshes. The Rattlesnake Hammock pool floods only 565 acres. That leaves 3,214 acres that could become wetlands by impounding or pool stage manipulation. Based on the HEP results that were developed for Pool B, this additional acreage of wetlands would produce an increase of approximately 7,960 Habitat Units for the mix of species examined in the Kissimmee Valley. This proposal for Pool A would add about 240 more Habitat Units for the wood stork.

Although outside the immediate study area, (except for the theoretical Total Restoration Plan), the Paradise Run area south of the selected plan consists of an 11 mile section of the Kissimmee River and flood plain near Lake Okeechobee, which was bypassed by C-38 and could be easily restored by rewatering the area.

The Paradise Run plan would reflood 4,100 to 5,000 additional acres of floodplain. The 1980 HEP performed and cited in our 1984 report indicates that implementing the Paradise Run Plan would add 6,387 Habitat Units to the Existing 25,483 HUs to make 32,320 HU's total. This is an indication of the value of this restoration plan addition, that could be realized if included in the overall Kissimmee River Restoration Plan by the Federal Government (Table 1).

Table 2. Comparison of Kissimmee River Wetland Acreages and Habitat Units (1991 HEP)&

HISTORIC CONDITION			EXISTING CONDITION			SELECTED PLAN			USFWS ADDITION#			SELECTED PLAN PLUS USFWS ADDITION		
POOL	WETLAND ACREAGE	HABITAT UNITS	POOL	WETLAND ACREAGE	HABITAT UNITS	POOL	WETLAND ACREAGE	HABITAT UNITS	POOL	WETLAND ACREAGE	HABITAT UNITS	POOL	WETLAND ACREAGE	HABITAT UNITS
A	7,379	61,985	A	**4,161**	23386	A	4,161	23,386	A	3,214	7,960	A	7,375	31,346
B	10,100	84,666	B	**6,806**	36899	UPPER B	1,022	9,500	B	–	–	UPPER B	1,022	9,500
						LOWERB	**7,964**	66,801				LOWER B	**7,964**	**66,801**
C	5,713	80,561	C	**4,667**	26046	C	**9,783**	81,682	C	–	–	C	**9,783**	**81,682**
D	7,877	68,031	D	**3,500**	22818	D	**7,992**	69,420	D	–	–	D	**7,992**	**69,420**
E	4,728	44,557	E	**1,994**	14294	UPPER E	**2,944**	26,643	E	–	–	UPPER E	**2,944**	**26,643**
						LOWER E	1,314	7,910				LOWER E	1,314	7,910
PARADISE RUN	–	–		–						4,100	6,387@	PARADISE RUN	4,100	6,387
TOTAL	35,797	339,800		21,128	123443		35,180	285,342		7,314	14,347		42,494	299,689

[&] BOLDFACE = Fully Restored River/Floodplain.

[#] Includes partial restoration of 11 miles of Paradise Run.

[@] 1980 HEP Value.

The Service believes there will be a need for a wildlife management plan for the restored area. The basin, as we know it in recorded history, was subject to cattle grazing and burning to maintain winter pasture. A wildlife management plan could assess the limits on use of these normal wildlife management techniques and the limits and perscriptions to place on these practices to maintain the ecosystem and its components, including endangered species. Also, consideration could be given to nesting boxes and platforms, as well, in the plan.

CONCLUSIONS AND RECOMMENDATIONS

1. This Kissimmee River Restoration Project is an important milestone for a National effort to restore and protect wetlands. To restore a river ecosystem after channelization is unprecedented. We heartily endorse and support the Selected Plan, with the addition of 2. below.

2. We recommend the previously identified Paradise Run plan be added to the Selected plan. To complete restoration planning, the flow-through marsh concept and Pool stage manipulation should be implemented for suitable areas in Pool A east of C-38 and immediately south of State Road 60.

3. The project will aid in the recovery of several endangered species, without harming threatened species populations. The abundance and distribution of listed species should be monitored during construction (a fifteen year or more period) as described in the Conservation Recommendations contained within this report. A Wildlife Management Plan should be developed which considers items such as prescribed burning and cattle grazing in the floodplain.

Attachments

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HABITAT EVALUATION PROCEDURES

UPDATED REPORT

KISSIMMEE RIVER RESTORATION

CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL PROJECT

JUNE 1991

The individuals below have reviewed and concur in the information within this report.

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UPDATED HABITAT EVALUATION PROCEDURES ON THE KISSIMMEE RIVER

Introduction

The Kissimmee River flows from the south end of Lake Kissimmee and, prior to construction of Canal 38, meandered about 98 miles to Lake Okeechobee (Figure 1). Canal 38, completed in 1971, reduced this distance to about 50 miles. This reduced the time for water to flow from the Kissimmee Upper Chain to Lake Okeechobee and consequently flood control benefits to the Orlando area and agricultural interests in the associated flood plains. In the early 1970's, the State requested a restudy of Canal 38.

A Federal resolution, adopted April 25, 1978, requested the Board of Engineers for Rivers and Harbors to review the report of the Chief of Engineers on Central and Southern Florida, House Document 643, Eightieth Congress, and other pertinent reports, "with a view of determining whether any modification of the recommendations contained therein and of the system of works constructed pursuant thereto, is advisable at this time, with respect to questions of the quality of water entering the Kissimmee River and Taylor Creek-Nubbin Slough and Lake Okeechobee, flood control, recreation, navigation, loss of fish and wildlife resources, other current and foreseeable environmental problems, and loss of environmental amenities in those areas. Potential modification alternatives, if any, shall include, but not be limited to consideration of restoration of all or parts of the Kissimmee River below Lake Kissimmee and of the Taylor Creek-Nubbin Slough Basin."

The Fish and Wildlife Service Habitat Evaluation Procedures (HEP) was used as one of the methods to evaluate effects of modifications on wildlife values in the Kissimmee River valley. That HEP information was included in the Corps of Engineers Draft Feasibility Report and Environmental Impact Statement on the Kissimmee River published in August 1984.

In early 1991 the Corps of Engineers began a study of the Level II Backfilling plan for restoration of the Kissimmee River as requested by the Water Resources Development Act of November 28, 1990. As part of this study the Corps required an updated version of the original HEP because the deadline of September 1991 did not permit development of a new HEP from the beginning stages. This review included updating the HEP by using newly available relevant information. This document contains elements from the 1980 HEP study and the findings of the 1991 HEP update.

The 1980 HEP REPORT on the KISSIMMEE RIVER

The original HEP analysis began in early 1979 with a preliminary meeting on HEP uses and procedures. HEP is a species-habitat assessment procedure. The advantages and disadvantages of its use are discussed in the 1981 baseline report. HEP evaluation of the Kissimmee River utilized the 1976 HEP version in the field, which did not require as specific and detailed habitat criteria sheets for the evaluation species as present versions and the 1980

HEP version for office projections. The Florida Game and Fresh Water Fish Commission, U.S. Fish and Wildlife Service and the U.S. Army Corps of Engineers provided team members for the field evaluation.

The procedure for conducting a baseline HEP is as follows:

1. Define the limits of the study area.

2. Select and map the study habitats.

3. Select the study species.

4. Select sampling locations and determine habitat suitability for each cover type and species.

5. Determine baseline habitat units for the area by multiplying the area of habitat times the suitablity for each species.

Team composition for this study consisted of the following members for the sampling periods of 3 to 14 December 1979 and 21 to 25 January 1980:

Frank Montalbano	Florida Game and Fresh Water Fish Commission
Karen Foote	Florida Game and Fresh Water Fish Commission
Gerald Atmar	U.S. Army Corps of Engineers
Joe Johnston	U.S. Fish and Wildlife Service

The follow-up sampling period in March 31 to April 4, 1980 consisted of:

Frank Montalbano	Florida Game and Fresh Water Fish Commission
Larry Perrin	Florida Game and Fresh Water Fish Commission
Gerald Atmar	U.S. Army Corps of Engineers
Joe Johnston	U.S. Fish and Wildlife Service

The objectives of HEP in the study of the Kissimmee River basin were to determine baseline conditions as of 1978 in the area and determine the habitat loss, since baseline year 1954, of fish and wildlife resources as a result of the construction of Canal 38. HEP also was used to determine the environmental and ecological impact and/or benefits of the various alternatives proposed to mitigate the impacts caused by construction of Canal 38.

STUDY AREA:

The study area for baseline HEP evaluation of the Kissimmee River Valley was bounded on the north by Structure 65 the southern end of Lake Kissimmee, on the south by Structure 65E north of Lake Okeechobee, and on the east and west by, but not including, the oak

hammock line along the edge of the flood plain (Figure 2). This area is up to two miles wide and about 45 miles long encompassing about 47,000 acres[1] with land elevations varying from about 50 feet mean sea level in the north end to about 20 feet mean sea level in the south.

Canal 38 is divided into five pools. These pools are formed behind water control structures designated Structure 65 A, B, C, D, and E. There is about a 6-foot drop in the water level from one pool to the pool downstream. Maintainance of a non-fluctuating water level behind the structures causes the northern end of each of the pools to be permanently drained and the southern end of the pools to be permanently flooded, resulting in extreme ecological alterations in hydrology over the prechannelized Kissimmee River system.

HABITAT TYPES AND STRATIFICATION

Vegetation of the Kissimmee River Valley was mapped by the South Florida Water Management District using 1974 aerial photography. The original HEP team decided to make use of these maps because they were relatively recent and would not require additional funds or time to obtain. The initial habitat classification list for the area included 25 habitat types; too many to adequately evaluate in the study. Therefore the study team combined and/or eliminated certain habitat types to arrive at a number that represented real differences in faunal productivity and could be evaluated adequately. This resulted in delineation of 18 habitat types.

After conducting part of the field sampling, it was determined that the hardwoods category did not have a sufficient number of acres to be a separate category, therefore, it was eliminated from further consideration in the study. This resulted in delineation of 17 habitat types (Table 1).

Sample point selection was accomplished with computer generated random numbers, 26 for each habitat type, and a grid overlay that consisted of squares that represented three acres of study area. Numbering of grid points began at Structure 65E and progressed northward to State Road 60. Sites were numbered on field maps and sample data sheets to record the numerical order in which sites were selected. Between 6 and 12 sites were sampled for each habitat type. The first six random numbered sites were sampled to determine the accuracy, precision and number of sample sites required for the study area. Up to 6 additional sites were evaluated where necessary effort to attain the goal of 80 percent accuracy and 20 percent precision. Sample site locations are listed in Table 2 of the 1981 report.

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1 J.F. Milleson, R.L. Goodrick, J.S. VanArman. 1980. Plant Communities of the Kissimmee River Valley. South Florida Water Management District Tech. Pub. 80-7.

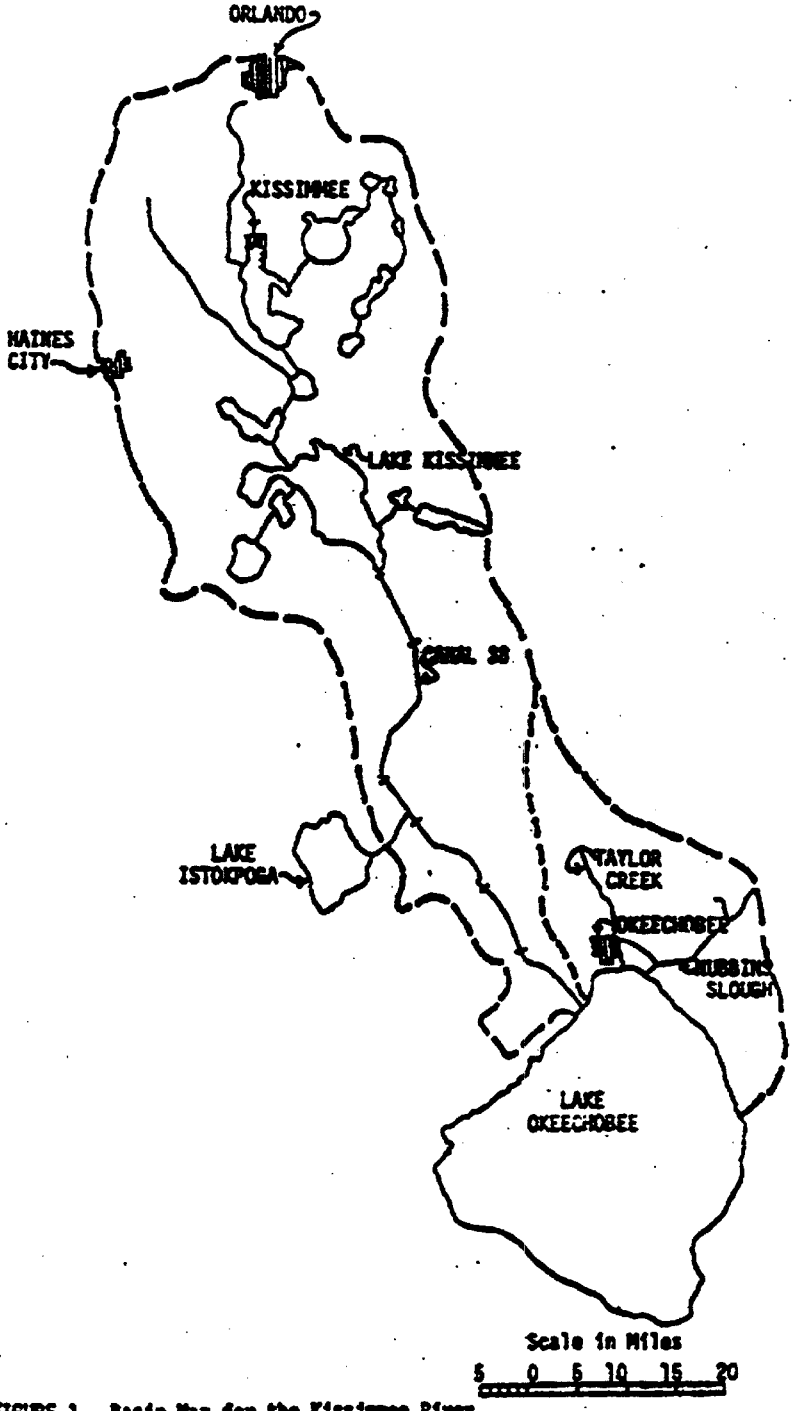


FIGURE 1. Basin Map for the Kissimmee River Canal 38, Restudy

FIGURE 2. Study Area for HEP Study of the Kissimmee River Flood Plain, Florida, 1979-1980

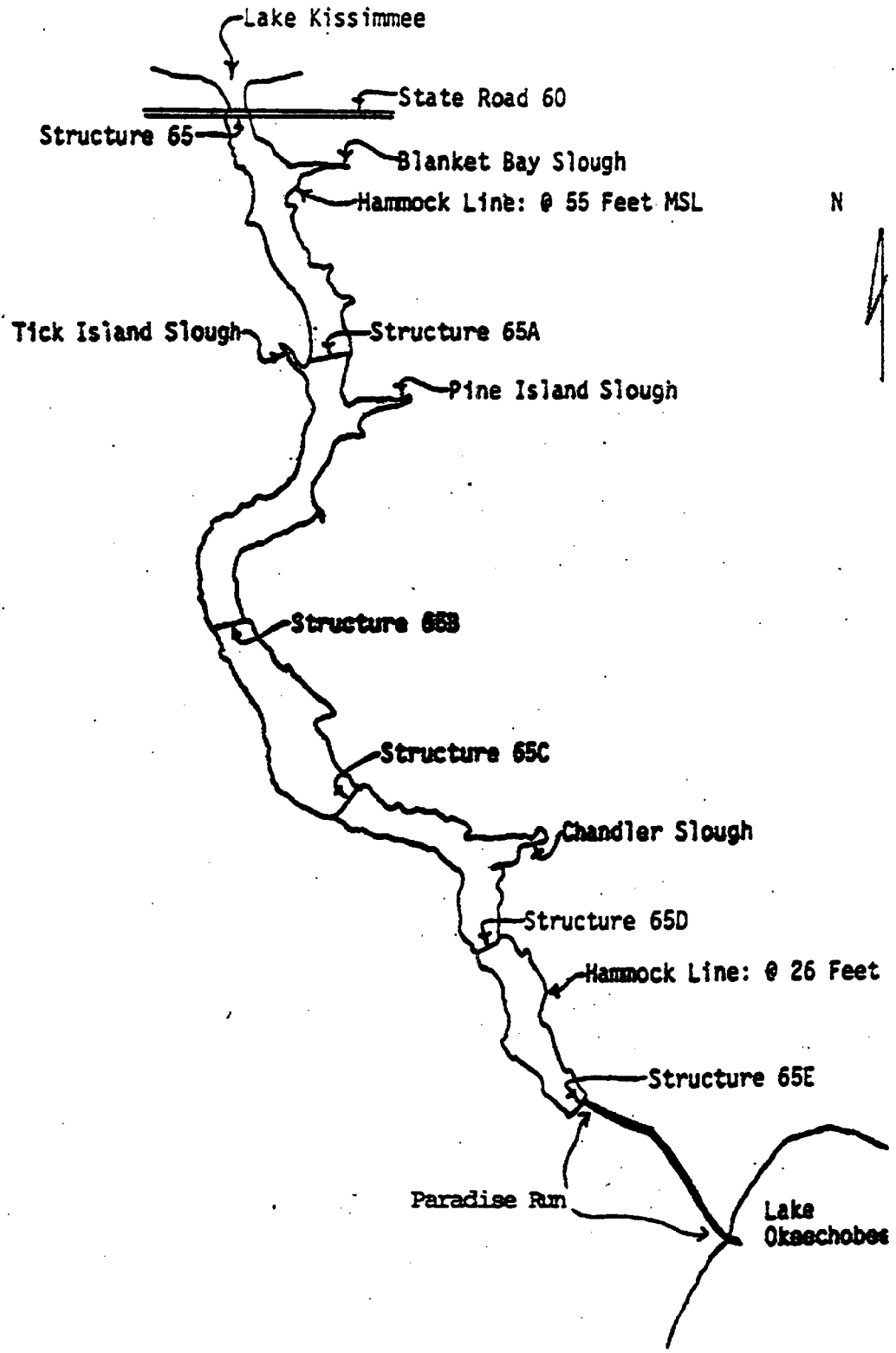


TABLE 1. COMBINED HABITAT TYPES AND ACREAGES FOR THE FIVE POOLS IN THE KISSIMMEE RIVER VALLEY AS DETERMINED BY MILLESON, et al. 1980.

HABITAT TYPE	POOL A	POOL B	POOL C	POOL D	POOL E	TOTAL	PERCENT
Canal 38	302	373	287	450	354	1,766	3.8
River Run	272	337	275	281	303	1,468	4.1
Floating Tussock	19	247	232	92	79	669	1.4
Broadleaf Marsh	61	988	1,171	652	193	3,065	6.5
Buttonbush	355	42	0	365	3	765	1.6
Rhynchospora	0	1,255	250	0	0	1,505	3.2
Maidencane	528	999	835	0	14	2,376	5.0
Aquatic Grass	406	267	263	306	135	1,377	2.9
Willow	604	414	431	215	45	1,709	3.6
Cypress	0	63	21	121	12	217	0.5
Primrose Willow	115	206	373	135	3	832	1.8
Woody Shrub	1,139	1,016	792	747	801	4,495	9.6
Switchgrass	116	344	83	161	7	761	1.6
Unimproved Pasture	1,877	1,802	527	587	243	5,036	10.7
Improved Pasture	3,157	2,151	4,195	2,771	2,731	15,005	31.9
Spoil	674	1,174	964	1,152	980	4,944	10.5
Oak/Cabbage	0	18	132	212	316	678	1.4
TOTAL	9,675	11,695	10,831	8,247	6,219	46,668	

SPECIES SELECTION AND CRITERIA SHEETS:

During the preliminary field evaluation, the original study team discussed the species that naturally occurred in the valley. These were predominantly wetland species and included 51 species or groups of species that were classed as important either ecologically, aesthetically, or economically. This study required creation of HEP species criteria sheets for these south Florida animals.

A contract consultant, Dr. Jack Stout of the University of Central Florida, formulated habitat criteria sheets for these selected species (Appendix 5 1981 HEP Study). The resultant criteria sheets were reviewed by the study team and 25 species or groups of species (Table 2), were selected as the evaluation species for the HEP. This selection was based upon the completeness of the criteria sheets, and ecological and economic importance of the species in the valley.

TABLE 2. EVALUATION SPECIES FOR CANAL 38 HEP

SPECIES		NICHE
Scientific Name	Common Name	Habitat, Feeding and Breeding Requirements
Anas fulvigula	Florida duck	Wetland omnivore. Terrestrial nester
Dabblers	Dabblers	Wetland omnivore. No breeding in area.

Aythya collaris	Ring-necked duck	Open water omnivore (primarily herbivore). No breeding in area.
Haliaeetus leucocephalus	Bald eagle	Wetland & terrestrial carnivore. Arboreal nester.
Herons & Egrets	Herons & Egrets	Wetland carnivore. Arboreal nester
Mycteria americana	Wood stork	Wetland carnivore. Wetland nester.
Grus canadensis	Sandhill crane	Terrestrial herbivore. Wetland nester.
Aramus guarauna	Limpkin	Wetland invertebrate carnivore. Shrub nester.
Capella gallinago	Common snipe	Moist soil invertebrate carnivore. No breeding in area.
Zenaida macroura	Mourning dove	Terrestrial herbivore. Arboreal nester.
Geothlypis trichas	Common yellowthroat	Wetland invertebrate carnivore. Wetland nester.
Procyon lotor	Raccoon	Cosmopolitan omnivore. Cavity breeder.
Lutra canadensis	River otter	Aquatic carnivore. Cavity breeder.
Lynx rufus	Bobcat	Cosmopolitan carnivore. Reproductive needs unknown
Neofiber alleni	Florida water rat	Wetland herbivore. Terrestrial breeder
Alligator mississippiensis	American alligator	Aquatic carnivore. Wetland nester.
Chrysemys spp.	Cooter turtles	Aquatic herbivore. Bare soil nester
Rana grylio	Pig frog	Wetland invertebrate carnivore. Wetland spawner.
Notemigonus crysoleucas	Golden shiner	Aquatic omnivore. Bare sand spawner.
Ictalurus punctatus	Channel catfish	Aquatic omnivore. Aquatic spawner.
Fundulus seminolis	Seminole killifish	Wetland invertebrate carnivore. Wetland spawner.

Gambusia affinis	Mosquitofish	Wetland invertebrate carnivore. Wetland breeder.
Micropterus salmoides	Largemouth bass	Aquatic carnivore. Bare sand spawner.
Pomoxis nigromaculatus	Black crappie	Open water invertebrate carnivore. Wetland spawner

FINDING OF THE 1980 HEP

HSI values for habitat types in the original HEP study as listed in the 1981 report were very low, indicating degraded conditions. The highest score was 6.85 out of a possible total of 25. Habitat unit values for the 17 habitat types are listed in Table 3 in decreasing order. This order generally parallels the reduction in the hydroperiods for the respective habitat types with the wetter habitats at the top and more xeric habitats at the bottom.

Construction of Canal 38 created habitat types that did not occur in the area or occurred in much smaller acreages prior to its construction. Therefore, the habitats can be divided into two categories. It was assumed that seven of the 17 habitats were created or greatly expanded by construction of the canal. These habitats were: Canal 38, primrose willow, woody shrub, tussock, unimproved pasture, improved pasture, and spoil. Woody shrub, unimproved pasture and primrose willow probably existed in the valley prior to channelization, but the acreages were much less than that which exists now. Therefore, these habitat types were placed in this group. The remaining habitats, ten in number, were considered native to the study area. The values of created habitats were generally lower than those of the natural habitats. Also wetter areas generally had higher values than drier ones, and natural habitats were generally more valuable than altered or created habitats.

TABLE 3. SUITABILITY VALUES AND ACREAGE OF HABITATS EVALUATED IN THE KISSIMMEE RIVER FLOODPLAIN DURING THE 1980 HEP STUDY

HABITAT TYPE	HSI HABITAT UNIT VALUE	HABITAT ACREAGE	HABITAT UNITS
River Run	6.85	1,468	10,059
Cypress	4.605	217	1,000
Canal 38	4.2	1,766	7,418
Broadleaf	4.008	3,065	12,285
Rhynchospora	3.927	1,505	5,911
Aquatic Grass	3.82	1,377	5,261
Buttonbush	3.732	765	2,855
Maidencane	3.452	2,376	8,202
Oak-Cabbage palm	3.3	678	2,235
Switchgrass	2.656	761	1,999
Primrose Willow	2.523	832	2,100
Woody Shrub	2.516	4,495	11,310
Willow	1.874	1,709	3,203
Tussock	1.837	669	1,229
Unimproved Pasture	1.823	5,036	9,181
Improved Pasture	1.427	15,005	21,413
Spoil	0.95	4,944	4,678
TOTAL	$\bar{x}$ 2.364	46,668	110,338

The HSI values by species found by the 1980 HEP team are shown in Table 4.

HABITAT TYPE--->	RIVER RUN	CY-PRESS	CANAL 38	BROAD-LEAF	RHYN-CHOSP.	AQUA. GRASS	BUTT BUSH	MAIDN. CANE	OAK CABB.	SWCH GRASS	PRIMR. WLW.	WOODY SHR.	WIL-LOW	TUS SOCK	UNIMP. PASTUR	IMPROV. PASTUR	SPOIL
SPECIES																	
Water Rat	0.27	0.07	0.04	0.48	0.51	0.17	0.50	0.52	0.00	0.03	0.25	0.00	0.01	0.25	0.00	0.00	0.01
Otter	0.49	0.35	0.30	0.19	0.21	0.07	0.24	0.16	0.03	0.06	0.17	0.14	0.08	0.12	0.04	0.02	0.03
Bobcat	0.10	0.30	0.03	0.20	0.22	0.29	0.09	0.20	0.66	0.28	0.21	0.46	0.28	0.06	0.30	0.15	0.15
Deer	0.09	0.34	0.01	0.24	0.35	0.36	0.19	0.34	0.75	0.29	0.20	0.43	0.27	0.05	0.26	0.17	0.12
Raccoon	0.37	0.47	0.10	0.33	0.33	0.36	0.21	0.31	0.55	0.25	0.28	0.34	0.26	0.18	0.19	0.11	0.12
Florida Duck	0.21	0.08	0.05	0.07	0.13	0.26	0.02	0.10	0.07	0.20	0.03	0.09	0.02	0.00	0.05	0.08	0.02
Dabblers	0.12	0.07	0.03	0.04	0.03	0.06	0.01	0.02	0.00	0.05	0.02	0.00	0.01	0.00	0.00	0.00	0.00
Ringneck Duck	0.14	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bald Eagle	0.26	0.19	0.29	0.12	0.14	0.19	0.03	0.14	0.38	0.20	0.02	0.17	0.05	0.02	0.16	0.14	0.12
Wood Stork	0.08	0.35	0.05	0.07	0.04	0.10	0.00	0.05	0.00	0.04	0.02	0.00	0.01	0.04	0.00	0.01	0.00
Sandhill Crane	0.05	0.03	0.01	0.16	0.30	0.40	0.06	0.20	0.21	0.31	0.02	0.11	0.00	0.03	0.30	0.32	0.09
Herons & Egrets	0.41	0.42	0.17	0.24	0.18	0.23	0.18	0.17	0.02	0.08	0.15	0.13	0.16	0.13	0.01	0.03	0.01
Mourning Dove	0.04	0.07	0.00	0.00	0.04	0.08	0.01	0.01	0.38	0.18	0.01	0.26	0.18	0.13	0.21	0.16	0.22
Limpkin	0.28	0.25	0.15	0.24	0.15	0.05	0.23	0.08	0.00	0.01	0.11	0.02	0.05	0.01	0.00	0.00	0.00
Common Snipe	0.02	0.09	0.00	0.03	0.09	0.41	0.00	0.16	0.02	0.29	0.02	0.03	0.00	0.02	0.15	0.18	0.00
Yellowthroat	0.06	0.04	0.03	0.34	0.28	0.14	0.52	0.24	0.23	0.14	0.39	0.27	0.12	0.22	0.10	0.00	0.04
Alligator	0.58	0.21	0.44	0.24	0.11	0.05	0.23	0.04	0.00	0.01	0.16	0.04	0.07	0.18	0.01	0.00	0.00
Cooter Turtles	0.57	0.21	0.38	0.03	0.02	0.02	0.07	0.00	0.00	0.02	0.02	0.02	0.05	0.02	0.03	0.05	0.02
Pigfrog	0.25	0.20	0.14	0.41	0.38	0.26	0.43	0.33	0.00	0.08	0.20	0.00	0.08	0.19	0.01	0.01	0.00
Largemouth Bass	0.48	0.21	0.31	0.05	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
Channel Catfish	0.44	0.08	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Black Crappie	0.43	0.02	0.44	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mosquitofish	0.36	0.41	0.18	0.52	0.43	0.32	0.56	0.38	0.00	0.11	0.24	0.00	0.10	0.19	0.00	0.00	0.00
Seminole Killifish	0.35	0.08	0.26	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Golden Shiner	0.41	0.06	0.29	0.01	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00

TABLE 4. 1980 HEP TEAM HSI VALUES FOR EXISTING CONDITIONS

1991 UPDATE AND USE OF HEP:

The 1991 HEP team was formed and consisted of the following individuals:

Lou Toth	South Florida Water Management District
Steve Miller	Florida Game and Fresh Water Fish Commission
Larry Perrin	Florida Game and Fresh Water Fish Commission
Brian Barnett	Florida Game and Fresh Water Fish Commission
Brian Toland	Florida Game and Fresh Water Fish Commission
Bill Lang	U.S. Army Corps of Engineers
Joseph D. Carroll	U.S. Fish and WIldlife Service
Arnold Banner	U.S. Fish and Wildlife Service

The initial stages of this HEP study were taken from the previous study. These included the limits of the study area, study habitats, selected species, and baseline habitat units. The team formed in Vero Beach from April 22 through 25, 1991 and reviewed the methods used by the 1979-1980 team as explained by the original members, Larry Perrin and Gerald Atmar.

Baseline conditions for the study area computed by the HEP team in 1981 were presented as HSI values for each of the 25 species or species groups for each of the 17 habitat types. (Table 4) Each of these values were considered by the team and a decision to change those values was made only if there was agreement that an error had been made or that the studies conducted during the Demonstration Project for the Kissimmee River by the Florida Game and Fresh Water Fish Commission and the South Florida Water Management District justified a change in the baseline HSI values. The changes made are illustrated in Table 5.

The main changes involved in the HSI values for fishes in two habitats, Canal 38 and the River Runs. The Fisheries studies associated with the Demonstration Project (Miller, Kiss River Symposium and Miller, in press, and Toth SFWMD, and Sessions, DER) indicate that Canal 38 suffers from a chronic low dissolved oxygen problem in summer. This is related to the low flow conditions that occur because of management of the upper chain of lakes and the 5 pools in the canal system.

HABITAT TYPE-->	RIVER RUN	CY-PRESS	CANAL 38	BROAD-LEAF	RHYN-CHOSP.	AQUA. GRASS	BUTT BUSH	MAIDN. CANE	OAK CABB.	SWCH GRASS	PRIMR. WLW.	WOODY SHR.	WIL-LOW	TUS SOCK	UNIMP. PASTUR	IMPROV. PASTUR	SPOIL
SPECIES																	
Water Rat	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Otter	•	•	CHANGE	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Bobcat	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Deer	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Raccoon	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Florida Duck	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Dabblers	CHANGE	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Ringneck Duck	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Bald Eagle	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Wood Stork	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Sandhill Crane	•	•	•	•	•	•	•	•	•	•	•	•	•	•	CHANGE	CHANGE	•
Herons & Egrets	CHANGE	•	CHANGE	•	•	•	•	•	•	•	•	•	•	•	CHANGE	•	•
Mourning Dove	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Limpkin	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Common Snipe	•	•	•	•	•	CHANGE	•	•	•	•	•	•	•	•	•	•	•
Yellowthroat	•	•	•	•	•	•	•	•	•	•	•	•	CHANGE	•	•	•	•
Alligator	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Cooter Turtles	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Pigfrog	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Largemouth Bass	CHANGE	•	CHANGE	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Channel Catfish	CHANGE	•	CHANGE	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Black Crappie	CHANGE	•	CHANGE	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Mosquitofish	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Seminole Killifish	CHANGE	•	CHANGE	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Golden Shiner	CHANGE	•	CHANGE	•	•	•	•	•	•	•	•	•	•	•	•	•	•

TABLE 5. 1980 HSI VALUES CHANGED IN 1991 HEP TEAM UPDATE

The weir construction associated with the Demonstration project did not correct this problem. Sampling for several fish species defined the relative changes should be made in the HSI values. The team believed currently available information clearly indicated that the HSI values for several species of fish in the existing Canal and river runs should be reduced.

The remainder of the changes were the result of concensus of the investigators that changes should be made based on their considerable recent field experience. For example, the HSI value for otter using C-38 was reduced because this species has not been observed along the canal. The updated HSI values for existing conditions are shown in Table 6.

The group also created new preproject HSI values to show prechannelization conditions. This was assumed to be estimated HSI values for habitats predicted to occur following implementation of the Level II Backfilling Plan including the hydrological changes in management of the upper chain of lakes that the plan requires. These lake level management changes provide for a continual minimum flow of 250 cubic feet per second. These data are shown as preproject HSI values in Table 7.

The HEP team also created HSI values for Pool B under the Demonstration project conditions to enable revision of the existing conditions from those that were present in 1980. The Demonstration project includes conditions related to the installation of the notched weirs, and conditions in other habitat types affected by the flow through marsh, and pool water level manipulation. These modified values are shown in Table 8.

Evaluation of future conditions as a result of an alternative in Pool A requires projected hydrologic and land use information and determination by the team members as to the HSI values for the evaluation species within each habitat type. The team decided to create HSI values for the channel and river runs assuming that Canal 38 were to be shallowed to 10 foot depth in Pool A as envisioned by the Level II Backfilling Plan. These values shown in Table 9 are largely hypothetical since projected future conditions do not exist within the study area, however where the Pool B demonstration project showed evidence of future conditions they reflect the best judgement of the study team which included several members who have done research and are familiar with habitats in the Kissimmee River basin.

Available preproject vegetation maps and hydrologic conditions, as well as projected habitat types, and hydrologic conditions, allowed the team to multiply established prechannelized acreage for each habitat type times the HSI values. The habitat types of past, and future, are believed to be essentially the same. Projected HSI values and expected to be close to historic values because the intent of the plan is to create the preproject hydrology. The projected HSI values for each species in each habitat type expected in the Level II Backfilling Plan are presented in Table 7.

HABITAT TYPE-->	RIVER RUN	CY-PRESS	CANAL 38	BROAD-LEAF	RHYN-CHOSP.	AQUA. GRASS	BUTT BUSH	MAIDN. CANE	OAK CABB.	SWCH GRASS	PRIMR. WLW.	WOODY SHR.	WIL-LOW	TUS SOCK	UNIMP. PASTUR	IMPROV. PASTUR	SPOIL
SPECIES																	
Water Rat	0.27	0.07	0.04	0.48	0.51	0.17	0.50	0.52	0.00	0.03	0.25	0.00	0.01	0.25	0.00	0.00	0.01
Otter	0.49	0.35	*.15	0.19	0.21	0.07	0.24	0.16	0.03	0.06	0.17	0.14	0.08	0.12	0.04	0.02	0.03
Bobcat	0.10	0.30	0.03	0.20	0.22	0.29	0.09	0.20	0.66	0.28	0.21	0.46	0.28	0.06	0.30	0.15	0.15
Deer	0.09	0.34	0.01	0.24	0.35	0.36	0.19	0.34	0.75	0.29	0.20	0.43	0.27	0.05	0.26	0.17	0.12
Raccoon	0.37	0.47	0.10	0.33	0.33	0.36	0.21	0.31	0.55	0.25	0.28	0.34	0.26	0.18	0.19	0.11	0.12
Florida Duck	0.21	0.08	0.05	0.07	0.13	0.26	0.02	0.10	0.07	0.20	0.03	0.09	0.02	0.00	0.05	0.08	0.02
Dabblers	*.21	0.07	0.03	0.04	0.03	0.06	0.01	0.02	0.00	0.05	0.02	0.00	0.01	0.00	0.00	0.00	0.00
Ringneck Duck	0.14	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bald Eagle	0.26	0.19	0.29	0.12	0.14	0.19	0.03	0.14	0.38	0.20	0.02	0.17	0.05	0.02	0.16	0.14	0.12
Wood Stork	0.08	0.35	0.05	0.07	0.04	0.10	0.00	0.05	0.00	0.04	0.02	0.00	0.01	0.04	0.00	0.01	0.00
Sandhill Crane	0.05	0.03	0.01	0.16	0.30	0.40	0.06	0.20	0.21	0.31	0.02	0.11	0.00	0.03	*.45	*.45	0.09
Herons & Egrets	*.28	0.42	*.10	0.24	0.18	0.23	0.18	0.17	0.02	0.08	0.15	0.13	0.16	0.13	*.10	0.03	0.01
Mourning Dove	0.04	0.07	0.00	0.00	0.04	0.08	0.01	0.01	0.38	0.18	0.01	0.26	0.18	0.13	0.21	0.16	0.22
Limpkin	0.28	0.25	0.15	0.24	0.15	0.05	0.23	0.08	0.00	0.01	0.11	0.02	0.05	0.01	0.00	0.00	0.00
Common Snipe	0.02	0.09	0.00	0.03	0.09	*.14	0.00	0.16	0.02	0.29	0.02	0.03	0.00	0.02	0.15	0.18	0.00
Yellowthroat	0.06	0.04	0.03	0.34	0.28	0.14	0.52	0.24	0.23	0.14	0.39	0.27	*.30	0.22	0.10	0.00	0.04
Alligator	0.58	0.21	0.44	0.24	0.11	0.05	0.23	0.04	0.00	0.01	0.16	0.04	0.07	0.18	0.01	0.00	0.00
Cooter Turtles	0.57	0.21	0.38	0.03	0.02	0.02	0.07	0.00	0.00	0.02	0.02	0.02	0.05	0.02	0.03	0.05	0.02
Pigfrog	0.25	0.20	0.14	0.41	0.38	0.26	0.43	0.33	0.00	0.08	0.20	0.00	0.08	0.19	0.01	0.01	0.00
Largemouth Bass	*.21	0.21	*.21	0.05	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
Channel Catfish	*.05	0.08	*.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Black Crappie	*.21	0.02	*.21	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mosquitofish	0.36	0.41	0.18	0.52	0.43	0.32	0.56	0.38	0.00	0.11	0.24	0.00	0.10	0.19	0.00	0.00	0.00
Seminole Killifish	*.18	0.08	*.18	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Golden Shiner	*.30	0.06	*.21	0.01	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00

TABLE 6. 1991 HEP UPDATE OF HSI VALUES FOR EXISTING CONDITIONS

HABITAT TYPE-->	RIVER RUN	CY-PRESS	CANAL 38	BROAD-LEAF	RHYN-CHOSP.	AQUA. GRASS	BUTT BUSH	MAIDN. CANE	OAK CABB.	SWCH GRASS	PRIMR. WLW.	WOODY SHR.	WIL-LOW	TUS SOCK	UNIMP. PASTUR	IMPROV. PASTUR	SPOIL
SPECIES																	
Water Rat	0.20	0.07	NA	0.48	0.51	0.51	0.50	0.60	0.00	0.03	0.25	0.00	0.10	0.25	0.00	0.00	0.01
Otter	0.80	0.60	NA	0.39	0.21	0.21	0.39	0.21	0.03	0.06	0.17	0.14	0.30	0.12	0.04	0.02	0.03
Bobcat	0.01	0.20	NA	0.10	0.35	0.35	0.09	0.15	0.66	0.50	0.21	0.46	0.18	0.06	0.30	0.15	0.15
Deer	0.01	0.24	NA	0.24	0.35	0.36	0.30	0.35	0.75	0.29	0.20	0.43	0.27	0.05	0.26	0.17	0.12
Raccoon	0.27	0.40	NA	0.33	0.36	0.36	0.21	0.36	0.70	0.25	0.28	0.34	0.35	0.18	0.19	0.11	0.12
Florida Duck	0.21	0.07	NA	0.40	0.75	0.75	0.20	0.60	0.07	0.30	0.03	0.00	0.02	0.00	0.05	0.08	0.02
Dabblers	0.21	0.07	NA	0.30	0.75	0.70	0.11	0.60	0.00	0.15	0.02	0.00	0.01	0.00	0.00	0.00	0.00
Ringneck Duck	0.24	0.03	NA	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bald Eagle	0.36	0.19	NA	0.30	0.50	0.50	0.10	0.40	0.38	0.20	0.02	0.17	0.05	0.02	0.16	0.14	0.12
Wood Stork	0.28	0.60	NA	0.40	0.60	0.60	0.20	0.60	0.00	0.24	0.02	0.00	0.10	0.04	0.00	0.01	0.00
Sandhill Crane	0.05	0.03	NA	0.20	0.50	0.50	0.06	0.40	0.21	0.31	0.02	0.11	0.00	0.03	0.45	0.45	0.09
Herons & Egrets	0.56	0.42	NA	0.44	0.50	0.50	0.35	0.50	0.02	0.24	0.15	0.13	0.35	0.13	0.20	0.03	0.01
Mourning Dove	0.01	0.07	NA	0.00	0.20	0.20	0.05	0.01	0.38	0.18	0.01	0.26	0.00	0.13	0.21	0.16	0.22
Limpkin	0.60	0.60	NA	0.50	0.25	0.25	0.35	0.30	0.00	0.11	0.11	0.02	0.35	0.01	0.00	0.00	0.00
Common Snipe	0.02	0.09	NA	0.20	0.35	0.35	0.00	0.30	0.02	0.40	0.02	0.03	0.00	0.02	0.15	0.18	0.00
Yellowthroat	0.06	0.04	NA	0.20	0.10	0.10	0.52	0.20	0.23	0.14	0.39	0.80	0.60	0.22	0.10	0.00	0.04
Alligator	0.79	0.70	NA	0.50	0.21	0.21	0.50	0.30	0.00	0.01	0.16	0.04	0.60	0.18	0.01	0.00	0.00
Cooter Turtles	0.78	0.70	NA	0.30	0.12	0.12	0.35	0.20	0.00	0.12	0.02	0.02	0.30	0.02	0.03	0.05	0.02
Pigfrog	0.25	0.21	NA	0.60	0.48	0.48	0.60	0.55	0.00	0.18	0.20	0.00	0.30	0.19	0.01	0.01	0.00
Largemouth Bass	0.75	0.50	NA	0.30	0.10	0.10	0.30	0.20	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.00
Channel Catfish	0.75	0.50	NA	0.10	0.10	0.10	0.10	0.20	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.00
Black Crappie	0.50	0.50	NA	0.10	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.00
Mosquitofish	0.50	0.41	NA	0.90	0.60	0.60	0.90	0.80	0.00	0.21	0.24	0.00	0.70	0.19	0.10	0.00	0.00
Seminole Killifish	0.50	0.10	NA	0.25	0.20	0.20	0.25	0.25	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00
Golden Shiner	0.75	0.20	NA	0.30	0.10	0.10	0.30	0.20	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00

TABLE 7. HISTORIC (BEFORE C-38) HSI VALUES FOR KISSIMMEE RIVER AS DESIGNATED BY 1991 HEP TEAM

HABITAT TYPE-->	RIVER RUN	CY-PRESS	CANAL 38	BROAD-LEAF	RHYN-CHOSP.	AQUA. GRASS	BUTT BUSH	MAIDN. CANE	OAK CABB.	SWCH GRASS	PRIMR. WLW.	WOODY SHR.	WIL-LOW	TUS SOCK	UNIMP. PASTUR	IMPROV. PASTUR	SPOIL
SPECIES																	
Water Rat	S#.37	0.07	0.04	0.48	0.51	0.17	0.50	0.52	0.00	0.03	0.25	0.00	S#.10	0.25	0.00	0.00	0.01
Otter	0.49	0.35	*.15	0.19	0.21	0.07	0.24	0.16	0.03	0.06	0.17	0.14	0.08	0.12	0.04	0.02	0.03
Bobcat	0.10	0.30	0.03	0.20	0.22	0.23	0.09	0.20	0.66	0.28	0.21	0.46	S#.18	0.06	0.30	0.15	0.15
Deer	0.09	0.34	0.01	0.24	0.35	0.36	0.19	0.34	0.75	0.29	0.20	0.43	0.27	0.05	0.26	0.17	0.12
Raccoon	0.37	0.47	0.10	0.33	0.33	0.36	0.21	0.31	0.55	0.25	0.28	0.34	0.26	0.18	0.19	0.11	0.12
Florida Duck	0.21	0.08	0.05	S#.17	S#.23	S#.36	0.02	S#.23	0.07	0.20	0.03	0.09	0.02	0.00	0.05	0.08	0.02
Dabblers	*.21	0.07	0.03	S#.14	S#.13	S#.16	0.01	S#.13	0.00	S#.15	0.02	0.00	0.01	0.00	0.00	0.00	0.00
Ringneck Duck	0.14	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bald Eagle	0.26	0.19	0.29	0.12	0.14	0.19	0.03	0.14	0.38	0.20	0.02	0.17	0.05	0.02	0.16	0.14	0.12
Wood Stork	0.08	0.35	0.05	S#.17	0.04	S#.20	0.00	0.05	0.00	S#.14	0.02	0.00	0.01	0.04	0.00	0.01	0.00
Sandhill Crane	0.05	0.03	0.01	0.16	0.30	0.40	0.06	0.20	0.21	0.31	0.02	0.11	0.00	0.03	*.45	*.45	0.09
Herons & Egrets	S#.36	0.42	*.10	S#.34	S#.28	S#.33	0.18	S#.28	0.02	S#.18	0.15	0.13	S#.26	0.13	S#.20	0.03	0.01
Mourning Dove	0.04	0.07	0.00	0.00	0.04	0.08	0.01	0.01	0.38	0.18	0.01	0.26	0.18	0.13	0.21	0.16	0.22
Limpkin	S#.36	0.25	0.15	0.24	S#.25	0.05	0.23	S#.25	0.00	S#.11	0.11	0.02	S#.15	0.01	0.00	0.00	0.00
Common Snipe	0.02	0.09	0.00	0.03	0.09	*.14	0.00	0.16	0.02	0.29	0.02	0.03	0.00	0.02	0.15	0.18	0.00
Yellowthroat	0.06	0.04	0.03	0.34	0.28	0.14	0.52	0.24	0.23	0.14	0.39	0.27	*.30	0.22	0.10	0.00	0.04
Alligator	0.58	0.21	0.44	0.24	0.11	0.05	0.23	0.04	0.00	0.01	0.16	0.04	0.07	0.18	0.01	0.00	0.00
Cooter Turtles	0.57	0.21	0.38	0.03	0.02	0.02	0.07	0.00	0.00	0.02	0.02	0.02	0.05	0.02	0.03	0.05	0.02
Pigfrog	0.25	0.20	0.14	0.41	0.38	0.26	0.43	0.33	0.00	0.08	0.20	0.00	0.08	0.19	0.01	0.01	0.00
Largemouth Bass	*.21	0.21	*.21	S#.10	0.00	0.00	0.08	S#.10	0.00	0.00	0.00	0.00	S#.14	0.00	0.00	0.00	0.00
Channel Catfish	*.05	0.08	*.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Black Crappie	*.21	0.02	*.21	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mosquitofish	0.36	0.41	0.18	S#.60	S#.53	S#.42	0.56	S#.50	0.00	S#.21	0.24	0.00	S#.20	0.19	S#.10	0.00	0.00
Seminole Killifish	*.18	0.08	*.18	S#.10	0.00	S#.05	0.01	S#.10	0.00	0.00	0.00	0.00	S#.10	0.00	0.00	0.00	0.00
Golden Shiner	*.30	0.06	*.21	S#.10	0.00	0.00	0.05	S#.10	0.00	0.00	0.00	0.00	S#.10	0.00	0.00	0.00	0.00

TABLE 8. For demonstration Project in Pool B

S# = 1991 HEP Team Change from Update - to be applied in Demonstration Project Area only

* = Updated value

HABITAT TYPE-->	RIVER RUN	CY-PRESS	CANAL 38	BROAD-LEAF	RHYN-CHOSP.	AQUA. GRASS	BUTT BUSH	MAIDN. CANE	OAK CABB.	SWCH GRASS	PRIMR. WLW.	WOODY SHR.	WIL-LOW	TUS SOCK	UNIMP. PASTUR	IMPROV. PASTUR	SPOIL
SPECIES																	
Water Rat			0.04														
Otter			*.15														
Bobcat			0.03														
Deer			0.01														
Raccoon			0.10														
Florida Duck			0.05														
Dabblers			0.03														
Ringneck Duck			0.06														
Bald Eagle			0.29														
Wood Stork			0.05														
Sandhill Crane			0.01														
Herons & Egrets			*.10														
Mourning Dove			0.00														
Limpkin			0.15														
Common Snipe			0.00														
Yellowthroat			0.03														
Alligator			0.44														
Cooter Turtles			0.38														
Pigfrog			0.14														
Largemouth Bass			=.6														
Channel Catfish			=.5														
Black Crappie			=.5														
Mosquitofish			=.18														
Seminole Killifish			=.18														
Golden Shiner			=.21														

TABLE 9. PROJECTED HSI VALUES FOR IMPLEMENTATION OF POOL A SHALLOWING PROPOSAL

* changed HSI values associated with 1991 update.

= changed HSI values specific to the Pool A shallowing proposal.

Digital maps of preproject and present vegetation cover were taken into a Geographic Information System (GIS), projected to UTM, and then clipped to a maximum common boundary. In this way the 1978 (Milleson et al) and 1981 (Pierce el al) maps of current and historic conditions covered the same study area for acreage determinations. The latter maps required rectification to correct for digitizing errors. Mr. Louis Toth supplied maps of the predicted vegetation coverage following completion of the Level II Backfilling Plan and also updated the Milleson map to correct it to 1991 conditions. Acreage for each vegetation category ws multiplied by the appropriate HSI, for each species to yield Habitat Units by pool and in total (Appendix 1).

Due to the large amount of time required to determine HSI values and habitat units, only the Level II Backfilling alternative and possible changes to Pool A have been evaluated in this HEP analysis.

This report has been reviewed and concurred with by all members of the HEP study team. If there are any questions, please contact the Vero Beach Field Office of the U.S. Fish and Wildlife Service.

APPENDIX 1 HEP

Habitat Types and Acreages for the Kissimmee River Valley as determined by GIS analysis, for the HEP Study, 1991.

HISTORIC ACRES

HIST	POOLA	POOLB	POOLC	POOLD	POOLE	TOTALS
R.RUN	753	1074	782	1201	990	4801
CYPRESS	0	44	40	122	49	255
C-38	0	0	0	0	0	0
BROADLEAF	3026	4131	5032	4778	2800	19767
RHYNCHOSPORA	0	19	0	0	0	19
AQUATIC GRS.	726	1587	1084	1226	766	5389
BUTTONBUSH	2279	357	627	0	0	3262
MAIDENCANE	109	2018	1525	0	0	3652
OAK/CABBAGE	132	444	435	652	762	2425
SWITCHGRASS	287	70	17	70	0	444
PRIMROSE WILL.	0	0	0	0	0	0
WOODY SCHRUB	99	45	78	88	52	362
WILLOW	101	754	443	393	71	1762
TUSSOCK	0	0	0	0	0	0
UNIM. PASTURE	2214	749	658	665	688	4966
IMPR. PASTURE	234	203	176	198	681	1492
SPOIL	52	0	87	31	0	170
TOTALS	10011	11496	10976	9423	6859	48765

HISTORIC ACREAGE BY COVER TYPE IN KISSIMMEE RIVER FLOODPLAIN BY HABITAT TYPE (1991 HEP UPDATE)

PRESENT	POOLA	UPPER POOLB	LOWER POOLB	POOLC	POOLD	POOLE	TOTALS
R.RUN	272		337	275	281	303	1468
CYPRESS	0		120	21	83	38	262
C-38	304		386	295	462	357	1803
BROADLEAF	59		1441	1107	648	192	3447
RHYNCHOSPORA	0		755	249	0	0	1005
AQUATIC GRS.	493		1068	279	383	136	2359
BUTTONBUSH	395		39	0	365	4	803
MAIDENCANE	815		1081	834	0	13	2743
OAK/CABBAGE	386		879	707	1261	709	3942
SWITCHGRASS	117		215	55	84	0	471
PRIMROSE WILL.	112		89	355	135	3	693
WOODY SCHRUB	995		472	775	745	819	3806
WILLOW	580		559	228	222	50	1639
TUSSOCK	19		243	193	94	81	630
UNIM. PASTURE	1797		1288	464	586	232	4366
IMPR. PASTURE	3006		1579	3923	2913	2495	13915
SPOIL	692		1269	1604	1187	1016	5189
TOTALS	10042		11821	10785	9447	6446	48541

PRESENT ACREAGE BY COVER TYPE IN KISSIMMEE RIVER FLOODPLAIN BY HABITAT TYPE (1991 HEP UPDATE)

FUTURE	POOLA	UPPER POOLB	LOWER POOLB	POOLC	POOLD	UPPER POOLE	LOWER POOLE	TOTALS
R.RUN	272	20	883	793	1204	620	164	3957
CYPRESS	0	94	15	40	105	34	4	292
C-38	304	108	0	0	0	0	222	634
BROADLEAF	59	58	3891	7293	5084	1682	166	18233
RHYNCHOSPORA	0	460	0	0	0	0	0	460
AQUATIC GRS.	493	116	1256	884	1262	551	123	4685
BUTTONBUSH	395	0	80	178	0	0	4	657
MAIDENCANE	815	17	1094	65	0	0	13	2005
OAK/CABBAGE	386	44	400	435	669	463	321	2719
SWITCHGRASS	117	10	70	17	70	0	0	284
PRIMROSE WILL.	112	24	0	0	0	0	3	139
WOODY SCHRUB	995	60	40	66	88	14	517	1781
WILLOW	580	26	636	447	178	41	40	1949
TUSSOCK	19	28	0	0	0	0	57	103
UNIM. PASTURE	1797	614	583	422	616	175	150	4357
IMPR. PASTURE	3006	579	44	190	198	46	1068	5130
SPOIL	692	372	0	8	31	0	613	1716
TOTALS	10042	2631	8991	10838	9506	3628	3466	49101

FUTURE ACREAGE BY COVER TYPE IN KISSIMMEE RIVER FLOODPLAIN BY HABITAT TYPE
WITH LEVEL II BACKFILLING PLAN IN PLACE (1991 HEP UPDATE)

Habitat Units Determinations of Evaluation Species in Available Habitat for Canal 38 HEP Study.

PROCESSING OF HEP DATA

Computations within HEP analyses may be displayed in a series of tables. Because of the voluminous amount of data involved in this analysis many of the intermediate steps were combined using formulas in a Lotus spreadsheet. The HSI values produced by the team and the area values derived from GIS processing first were reorganized according to four circumstances: period or scenario (historic, present, (level 2 backfilling); location along the river (pools A to E); cover type; and species. For each scenario HU (habitat unit) values were computed by species for each pool. The spreadsheet formulas just summed the incremental HU values which were the products of HSI times area for each cover type in that pool.

Results from the analysis are presented by species and pool for each scenario. The results also are summed for each species and pool to make trends more apparent (Appendix 2).

BY'S BY	WATER		BOBCAT		RACCOON		DABBLERS		BALD	WOOD		HERONS &		LIMPKIN		YELLOWTHROAT		COOTER				CHANNEL	BLACK	MOSQ.	SEMINOLE	GOLDEN	
POOL	RAT	OTTER		DEER		FLA.	DUCK	RINGNECK	EAGLE	STORK	CRANE	EGRETS	DOVE		SNIPE	ALLIGATOR	TURTLE	PIGFROG	BASS	CATFISH	CRAPPIE	FISH	KILLIFISH	SHINER	TOTALS
POOLA	3197	3007	1707	2590	2667	2662	1934	1089	2336	2450	2420	3630	900	3045	1401	2363	3522	2540	3086	2281	1220	937	6025	1890	2271	61905
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POOLB	4487	3601	2069	3210	3823	4689	3062	1499	3457	4220	3002	4836	706	4341	1306	2317	4529	3090	5100	2965	2067	1234	7790	2603	2076	84666
POOLC	4401	3595	1829	3031	3602	4126	3427	1690	3357	3997	2721	4507	606	4816	2010	2293	4436	2969	5103	2051	1719	1110	7750	2474	2794	80561
POOLD	3299	3340	1754	2493	3104	3216	2567	1725	2936	3114	2192	3757	737	3636	1590	1609	3927	2761	3920	2635	1680	1257	6043	2111	2559	68031
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POOLE	1948	2167	1416	1877	2260	2050	1540	1079	2096	1900	1776	2905	780	2541	1098	1826	2429	1816	2341	1705	1145	821	3613	1366	1603	44557
TOTALS	17230	15790	8855	13201	15544	16542	13377	7090	14342	15780	12830	19023	3981	27279	8311	9609	18043	13191	20349	12437	7831	5360	31221	10442	12184	339799

HABITAT UNIT VALUES FOR THE HISTORIC KISSIMMEE RIVER FLOODPLAIN; ALL EVALUATION SPECIES, BY POOL (HEP UPDATE 1991)

BY'S BY	BOBCAT WATER		BOBCAT		RACCOON		DABBLERS		BALD	WOOD		HERONS &		LIMPKIN		YELLOWTHROAT		COOTER				CHANNEL	BLACK	MOSQ.	SEMINOLE	GOLDEN	
POOL	RAT	OTTER		DEER		FLA.	DUCK	RINGNECK	EAGLE	STORK	CRANE	EGRETS	DOVE		SNIPE	ALLIGATOR	TURTLE	PIGFROG	BASS	CATFISH	CRAPPIE	FISH	KILLIFISH	SHINER	TOTALS
POOLA	860	820	2416	2564	2104	793	132	56	1540	175	2063	979	1600	379	1091	1310	574	502	831	179	29	125	973	119	172	23386
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POOLB	2167	1270	2070	3306	3156	1529	742	70	1900	804	2044	2000	2094	842	1029	1963	1056	637	2046	511	46	155	2069	502	615	36899
POOLC	1370	965	2036	2704	2050	843	165	56	1679	260	2070	1040	1583	579	1076	1620	770	587	1105	189	30	120	1401	109	159	26046
POOLD	732	790	2425	2593	2272	708	140	67	1646	199	2250	620	1640	690	775	1246	732	625	770	246	46	161	964	140	213	22810
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POOLE	256	504	1593	1652	1620	691	94	64	1181	112	1600	464	1300	223	562	681	440	600	301	158	36	130	360	123	171	14294
TOTALS	5300	4356	11741	12818	11600	4564	1274	314	7902	1400	12612	5087	8076	2492	4532	6557	3569	2930	4941	1280	194	700	6567	1001	1329	123443

HABITAT UNIT VALUES FOR EXISTING KISSIMMEE RIVER AND FLOODPLAIN; ALL EVALUATION SPECIES, BY POOL (HEP UPDATE 1991)

BY'S BY	LEVEL 2 BACKFILL WATER		BOBCAT		RACCOON		DABBLERS		BALD	WOOD		HERONS &		LIMPKIN		YELLOWTHROAT		COOTER				CHANNEL	BLACK	MOSQ.	SEMINOLE	GOLDEN	
POOL	RAT	OTTER		DEER		FLA.	DUCK	RINGNECK	EAGLE	STORK	CRANE	EGRETS	DOVE		SNIPE	ALLIGATOR	TURTLE	PIGFROG	BASS	CATFISH	CRAPPIE	FISH	KILLIFISH	SHINER	TOTALS
POOLA	860	820	2416	2564	2104	793	132	56	1540	175	2063	979	1600	379	1091	1310	574	502	831	179	29	125	973	119	172	23386
UPPER POOLB	362	293	629	623	575	560	467	25	593	483	901	544	464	261	431	245	270	237	377	140	137	71	553	157	110	9500
LOWER POOLB	3440	2994	1625	2473	3040	3451	2915	1300	2965	3319	2205	3706	580	3306	1697	1791	3675	2404	4020	2396	1602	1037	6160	2056	2320	66801
POOLC	4206	3950	1643	2706	3606	3905	3042	2379	3264	3019	2350	4475	582	4609	1922	2160	4071	3176	5293	3092	1597	1290	8070	2520	3035	81602
POOLD	3353	3394	1751	2517	3220	3359	2602	1017	3032	3220	2252	3820	720	3715	1664	1623	3950	2782	4054	2661	1644	1217	6100	2163	2611	69420
UPPER POOLE	1219	1325	753	1035	1317	1265	1020	655	1225	1202	842	1439	343	1306	509	591	1490	1099	1451	1054	710	500	2215	851	1040	26643
LOWER POOLE	104	297	859	800	783	246	56	36	614	64	819	202	626	141	266	374	277	270	206	92	20	81	249	71	90	7910
TOTALS	13720	13000	9676	12870	14724	13600	10317	6349	13140	12260	12321	15326	4052	13077	7661	8111	15114	10630	16232	9622	5747	4336	24416	7945	9402	205342

HABITAT UNIT VALUES FOR THE LEVEL II BACKFILLING PLAN; ALL EVALUATION SPECIES, BY POOL (HEP UPDATE 1991)

ANNNEX F

CULTURAL RESOURCES

ANNEX F

CULTURAL RESOURCES

INTRODUCTION

Although the Kissimmee River basin has received little systematic, professional cultural resources investigation, the area has a high potential to contain significant cultural resources. Previous investigations have been confined to small archeological surveys in discreet project areas, designed to take into consideration the effects of specific development projects on cultural resources in compliance with the *National Historic Preservation Act of 1966*. A limited amount of sponsored archeological work and academic research in the region (Sears, 1982), (Johnson, 1990) has made a contribution to an understanding of the region's prehistory and history. In 1986, the Avon Park Air Force Range completed a *Preliminary Cultural Resources Assessment Survey* in compliance with *Air Force Guidelines for Historic Preservation* and applicable Federal regulations (Austin and Piper, 1986). Local written histories and the collections of county historical societies provide insights into the historical development of the region and address the impacts of specific periods such as the Seminole War period and industries such as turpentining and cattle ranching as they relate to cultural resources.

In preparation of this *Feasibility Report and Environmental Impact Statement*, a limited cultural resources investigation was conducted, including an on-site visit and archival research. During a site visit, portions of the canal right-of-way, old river channel, detention areas and C-38 spoil areas were visited. Interviews were conducted with local land owners, area residents, and SFWMD personnel. Water control structures scheduled for demolition under the Level II Backfill Plan were photographed and their National Register eligibility was evaluated. Preliminary assessments were made of vernacular architecture that may be affected by the project. The site of Fort Basinger, a Second Seminole War period fort that may be affected by the project was inspected.

During the archival and background research, coordination with the Florida State Historic Preservation Officer (SHPO) was reestablished. In a letter dated June 3, 1982, in response to the Corps of Engineers'(Corps) request for information for the 1985 report, the SHPO indicated that the Kissimmee River area has a high potential for containing significant prehistoric and historic period cultural resources. In a letter dated June 18, 1991, their assessment was reaffirmed. Based on a preliminary assessment of the nature

and scope of the proposed work, the SHPO further stated that the recommended plan has the potential to adversely affect significant historic properties. In a letter dated October 16, 1991, the SHPO supported the cultural resources compliance procedures proposed by the Corps in this document.

Archeological site records in the Florida Master Site File and cultural resources reports on file with the Florida Division of Historical Resources, in Tallahassee were examined. Professional archeologists knowledgeable about the prehistory and history of the area were contacted to provide additional information regarding cultural resources in the Kissimmee River basin. The as-built drawing for C-38 provided valuable information on the pre-project, historic condition.

PREVIOUS INVESTIGATIONS

Austin and Piper's report (1986) provides a comprehensive description of significant cultural resources on the Avon Park Air Force Range (APAFR). The Fort Kissimmee site, 8Hg15, a historic period Second Seminole War fort site and residential homestead site; the Gaging Station site 8Hg18; the Orange Hammock site, 8Hg20; and two prehistoric period sites, represent occupations near the Kissimmee River which meet the criteria of eligibility to the National Register. In contrast, early 20th century homestead sites and turpentine camp sites located in the interior of the APAFR do not appear to meet the criteria of eligibility to the National Register. Based on this information, significant prehistoric and historic period archeological sites are expected to be located in proximity to the river.

Another informative investigation within the study area is the work of William Johnson (1990), who conducted an investigation of prehistoric earthwork structures in the Kissimmee River basin. Johnson examined aerial photographs and historic maps to identify potential earthwork sites, then groundtruthed his original findings. Johnson located four prehistoric earthworks in or near the study area. Three of the four are rectangular or square earthwork structures, a site type never before recorded in the river basin (Johnson, personal communication). The third site is a semi-circular and linear embankment earthwork similar to other sites recorded around the Okeechobee (Carr 1985). Three of the sites, 8Ob28, 8Ob29, and 8Ob31, apparently were partially impacted during construction of C-38. Portions of two of the three impacted sites may remain buried under C-38 disposal piles.

During an intensive survey of portions of the River Ranch property (Austin 1990), a large, dense Belle Glade village midden with ceramics and well

preserved faunal material was identified. The site, 8Po1685, is located on Long Hammock, adjacent to the Kissimmee floodplain west of C-38. The site is significant for its potential to establishing chronology, studying Belle Glades lifeways, and the interaction between St. Johns, Kissimmee, and Lake Okeechobee culture areas. An unrecorded burial mound is reported to be located directly south of site 9Po1685.

CULTURAL OVERVIEW

Much of the Kissimmee River basin's prehistoric cultural chronology has been derived using data from sites located in other parts of Florida. Table F-1 shows the river basin's cultural chronology as it is presently perceived. The study area is located in two archaeological areas, as defined by Milanich and Fairbanks (1980), the East and Central Lake District archaeological area and the Okeechobee Basin archaeological area. Although the cores of these archaeological areas are distinctive, the boundary between the two areas is not well defined and is arbitrarily drawn east-west near the center of Polk and Osceola Counties.

The earliest widely accepted occupation of Florida dates from the time when man is thought to have arrived in Florida, around 12,000 years ago, until ca. 6500 B.C. (Milanich and Fairbanks, 1980). This period is termed the Paleo-Indian stage. Few Paleo-Indian archeological sites are recorded in Florida, and because sea level was as much as 35 meters (115.5 feet) lower then, a large number of coastal and riverine sites are presumed to now be inundated. Until recently, Paleo-Indians were thought to be widely ranging nomadic hunters and gatherers, exploiting now extinct Pleistocene megafauna. Recently developed models of human behavior now suggest that Paleo-Indians led a more sedentary lifestyle. Paleo-Indian archeological sites are rare in southern Florida, and none are recorded in the study area. However, professional investigations at Nalcrest, in Polk County, and Little Salt Springs, and Warm Mineral Springs, have helped to define the period.

The Archaic stage, (ca. 6500 B.C. - ca. 1200 B.C.), is thought to be a reflection of man's adaptation to the changing environment at the start of the Holocene, when our basically modern climate and biota were established. Archaic Indians exploited a wider range of resources than Paleo-Indians, probably utilized a more restricted territory, and may have led a more sedentary existence. Seasonally available food resources, including deer and small game, hardwood nuts, freshwater snails, and marine shellfish were used during the Archaic. The Archaic is further subdivided into the Early Archaic, the Mount Taylor phase, after 4000 B.C., and the Orange phase, after 2000 B.C. Crude fiber-tempered pottery first occurs in the Orange phase. Few Early

Archaic or Mount Taylor period archeological sites are recorded in the study area, and none are located in the Okeechobee Basin. Archaic period sites become more numerous during the Orange phase.

The Transitional Stage, (ca. 1200 B.C. - ca. 500 B.C.) is characterized by changes in technology and lifestyles. Sand replaces or augments fiber as a ceramic tempering agent. A profusion of stone tool types and ceramic styles in this stage indicates increased population movement and social interaction, and more complex political and religious community organization. Regional cultural diversity becomes apparent by the end of this stage, and the East and Central Lakes District and the Okeechobee Basin archaeological areas become distinct.

In East and Central Florida, the St. Johns culture begins about 500 B.C. and lasts into the historic period about A.D. 1500. The St. Johns has been subdivided into six temporal periods, based on changes in ceramics and other material remains. Changes in ceramic technology appear to reflect variations in the degree of interaction with indigenous groups from northern Florida through time. Limited horticulture is assumed to be established by the beginning of the St. Johns, although abundant marine food resources appear to be the staple throughout the 2000 year time span. Formal agricultural practices, if present, made only a minor contribution to the subsistence base.

In the Okeechobee Basin, the Belle Glades culture sequence (ca. 1000 B.C. - A.D. 1700) is subdivided into four periods. Ceramic technology progresses from fiber tempered to fiber and sand tempered to sand tempered ceramics, with St. Johns ceramic types also being used during the Belle Glades culture sequence (Austin 1990). Hunting and collecting subsistence strategies are thought to have been supplemented by maize agriculture practiced on circular and linear earthworks. A complex political system practiced by the Calusa was recorded in the late Belle Glades sequence. Objects of Spanish origin obtained from European contact or shipwreck salvage have been recovered from sites dating to the late periods of the Belle Glades.

During the early historical period, beginning with the first Spanish colonial period (1513 - 1763), European contacts were limited to the coastal areas. Native Florida tribes were decimated by European diseases and conflict, and by the 18th century, migrants from the Creek and other southeastern groups, were moving into the vacated interior Florida. These migrants eventually coalesced into the Seminole tribe. The Seminoles lived in dispersed hamlets and farmed, hunted, and raised cattle. Following the United States government policy of Indian removal, General Zachary Taylor led a force down the Kissimmee River valley during the Second Seminole War in 1873.

The conclusion of the Third Seminole War in 1858 opened the Kissimmee River basin to Anglos, and cattle ranchers and farmers were the earliest settlers. Railroads and draining of swampland opened up the area to more homesteaders. The turpentine and timber industries made a significant economic impact on the region.

The first study of the Kissimmee river made by the U.S. government was conducted in 1899. Improvement to the Kissimmee river were begun in 1903 under a project which provided for a channel 3 feet deep and from 30 to 60 feet wide, from the town of Kissimmee to Fort Basinger. *The Board of Engineers for Rivers and Harbors (1913)*, stated that, although the amount of commerce handled by the river is small, the river was worthy of improvement to the extent of maintaining the 3 foot deep channel from Kissimmee to Lake Okeechobee, a distance of 137 miles. Commodities transported on the Kissimmee river during the period 1906-1907 include cattle and sheep, vegetables, grains and fruit, and lumber and naval stores (Carson 1908). The land was described as "admirably adapted to truck farming" (Kribbs, 1909). After World War II, population increased rapidly.

Table F-1. Cultural Chronology for the Kissimmee River Basin.

Present	Modern	
A.D. 1800	Seminole	
A.D. 1700	Early Historical Period	
A.D. 1500	St. Johns Culture Period (East and Central Lake District)	Belle Glades Culture Period (Okeechobee Basin)
500 B.C.		
1,000 B.C.	Transitional	
1,200 B.C.		
2,000 B.C.	Orange	
4,000 B.C.	Mount Taylor	
6,500 B.C.	Early Archaic	
10,000 B.C.	Paleo-Indian	

EFFECTS TO CULTURAL RESOURCES

Effects to historic and prehistoric archeological sites and standing structures, engineering structures and architectural features will be evaluated during future cultural resources investigations. Effects from the proposed project are anticipated to come from construction, erosion, human disturbance, and changes in the hydrologic regime in the flood plain.

In preparation of the 1985 Corps report, the SHPO indicated that at least 17 sites of historic or archeological significance were recorded within the Kissimmee River basin, and that 30-50 additional unrecorded sites were likely to be present. In a letter dated June 18, 1991, the SHPO reaffirmed the archeological and historical potential of this region. Inspection of the Florida Master Site File in Tallahassee revealed that at least 50 archeological sites are now recorded in the river basin. Approximately 3000 archeological and historical properties are recorded in the four-counties included in the lower basin. Few of the recorded sites have been evaluated for eligibility to the National Register of Historic Places. Therefore, effects to these resources must await further investigation.

Based on a preliminary assessment, the proposed project is expected to have no effect on standing structures, engineering structures or architectural features. Water control structures along C-38, including the spillways, boat locks, existing auxiliary structures and tieback levees, do not appear to meet the criteria for eligibility to the National Register. The structures and appurtenant facilities are less than fifty years old, are similar in design to other water control structures throughout the Central & Southern Florida (C&SF) Project which will remain intact, and do not make a contribution to history. The CSX Transportation (CSXT) Railroad bridge across C-38 also does not appear to meet the criteria of eligibility. Examination of the as-built drawing for C-38 indicate that the CSXT railroad bridge across the original river channel was left in place, with fill placed around it at the time construction of C-38. Preliminary assessment, based on inspection of the as-builts, indicates that the original bridge also does not meet the eligibility criteria. The Highway 60, Highway 70, and U.S. Highway 98 bridges across C-38 also do not meet the National Register eligibility criteria. These bridges are not presently scheduled for modification. Implementation of the Level II backfill plan will affect approximately 400 standing structures. Based on a preliminary assessment, many of the structures do not appear to meet the criteria of eligibility for the National Register.

Construction of the proposed project may cause effects from creation of new river channel, excavation of C-38 spoil piles, degrading of tieback levees, excavation of borrow material, and other construction related activities. Based on data collected during the archival and literature search, the Corps expects that unrecorded archeological sites were covered by spoil during construction of C-38, and predicts that removal of that spoil during restoration may create adverse effects. Spoil from C-38 construction covers portions of known, recorded archeological sites, including fragile, linear earth mounds that are likely to be adversely affected if spoil is removed. Approximately 18 new river channel sections will be constructed with a total length of 11.6 miles. Unrecorded archeological sites within the floodplain may be affected by this construction.

The Recommended Plan will change the existing condition hydrologic regime by restoring discharge characteristics, overbank flows, flow velocities, stage recession rates and flood plain inundation frequencies to pre-project conditions. With the implementation of the Recommended Plan, induced flooding effects are expected to be significant up to the 100-year flood level. Fringe areas that are currently not at a significant level of flood risk may experience an increase in frequency of inundation. Other areas closer to the river with comparatively more frequent flood risk may experience flooding of somewhat greater depths for longer duration. Restoration is expected to rejuvenate approximately 10,200 acres of existing wetlands and reinundate about 15,000 acres of presently pasture and dry shrub land.

In considering how the proposed project will create effects to significant historic properties, investigations will evaluate effects from changes in the hydrologic regime. The historic, pre-channelization condition for cultural resources in the flood plain was wet, or seasonally wet. The current post-channelization condition is drier than the historic condition. The proposed project will restore the floodplain to a wetter condition, similar to the historic condition. Federal laws and regulations and Corps policies require consideration of effects of the project be compared to the current, drier condition, and not to the historic condition. Little is presently known about the range of historic properties in the flood plain or their present condition. Initial cultural resources investigations will assess the present condition of potentially significant resources and evaluate how changes to a wetter condition may adversely effect those resources.

PLAN OF FUTURE CULTURAL RESOURCES INVESTIGATIONS

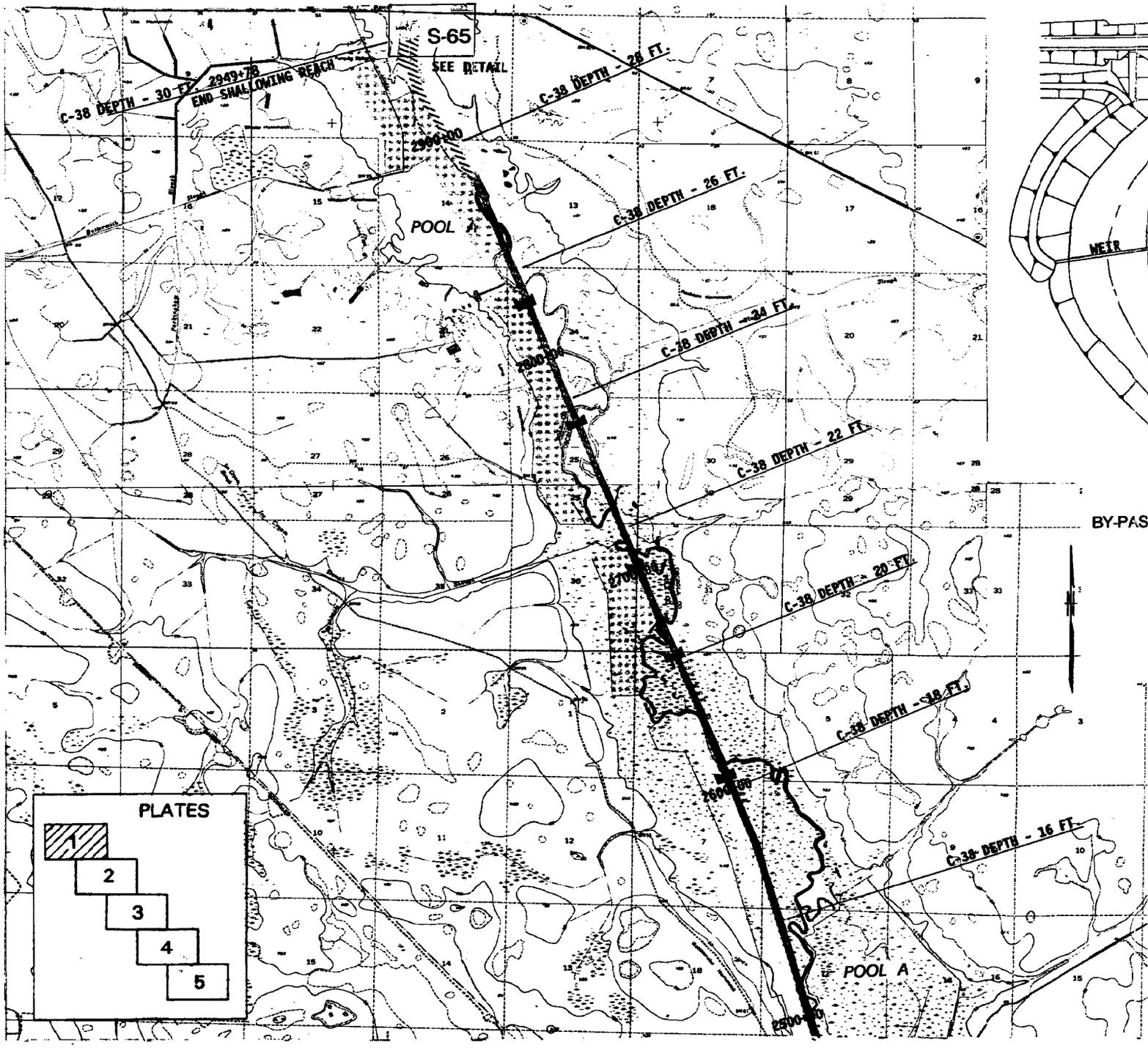
Early in PED, appropriate cultural resources investigations will be conducted to locate and identify potentially significant historic properties that

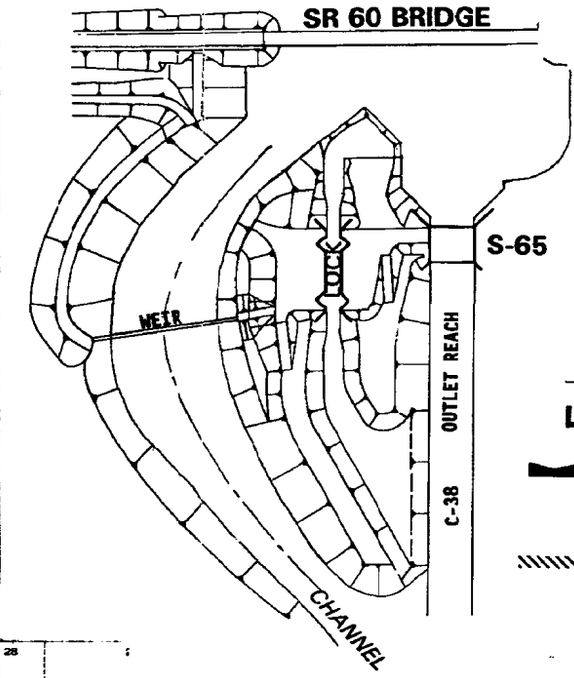
will be affected by the project. Initially, a comprehensive archival and background review will be completed, and an historical overview will be compiled. Archival research should culminate in the formulation of specific research question that will direct future field studies, guide analysis of collected data, and most importantly, give the resource managers a basis against which to measure site significance and National Register eligibility.

An architectural assessment will be made of structures and architectural features which may be affected. An archeological sample survey, stratified by culturally meaningful environmental variables, will be undertaken. A geomorphological investigation designed to identify land forms which are likely to contain significant resources will be completed. The geomorphological investigation should identify land forms which would be unlikely to contain aboriginal archeological sites, such as depositions created within the last 150 years or pre-pleistocene deposits.

Based on the results of the archival and background review, the archeological sample survey and the geomorphological investigation, a predictive model will be developed to identify areas with a high probability to contain significant resources. Additional archeological investigations are expected to be necessary in order to adequately assess the National Register of Historic Places eligibility of all potentially significant historic properties.

In consultation with the State Historic Preservation Officer (SHPO), the Corps will apply the criteria of effect and adverse effect (36 CFR 800.9) for historic properties that meet the criteria of eligibility to the National Register of Historic Places. For those historic properties which will be adversely affected, mitigation plans will be developed by the Corps, in consultation with the SHPO and the Advisory Council on Historic Preservation, to mitigate adverse effects. The Corps will implement the mitigation plans prior to any ground disturbing activities or reinundation being initiated. Collections from cultural resources investigations will be curated in repositories meeting the standards established by the Corps and the National Park Service.





BY-PASS WEIR AND CHANNEL

LEGEND:

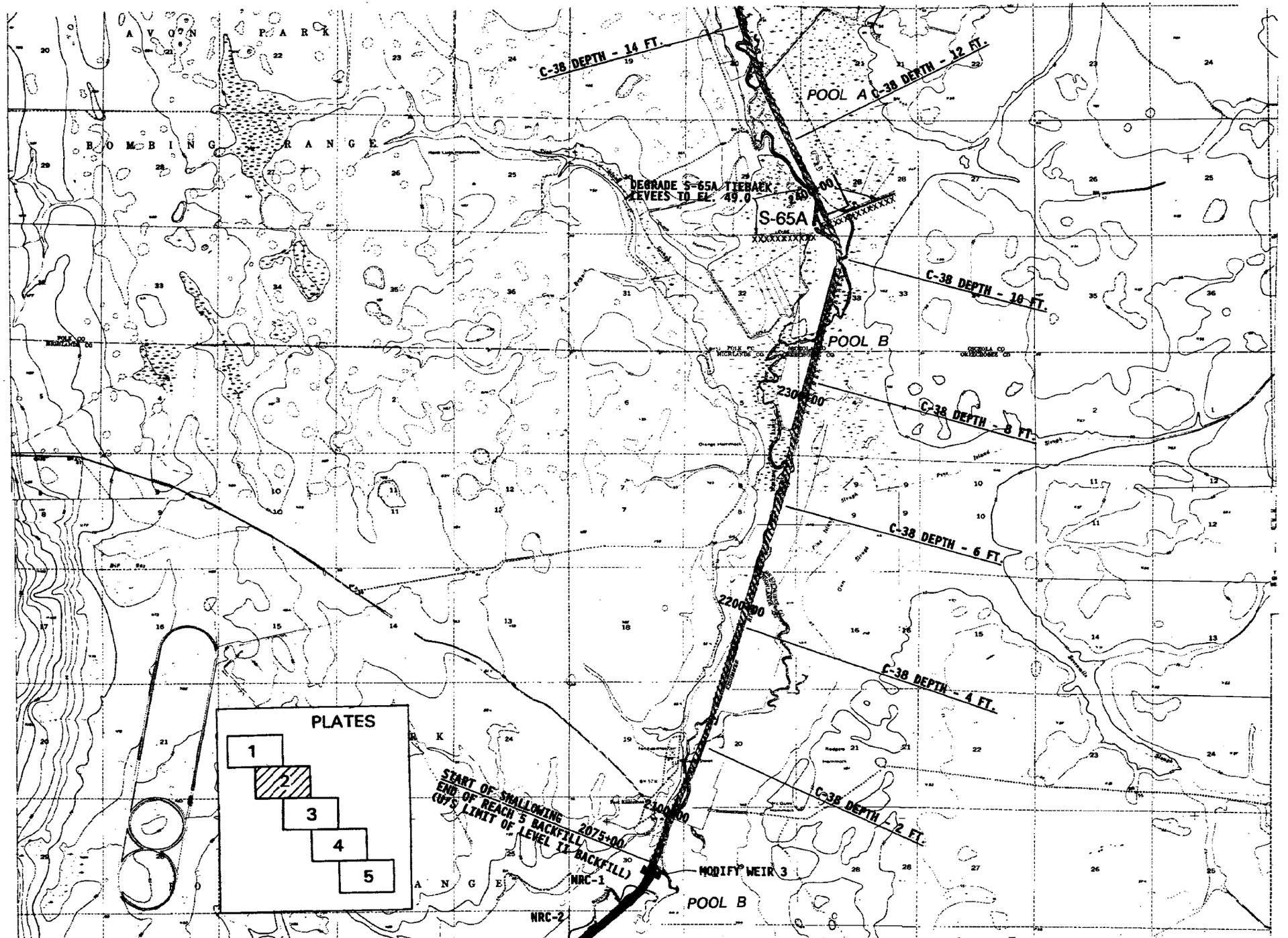
- WEIR
- LOCK
- SHALLOWING
- DISPOSAL AREA

SCALE 1:24000

CONTOUR INTERVAL 5 FEET

RECOMMENDED PLAN

PLATE 1



LEGEND:

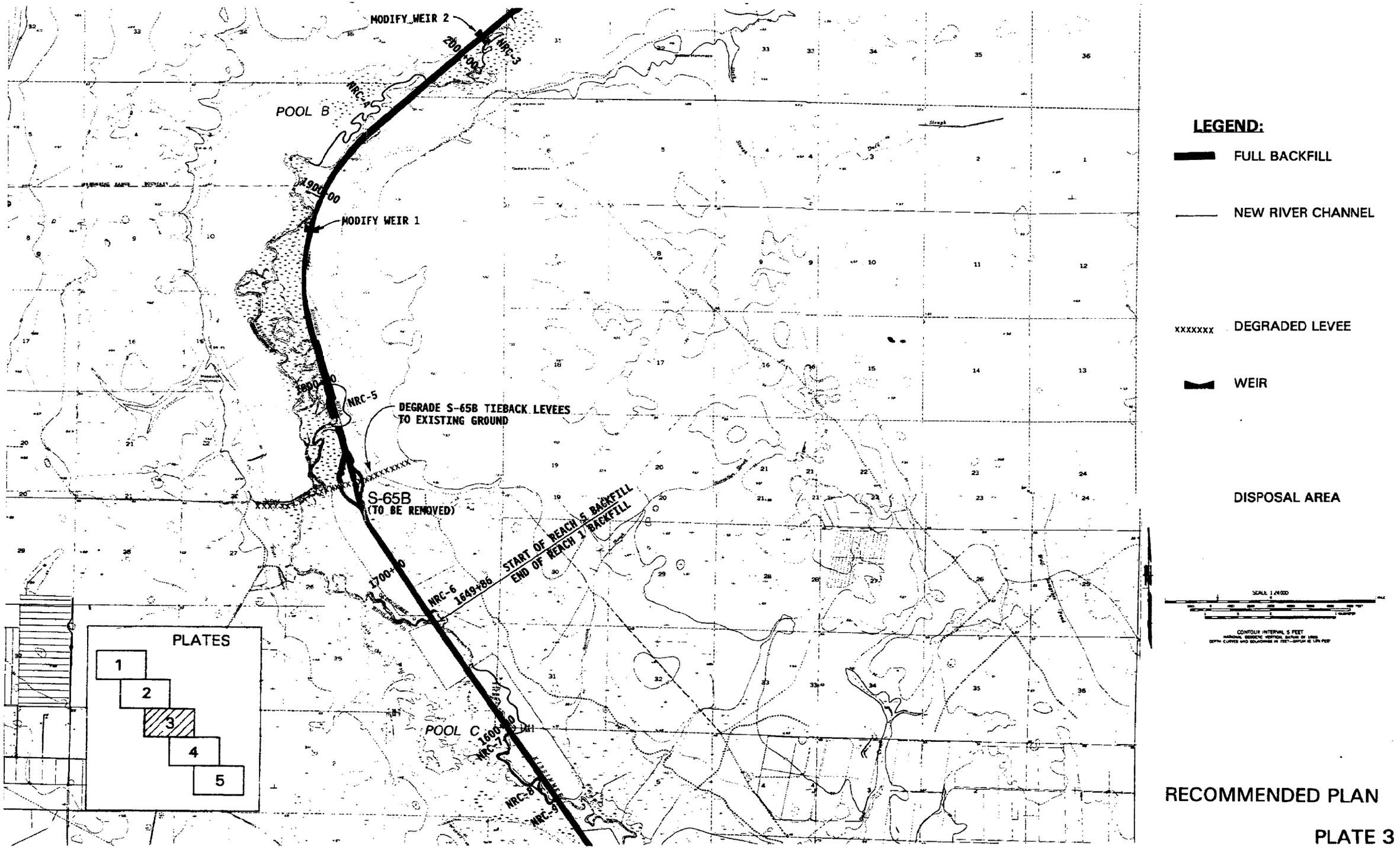
- FULL BACKFILL
- NEW RIVER CHANNEL
- DEGRADED LEVEE
- WEIR
- SHALLOWING
- DISPOSAL AREA

SCALE 1:24000

CONTOUR INTERVAL 5 FEET

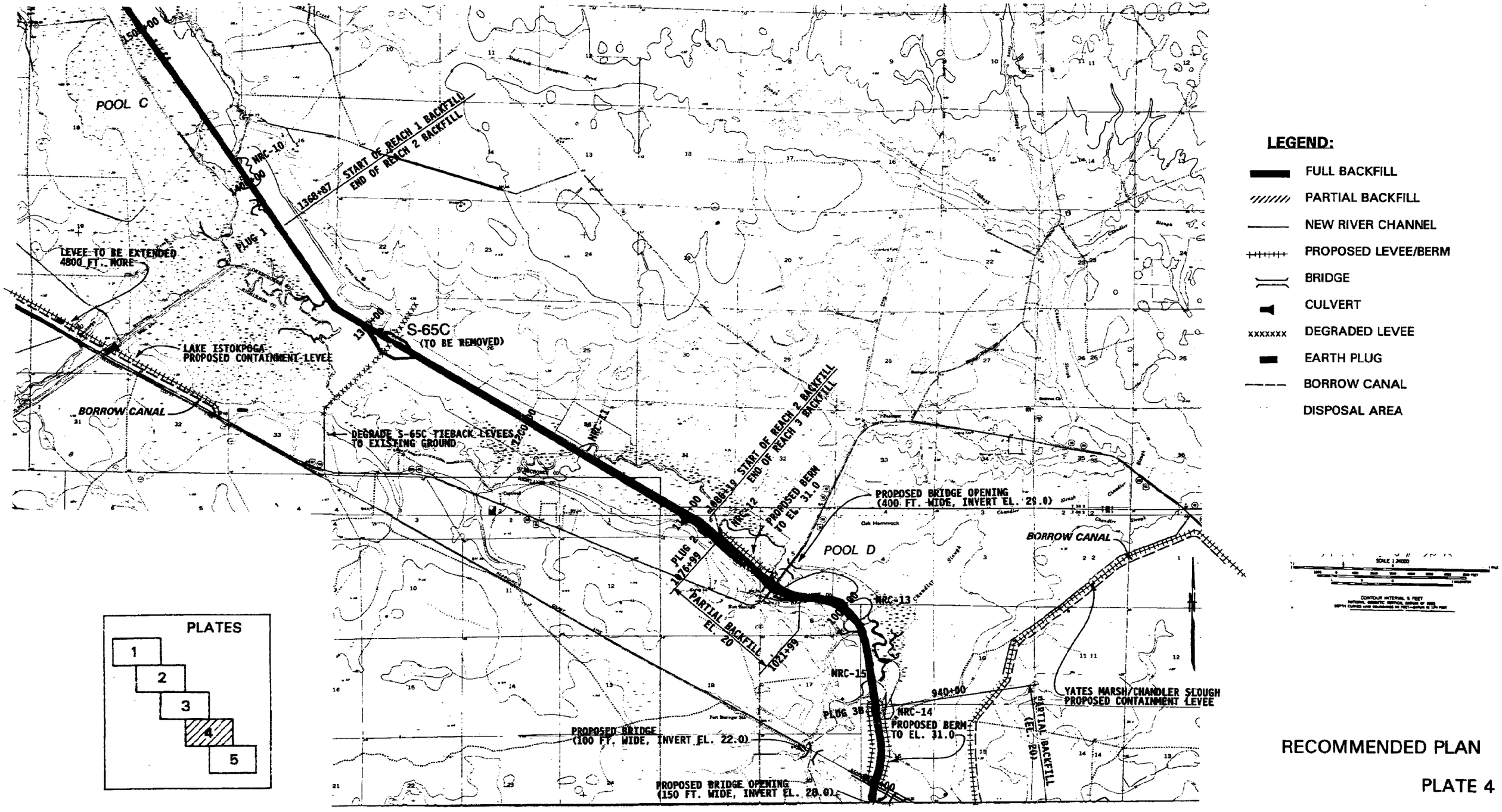
RECOMMENDED PLAN

PLATE 2



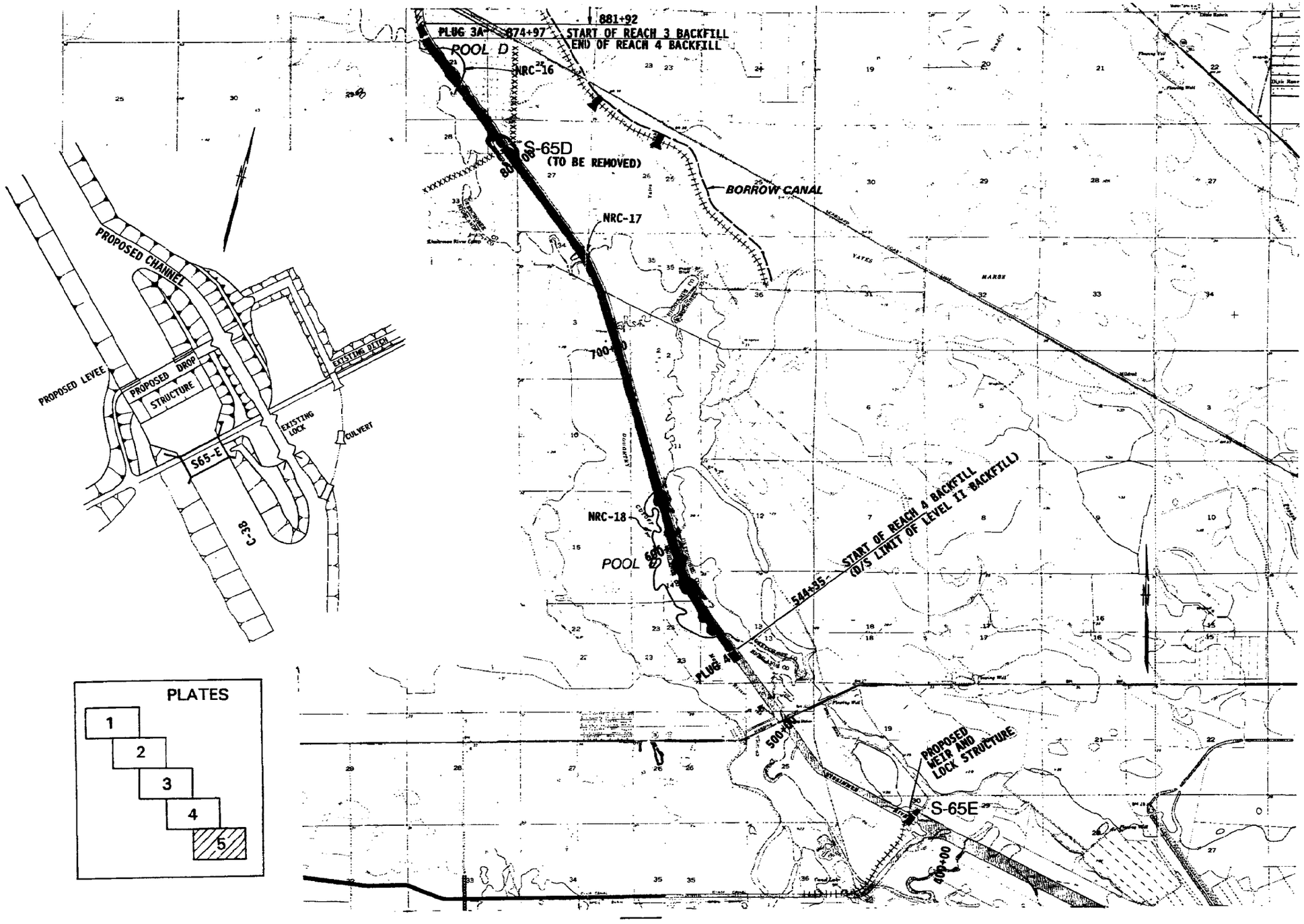
RECOMMENDED PLAN

PLATE 3



RECOMMENDED PLAN

PLATE 4



LEGEND:

- FULL BACKFILL
- PARTIAL BACKFILL
- NEW RIVER CHANNEL
- PROPOSED LEVEE/BERM
- CULVERT
- xxxxxxx DEGRADED LEVEE
- EARTH PLUG
- WEIR
- LOCK
- BORROW CANAL
- DISPOSAL AREA

RECOMMENDED PLAN

PLATE 5

ANNEX G

ENVIRONMENTAL OUTPUT OF ALTERNATIVE PLANS

ANNEX G

ENVIRONMENTAL OUTPUT OF ALTERNATIVE PLANS

Discussions provided in this annex, in accordance with 40 CFR 1502.22, reflect the uncertainty and interplay of professional judgements regarding fish and wildlife population projections presented in the Environmental Impact Statement (EIS). As specified in 40 CFR 1502.22(b), the estimates and projections EIS reflect worst case analyses.

RIVER/FLOOD PLAIN ECOSYSTEM

Because the Weir, Plugging and Level I Backfilling plans will not reestablish full complement of hydrologic criteria and physical form guidelines on any portion of the river and flood plain, these plans would not restore any acres of ecosystem comparable to that which existed prior to channelization. The Level II Backfilling Plan would restore 33,000 acres of river/flood plain ecosystem which would reestablish habitat for 318 fish and wildlife species.

WETLANDS

Wetland acreage for historic and existing conditions and for alternatives except the Weirs and Plugging Plans and the Level I Backfilling Plan were calculated by the U.S. Fish and Wildlife Service, (USFWS) using a 1980 map prepared by Milleson, T.F. (1974 photography) and an earlier map by Pierce, G. (1954 photography). Vegetative maps of the Kissimmee River flood plain prepared by several other researchers were also considered.

Projections of wetland acreage for the Weir, Plugging and Level I Backfilling Plans were based upon Demonstration Project monitoring data and modelling results. The data showed that flood plain wetlands could be re-established under these plans primarily through pool stage manipulations. The Demonstration Project showed that 3 to 4 months of fairly continuous inundation was required to re-establish wetlands on drained flood plain. Modelling results of simulated flood plain inundation at the Fort Kissimmee index station indicated the Weir and Plugging Plans would inundate no more than 30 percent of the flood plain for the required length of time, while the Level I Backfilling Plan would lead to sufficient length of inundation on only about 26 percent of the flood plain. The peak stage of the pool manipulation schedule, or 2 feet above the existing stage of each pool, would inundate 42

percent of the flood plain at this location for about one month, and stages would be maintained at least one foot above present pool stages for four months each year. Based upon these latter hydroperiods, pool stage manipulations of the Weir, Plugging and Level I Backfilling Plans would lead to re-establishment of approximately 3000 acres of additional flood plain wetlands.

HABITAT EVALUATION PROCEDURES (HEP)

See USFWS's draft HEP Updated Report for an account of the procedures used to evaluate historic, present, future without project and futures under the Level II Backfilling Plan and the Recommended Plan. HEP evaluations for the historic and present conditions were made for the 1985 Feasibility Report and EIS and were updated for this report. The HEP evaluation for the 1985 Partial Backfill alternative was updated to assess impacts of the Level II Backfilling Plan. However, there are no HEP evaluations for alternatives approximating the Weir, Plugging and Level I Backfilling Plans. The ranges for habitat units (HUs) presented under these alternatives in Table 23 are the consensus of professional biologists representing the U.S. Fish and Wildlife Service, the Florida Game and Fresh Water Fish Commission, the South Florida Water Management District and the Corps of Engineers. The consensus is based on observed relationships between acreage and calculated HEP units under historic and existing conditions, on projected hydrological conditions under Weir, Plugging and Level I Backfilling Plans, and on results of the SFWMD Demonstration Project. The upper end of the range, 170,000 HUs, reflects the approximate ratio between wetland acreage and HUs under historic and existing conditions. The lower end of the range is the number of HUs under existing conditions.

FISH BIOMASS

Studies of prechannelized Kissimmee River fish communities were conducted by the Florida Game and Fresh Water Fish Commission (FGFWFC) in 1957 in the lower (Paradise Run) Kissimmee River and in an adjacent, parallel canal called Government Cut. These studies allowed for a direct comparison of riverine and canal habitats. (Miller, Steven J., 1988 in Loftin, Toth and Obeysekera, 1988). The following tables were excerpted from the cited report.

Estimated number and biomass (lbs) per acre of fish sampled from Kissimmee River (0.38 acre sample) and Government Cut (0.92 acre sample) mainstream areas during July 1957. Estimated number and biomass (lbs) per

acre of fish sampled from a Kissimmee River slough (0.22 acre) and marsh (0.20 acre) in July 1957.

	Kissimmee river		Government Cut		Marsh	
	Number	Weight	Number	Weight	Number	Weight
Gamefish	116	7.3	15	0.1	1640	6.4
Catfish	805	10.0	-	-	50	3.2
Rough Fish	16	14.2	-	-	60	1.8
Forage Fish	387	2.5	16	t	2835	
7.9						
Totals	1224	34.0	31	0.1	4585	19.3
No. species	18		12		24	

Fisherman days statistics were removed from Table 23 for the final EIS. Discussions held within the Corps of Engineers subsequent to publication of the draft Environmental Impact Statement led to the conclusion that fisherman days statistics do not purely represent an environmental resource, but instead represent the utilization of that resource, have economic implications, and therefore are not comparable with the other statistics presented in Table 23. Fish biomass was chosen because it is non-utilitarian, as are HEP units and acres. The figures now presented in Table 23 as "fish biomass" are based on the 1957 FGFWFC data reviewed by Miller (SFWMD, 1990).

(Direct comparison of abundance data collected from the pre-channelized river with recently collected data is not readily done because of differing sampling gear, methods and objectives and the dynamics of the habitats).

The 1957 study reported a comparison of data from the pre-channelized Kissimmee River with contemporary data from the adjacent Government Cut, "a canal similar in many respects to the C-38." The study results showed total fish biomass in the Kissimmee River to be 340 times that in the canal. Fish biomass in a marsh adjacent to the river was over 190 times that in the canal (and about half that in the river). These data are explained by the fact that the habitats most-utilized by Kissimmee River fishes are the littoral zones, low flow areas and marshes. The straight-cut canal offers a relatively small proportion of littoral area per acre. Also, current velocities in the river during high flow were lower than in the canal. "The Kissimmee River was shallower, had more gently sloping banks, and had numerous bends and backwater areas.

This created a much more diverse habitat than the straight, relatively steep banked canal. In addition, the gently sloping banks and broad floodplain of the river tended to dissipate velocities, keeping them within a range more suitable for fish" (Miller, ibid.).

That the wetland habitat created by the Weirs, Plugging, and Level I Backfilling plans would be comparable to the marsh sampled in the above-cited study, i.e., would produce over 190 times the fish biomass as that in C-38, is unlikely. The above-cited figures for biomass per acre for river and canal were applied respectively to acres of river, canal and oxbows under each condition (alternative) in Table 23 and summed to obtain a July 1957-based instantaneous total biomass figure. (Acres for each habitat were calculated from the length and width dimensions in Table 22, using median figures where width ranges are given). The biomass figure for canal was used also for unrestored oxbows. One percent of the area of wetland for each alternative in Table 23 was used to calculate total biomass that would be produced on the adjacent flood plain under the respective alternative. The 0.01 figure was used because that is the area of flood plain historically flooded over 95 percent of the time.

Weirs and plugging plans, including the Level I Backfilling Plan, were treated differently. Under these plans excessive flow rates through river reaches, rapid runoff from the flood plain and occasional fish kills are expected to diminish fish production. For this reason wetland acreage under these alternatives was treated as having no fish biomass value, and the biomass figure cited for canal was used to calculate fish biomass for river reaches. The results are presented for comparative purposes in Table 23. (If one were to calculate biomass for marsh produced by the Weir and Plugging plans, the total biomass for each alternative would be the following: Weirs and Plugging, 4,000 lbs; Level I Backfilling Plan, 3,000 lbs.).

FISHING

Historic Condition

Fisherman days statistics were removed from Table 23 for the final EIS for reasons discussed above. The following discussion is retained, although the data discussed are not used in the final EIS.

USFWS fishing census 1955-56. (1958 Report) This study was conducted along 90 miles of the river. Government Cut was not included.

Existing Condition

Florida Game and Fresh Water Fish Commission (GFC) fishing census 1975. Data in fishing hours were converted to fisherman days by assuming 5 hours of fishing time equals one fisherman day.

"Without Project" Condition

The GFC fishing data for 1975 were projected to the year 2020 assuming fishing would grow proportionally to the Florida Central Region population and the present proportion of non-resident usage would continue. This yielded an estimate of 57,000 fisherman days. The biologists (Corps, GFC, FWS, SFWMD) felt this was much too high. The ecosystem and fishery habitats are being degraded and the bass population is slowly diminishing. Fishing pressure now (1991) on the C-38 canal is believed to be 30,000-34,000 fishermen days annually.

The effect of the Upper Basin Revitalization on the existing canal fishery is arguable. Some biologists (Miller, S. GFC) feel there will be a significant improvement in the bass population in Pool A due to improved dissolved oxygen (DO) levels and more natural seasonal flows into C-38. Comparable studies have shown fish with high oxygen requirements can survive for weeks when there is a very low DO level if tributary streams or dam leakage provide "spots" of adequate oxygen. Fish will move toward higher oxygen. (Conn. R. Study, 1963-1967). Other biologists (Toth, L) note the volume of water in Pool A and feel the improvement to the fishery in Pool A will be minuscule. There is also a possibility that the C-38 system may "flip out of bounds" prior to 2020 (Hollings - Theory of Ecosystem Integrity is referenced). The sunfish-catfish population that would remain would support few fishermen. This worst case scenario is not considered probable. The Jacksonville District projects 42,000 fishermen days in the year 2020 under "without project" conditions. This is predicated on the demographic data presented in Annex D. The projected population growth rate in Central Florida from 1992 (interpolated from Table 5 and Table 6) to 2020 (Table 7) is 60 percent, and:

$$32{,}000 + \frac{.60 \times 32{,}000}{2} = 41{,}600$$

Weirs, Plugging, and Level I Backfilling Plans

The estimate of 30,000 fisherman days per year was made by the state-federal Peer Group of biologists. All of these alternatives have fast recession rates in the upper 50% of the pools, all would cause periodic fish kills and all

would produce poor water quality and low dissolved oxygen. All the biologists who have worked on the river or canal agreed that existing C-38 is preferable to any of these alternatives.

Level II Backfilling and Recommended Plan

The estimate of 112,000 fisherman days in year 2020 for the restored river (56 miles) and retained canal (14 miles) was developed by the Jacksonville District and is generally concurred in by the group of state and federal biologists who assisted the District in planning. However, there was much discussion, debate, and uncertainty concerning this number. How the number was developed is of concern to reviewers, and current Corps planning guidance requires a sensitivity analysis.

Discussion

The 1956 FWS census was the only source of historical data (river fishery) available and was used as primary base. The 1975 GFC census is the best information available on C-38 and is used for the existing condition. The target year for estimating restoration is 2020 - (11-15 years for design work and phased construction).

In 1956 the Kissimmee River valley was undeveloped with a population of about 200, largely ranch families. Except for the 4 major highways there was little access to the river. The FWS creel census found only 3% of the fishermen were non-residents of Florida. The population in the draw zone (the surrounding counties) was about 600,000. The reader is referred to the demographic data in main body of this report.

By the year 2020 the population in the draw zone will be four times greater than in 1956. The 1975 GFC study of the canal found 28% of fisherman were non-residents. A 1990 GFC study of nearby Lake Okeechobee found 40% of the fisherman were non-residents.

If we assume that fishing pressure has and will increase proportionately to the local population, a common assumption since the Outdoor Recreation Review Commission Reports in 1964, the estimating procedure is simple:

35,000 fisherman days in 1956 - 3% non-residents = about 34,000 resident user days. Apply a growth factor of 4 and add 40% for current non-residents fishing (90,800) to yield 227,000 fisherman days that the 90 mile stretch of the Kissimmee River should have supported in the year 2020. The 56 restored miles of river is 63% of the river's former 90 miles; therefore, the

restored river should produce about 143,000 fisherman days annually. It is known that the upper 14 miles of C-38 canal that will be retained supports approximately half the fishing in the canal at the present time. Adding 21,000 to the 143,000 leads to 164,000 fisherman days for the canal and restored river in 2020.

When the 164,000 figure was discussed with the Peer Group a varied reaction was obtained. Most felt this figure was much too high. Steve Miller, Fishery Biologist, GFC who just completed five years of work on the canal, was particularly dubious. The assumption of proportionate fishing growth with human population growth cannot be supported in large urban areas and the Orlando area is urban. Lake Okeechobee, a very large lake with a very good bass fishery has dozens of fish camps, bass masters tournaments, and much TV publicity. In 1990 Lake Okeechobee had approximately 120,000 bass fisherman days. The lake will be a strong competitor of the restored river.

The growth factor for fisherman days on the total length of the restored river was reduced to 3 and the percentage of non-residents was reduced to 30%. This yielded 91,000 fisherman days for the restored river. Add 21,000 for the retained canal and the result is the 112,000 man-days found in the report for the Level II Backfilling and Recommended Plans.

WINTER WATER

Existing and "Without Project" Condition

The numbers are an educated guess based on a perusal of aerial photographs (Macomber, R. 1991).

Level II Backfilling and Recommended Plan

Winter water data for the Level II Backfilling and Recommended Plans were calculated by the SFWMD using Fort Kissimmee as an index location at which were simulated daily inflows from Lake Kissimmee and local inflows upstream of this index station. Simulated inflows were generated for the period between 1970-86 and were based upon historical rainfall and proposed changes in the Upper Basin regulation schedule. A stage/discharge rating table was developed using pre-channelization stages at Fort Kissimmee and inflows from Lake Kissimmee. A flood plain area/elevation relationship was derived for the flood plain adjacent to Fort Kissimmee using one-foot contour aerial photography. Using the stage/discharge rating table, simulated daily flows at Fort Kissimmee were converted to stages, which were compared to the flood plain area/elevation relationship to determine the percentage of the flood plain

adjacent to the index station which had water depths greater than one foot. When necessary, the appropriate flood plain area percentages were derived by interpolation of the flood plain area/elevation data. These percentages were multiplied by the total acreage of flood plain wetlands that will be restored within the backfilled section of the system. Resultant daily acreages for the restored flood plain were summed over the period between December 1 - March 1 yielding acre-days of winter water during each year of the simulation period.

DUCKS

A GFC biologist flew waterfowl counting flights up and down the Kissimmee River for eight years in the 1950's. He estimated 4,000 to 6,000 ducks on an average day in the winter season. These numbers become considered the standard estimate for the historic condition. The planners working on this report used this range of numbers for several months.

A waterfowl biologist currently employed by GFC recently provided information that increases the historic number considerably. Census techniques in the 1950's, the lush marsh - prairie - shrub thicket habitat of the flood plain, and the feeding and resting habits of most of the above species probably resulted in the aerial viewer counting only 40 percent of the birds. (Brakage, D.; letter received June 10, 1991). Other experienced Florida waterfowl biologists concur. (Frikett, S. to J. Carroll, FWS).

Post-channelization duck counts have been conducted by several biologists for many years and all counts are low. A recent and yet unpublished report (Toland, B. GFC) contains the result of 22 flights in 1987-89. The Kissimmee pools, as they are today, have a density of 0.8 ducks/km^2. Winter duck populations have been counted numerous times. During the period 1972-79 average duck counts ranged from 4 to 64 for the entire flood plain. These counts are probably subject to the same underestimating bias as the pre-channelization surveys. For this statement the existing mean winter duck population is estimated at 140 birds. Toland, however, estimates 875 ducks are present under existing conditions and projects the same number under "without project" conditions.

The biologists participating in this study have agreed on the following:

1. 12,500 mean daily winter population for the historic condition.

2. A Kissimmee River flood plain 74% restored will be more valuable today than the historic flood plain was in the 1950's due

to the tremendous loss of quality waterfowl habitat in South Florida. (Kissimmee Peer Group - 12 June 1991).

A problem arises when the literature concerning duck trends and population in Florida and the Eastern Flyway is analyzed (these data are referenced). Such analysis leads to the conclusion that there might only be a 40% recovery or roughly 5,000 birds (Olds, T. and Macomber, R.). Toland projects 4,200 birds under Weir, Plugging and Level I Backfilling Plans, and 7,500 birds under Level II Backfilling Plan and the Recommended Plan. Another state waterfowl biologist (Brakage, D.) feels that a 12,500 restored winter population is conservative. One non-migrating species, the fulvous tree duck, was not present in Florida in the 1950's. About 2,000 of these birds are now found near the mouth of old river. Conditions in the Kissimmee flood plain should be ideal and a significant growth in the population of this species is probable. Another non-migrating species, the mottled duck, has responded well to a specific management plan where shallow water wet prairies have been acquired and flooded. The restored Kissimmee flood plain should provide over 6,000 acres of this habitat type. Brakage also points out that many migrating species of importance to south Florida come to Florida from the Mississippi Flyway where conditions are not quite so dismal as the Eastern Flyway. Lastly, he assumes that the goal of the North American Waterfowl Plan for international restoration of waterfowl to the early 1970's population level will be met. This document concurs in the view and numbers provided by state wildlife biologist Brakage.

WADING BIRDS (Excluding Cattle Egrets).

Old books by early settlers talk about "endless strings" of wading birds in the sky. There were at least 11 species and the comparative abundance is known. White ibis were very numerous; great blue heron, snowy egret, tricolor heron, little blue heron, American bittern, glossy ibis, limpkin, and sandhill crane were common. (Chandler, Audubon Warden). The lower Kissimmee River and nearby Paradise Run were one of five sites in South Florida on the Audubon Society week long Everglades birding trips.

Wading birds, like waterfowl, have experienced a dramatic decline in recent decades in South Florida due to the loss of quality wetlands. Kushlan and others have estimated a 95% loss since European settlement and a 50% loss in the last 40 years.

Wading birds increased tenfold on the flooded area during the period of the Demonstration Project.

There is agreement within the professional Florida group interested in wading birds that the Kissimmee flood plain will be as valuable or more valuable, for this avian group, than it was historically. The reason, again, is the loss of wetlands and impounded wetlands that suffer a severe reduction in bird use. The key to how many can be expected may be the development of significant breeding populations. There is little nesting of these species now (Toland, B.). There was significant breeding population in the Paradise Run and Lower Kissimmee River area in the 1950's but the rest of the flood plain was not known to have such colonies. (Kushlan, pers. comm - 1988). Nesting colonies, if established, could produce populations in the range of 1 bird/acre (Soots, R. pers comm., 1991). The estimates are believed to be conservative. The population of 16,000 wading birds for the Level II Backfilling Plan and all other estimates were made by the Jacksonville District. It is the professional judgement of the writers of this report that these estimates may be low if significant breeding populations develop, but capping the restoration estimate at historic numbers seems prudent.

ATTACHMENT 1

Kissimmee River Restoration:

Fish and Wildlife Resources;

Planning Peer Group;

Participating Biologist:

Carroll, J. (FWS)
Fox, D. (GFC)
Macomber, R. (Consultant-COE)
Miller, S. (GFC)
Toth, L. (SFWMD)

Monitors: (Biologists)

Atmar, G. (COE-SAJ)
Lang., W. (COE-SAJ)

Monitors: (Planners)

Appelbaum, S. (COE-SAJ)
Orth, K. (COE-IWR)
Reed, R. (COE-SAJ)

Contributing:

Brakeage, D. (GFC)
Pierce, G. (Consultant)
Soots, R. (COE-WLRC)
Toland, B. (GFC)

HEP Team:

See Fish and Wildlife Service Coordination Report

ANNEX H

SOCIAL IMPACT ASSESSMENT

ANNEX H

SOCIAL IMPACT ASSESSMENT

PURPOSE AND SCOPE

The purpose of this report is to evaluate the potential social impact of the Kissimmee River Basin Restoration Project on four counties which comprise the study area. Social impacts to be assessed are those which would result from displacement of houses/people, businesses and farms. Social factors which were considered include impacts on income, employment, population distribution, fiscal condition, and community cohesion. The data required for assessment of social impacts include the location, type and value of structures, characteristics of affected neighborhoods, and demographic characteristics of affected populations (including age, race, sex, income, etc.). Data sources used for this study included Federal, State and local government publications, consultant's reports, and field surveys.

BACKGROUND INFORMATION

Preliminary estimates indicate that 816 structures located in the Upper and Lower Kissimmee Basins would be displaced by the restoration project. In the Upper Basin counties of Osceola and Polk as many as 434 structures may be affected. In the Lower Basin counties of Highlands and Okeechobee as many as 382 structures may be affected. These preliminary estimates are based on acquisition of all real property within the post-project 5-year flood plain.

During later preconstruction engineering and design, further analyses will be conducted to determine where structural solutions can be implemented. Floodproofing measures, such as ring levees or modifications to site and structure elevations, will be utilized wherever feasible to minimize adverse impacts.

Where relocations cannot be avoided, relocation assistance will be provided to residents and businesses in accordance with the Uniform Relocation Assistance and Real Property Acquisition Act of 1970, as amended. Based on county-wide averages of persons per household, it is estimated that up to 2,000 people could be displaced if flood proofing measures are not implemented. The following paragraphs address direct project impacts on both the Upper and

Lower Basin counties, without any floodproofing measures. Much of the information discussed is shown in tabular form in Tables 1 & 2.

DIRECT PROJECT IMPACTS - UPPER BASIN

Osceola County

A total of 12 residences and 3 acres of residential land may be affected in Osceola County. Those properties are located along the northeast side of Cypress Lake and valued at $104,000 for structures and $18,000 for land. Residential land was assigned to one of three categories for the Upper Basin. Low valued (L) land was evaluated at $6,000 per acre, moderate valued (M) land was evaluated at $10,000 per acre for undeveloped tracts and $55,000 an acre for developed building lots, and high valued (H) land was evaluated at $80,000 per acre. In addition to the residential properties, one commercial property may be affected. For that property, the structure was evaluated at $43,000 and the 1 acre of land it occupies was evaluated at $20,000. Flowage easements would be acquired for 4,716.6 acres of agricultural land and 15.9 acres of transitional land. The total value of those easements was estimated at $4,764,300. See Table 1.

The residences at Cypress Lake are small wood frame structures which are elevated on block piers 3 to 4 feet above ground. Only one of the residences is a year-round dwelling. The remainder are used seasonally and on weekends. The residential structures can be characterized as fishing retreats, located in an area which, until recent years, had no other development. The commercial structure is the Lake Cypress Fish Camp. A recreational vehicle park is located adjacent to the fish camp.

The direct social impacts of the proposed project in Osceola County would be minimal. Only one year-round residence would have to be relocated. The jobs supported by the fish camp and associated income would be lost to the County; however, those impacts could be avoided if an alternative to acquisition (i.e. floodproofing) were found to be cost effective during detailed design studies.

The total monetary impact of the project on residential, commercial, and agricultural property located in Osceola County is estimated at $122,000, $63,000, and $4,716,600 respectively, for a total of $4,949,300. The total just value of real property in Osceola County in 1990 was estimated at more than $4.9 billion. The taxable value of real property classified as single family residential, commercial and agricultural was estimated at $1,024.0 million, $1,037.4 million; and $136.1 million, respectively. The properties affected by

the project constitute less than 0.6 percent of the total value of any single land use classification and less than 0.2 percent of the total taxable value of real property for the county. For this reason, impacts on the real property tax base of Osceola County are not considered significant. See Table 3.

Polk County

A total of 419 residences and 259.0 acres of residential land may be affected in Polk County. Based on the county-wide average of 2.6 persons per household in 1990, it is estimated that up to 1,089 people may be displaced by the project in Polk County. In addition to the residential properties, two commercial properties with two acres of land would be taken. Flowage easements would be acquired for 10,828.0 acres of agricultural land, 396.5 acres of residential, 25.1 acres of transitional, and 0.6 acre of commercial land. The total value of those easements was estimated at 13,930,350. The cost of modifying the septic systems of 100 residences (estimated at $5,000 for each) in the Lake Kissimmee/Grape Hammock area is included in the cost of easements.

At Lake Hatchineha, 264 residences and 60.8 acres located in Hatchineha Estates are valued at $10,014,000 for structures and $3,293,900 for land. Residential land was categorized at the low (L), moderate (M), and high (H) values using the same values per acre stated for Osceola County. Hatchineha Estates is a neighborhood of single family detached homes located along a network of canals which provide access to Lake Hatchineha. Approximately one-half of the homes are stick built, and the other one-half are mobile and manufactured homes, many of which are second homes, which are generally used seasonally and on weekends. Virtually all of the homes are located along one of the canals and have their own boat docks. Evacuation/relocation would have a major adverse impact on Hatchineha Estates.

Six residences and 88.4 acres located in the Tiger Lake Estates on the eastern side of Tiger Lake are valued at $228,000 for structures and $530,500 for land. Tiger Lake Estates is a small residential community consisting of approximately 10-20 single family, stick built dwellings. The homes along the shoreline of Tiger Lake have boat docks. Those are the homes which would be taken for the proposed project. Evacuation/ relocation would have an adverse impact on Tiger Lake Estates.

Also located at Tiger Lake is Camp Tiger, a youth camp owned by the Lions Club. One commercial structure at Camp Tiger valued at $42,600 for the structure and $20,000 for 1.0 acre of land may be affected. Flowage easements would be acquired for 111.0 acres of agricultural land, 25.1 acres for transitional

land, and 46.1 acres for residential land valued at $111,000, $75,300 and $276,600, respectively.

At Tiote Estates located on the west side of Lake Rosalie, 28 residences/40.3 acres and 1 commercial structure/1.0 acre may be affected. The residential properties are valued at $1,150,000 for structures and $403,000 for land. Tiote Estates is neighborhood of approximately 50-100 single family detached homes. The homes are all stick built construction and are generally occupied year-round as their owners' primary residences. Virtually all of the waterfront homes have boat docks, and many have other improvements. Evacuation/relocation would have an adverse impact on Tiote Estates. The commercial property is valued at $220,115 for the structure and $20,000 for land. Flowage easements would be acquired for 552 acres for agricultural, 181.4 acres for residential valued at the low (L) level, and 13.9 acres for residential valued at the moderate (M) level. Total values for these easements are estimated at $552,150, $1,088,400 and $139,000.

There are 14 residential structures located in the Lake Kissimmee/Grape Hammock area which may be affected. These structures are valued at $370,500. The 32.09 acres of land to be acquired in the same residential area are valued at $192,600. Flowage easements would be acquired for 7,589.9 acres of agricultural land valued at $7,589,900, 124.8 acres of low (L) valued residential land at $748,500, 27.6 acres of medium (m) value residential land at $500,000, 2.7 acres of high (H) valued residential land at $218,400, and 0.6 acre of commercial land at $56,000.

Chandley Point located southwest of Kissimmee City has 57 residential structures and 9.8 acres of land that may be affected. The structures are valued at $2,986,000 and the land is valued at $784,800.

In and around Shady Oak Ranch and the Rocks Fish Camp, 50 residences and 27.6 acres of residential land may be affected valued at $1,050,000 and $1,515,300, respectively. The residential development at the fish camp consists of mobile homes on pads and manufactured housing. The development can be characterized as high density residential. Many of the homes are second homes occupied seasonally and on weekends. Evacuation/relocation would have a major adverse impact on the fish camp.

The total monetary impact of the project on residential, commercial, and agricultural and transitional property located in Polk County is estimated at $25,488,400, $358,715, $10,829,500, and $123,000 respectively, for a total of $36,751,465. The total just value of real property in Polk County in 1990 was estimated at more than $11.2 billion. Taxable value of real property classified as single family residential, commercial and agricultural was estimated at

$2,677.0 million, $1,563.5 million, and 488.7 million, respectively. The value of real property classified as residential affected by the project is nearly 1.0 percent of the total value of single family residential property. The properties affected by the project constitute 2.2 percent of the total value of agricultural and 0.02 percent of commercial land use classifications, respectively. Less than 0.5 percent of the total taxable value of real property for the county would be affected by the project. For this reason, impacts on the real property tax base of Polk County are not considered significant. See Table 3.

DIRECT PROJECT IMPACTS - LOWER BASIN

A total of 356 residences (some of which are identified as miscellaneous structures in Table 2) and 820.4 acres of residential land may be affected in the Lower River Basin. Based on the county-wide averages of persons per household in 1990, preliminary estimates indicate that up to 864 people may be displaced by the project in the lower basin. In addition to the residential properties, up to 38,654.9 acres agricultural land may be purchased and 9,286.6 acres of agricultural easements acquired. See Table 5. Residential land in the Lower Basin was assigned to two categories, High (H) and low (L). High (H) valued was evaluated at $80,000 per acre and Low (L) valued was evaluated at $20,000 per acre. No commercial would be taken in the Lower Basin. The agricultural land that may be purchased in the Lower Basin is valued at $38,654,900 and the easements that may be acquired in the Lower Basin are valued at $1,058,300.

Highlands County

A total of 121 residences and 61.7 acres of residential land may be affected in Highlands County. Based on the county-wide average of 2.3 persons per household in 1990, it is estimated that up to 278 people may be displaced by the project in Highlands County. The residential structures and land have an estimated value of $6,451,000. Residential communities which may be affected include Hidden Acres Estates, Kissimmee River Shores, Kissimmee River Fish Camp and River Wood.

In Hidden Acres Estates, 62 residential structures and 25.5 acres of residential land value at $1,301,000 and $2,040,000, respectively, may be affected. Hidden Acres Estates is a community of approximately 120 homes. The community is structured as a privately held corporation in which the residents are share holders. The community is not fully developed, and the ultimate number of residences is projected at approximately 200. The community can be characterized as high density single family development. The residences are manufactured housing and mobile homes on pads. Nearly

all of the mobile homes have structural additions and improvements, such as additional rooms, Florida rooms, and carports.

Approximately one half of the homes are primary residences, occupied year-round. The remainder are used seasonally and on weekends. The single commercial structure at Hidden Acres is a general store which serves both residents and boaters on the Kissimmee River. Other infrastructure owned by Hidden Acres estates includes a marina with approximately 80 slips, dry storage area for boats and trailers, a community swimming pool, a water pumping station, sanitary sewers and a waste water treatment plant.

The permanent residents of Hidden Acres Estates are primarily retirees who have settled there because of the unique combination of amenities offered by the community. Hidden Acres is located on an oak hammock, and the homes are nestled beneath large oak trees. Wildlife in the area is abundant, as are opportunities for water-based recreation. The high density single family nature of the development allows easy access on foot or by golf cart to all areas.

Evacuation/relocation would have a major adverse impact on the community of Hidden Acres. In addition to the 61 of the approximately 120 existing residences which would be taken, the fixed costs of the community's infrastructure would be shared by a much reduced base of remaining households. Those residents with fixed incomes (i.e. retirees) would be hard-pressed to bear the additional costs. Even if Hidden Acres were able to survive these financial hardships, the social fabric of the community would be significantly altered.

Fourteen residential structures valued at $510;000 and 12.0 acres of land valued at $240,000 may be affected in the developed area located in River Wood. River Wood is a small residential community of approximately 10-20 single family detached homes. The homes are primarily stick built, although a few manufactured homes are also present in the area. The community can be characterized as a low density residential development, as the homes are located on large lots and are, generally, widely separated. The homes are primary residences, occupied year-round. Like Hidden Acres Estates, River Woods is located in an upland area with many large old oak trees. Evacuation/ relocation would have a major adverse impact on River Woods.

In the Kissimmee River Shores area 17 residential structures and 7.6 acres of residential land valued at $424,000 and $608,000, respectively, may be affected. Kissimmee River Shores is residential community of primarily mobile homes on pads and manufactured housing, although a few stick built homes are also present. The community is located on an oak hammock adjacent to a basin which provides water access to the Kissimmee River. The basin is surrounded

by docks and boat slips owned by the residents. Like Hidden Acres, Kissimmee River Shores residents include a mix of retirees and seasonal residents. Evacuation/relocation would have an adverse impact on Kissimmee River Shores.

A fish camp located near the Kissimmee River Shores area includes 28 residential structures valued at $533,000 and 7.4 acres of land categorized as high (H) valued at $592,000 and 9.2 acres of residential land categorized as low (L) valued at $183,000 which may be affected. The residential development at the fish camp consists of mobile homes on pads and manufactured housing. The development can be characterized as high density residential. The total number of homes at the fish camp is approximately 150 to 200. The majority of homes are located on an oak hammock; however, the 28 which may be affected are located on lower ground between the river and the oak hammock. Many of the homes are second homes occupied seasonally and on weekends. Evacuation/ relocation would have an adverse impact on the fish camp.

In addition to the properties discussed previously, there are 59 miscellaneous structures valued at $1,793,000 which would be taken. Those structures consist primarily of storage and other structures associated with the residences which may be affected.

Okeechobee County

A total of 202 residences and 668 acres may be affected in Okeechobee County. Based on the county-wide average of 2.9 persons per household in 1990, it is estimated that up to 586 people may be displaced by the project in Okeechobee County. The residential structures and residential lands are valued at $18,515,000.

The area of River Acres has 91 residential structures valued at $2,023,000 and 135 acres of residential land valued at $2,700,000 which may be affected. River Acres is a community of single family detached homes. Approximately one-half of the homes are stick built, and the other half are mobile homes and manufactured housing. As at Hidden Acres, the permanent residents of River Acres are primarily retirees.

River Acres is unique among the study area neighborhoods, because it is centered around a grass airstrip. Many of the homes backyards are adjacent to the airstrip, and some residents have airplane hangars in their backyards. The airstrip is approximately 1/4 to 1/2 mile in length and is used by light airplanes and ultra-lights. Approximately 10-12 of the permanent residents have light airplanes. Seasonal and weekend residents are able to fly directly to their second homes. Many of the homes which are not adjacent to the

airstrip are waterfront properties, with docks and boat slips. The residents of River Acres were attracted by the unique combination of easy access by air and proximity to the water. The proposed project may require acquisition of all 91 of the residences at River Acres. Evacuation/relocation would have a major adverse impact on the River Acres community.

River Bluffs, south of the Yates Marsh has 61 structures and 381.6 acres of residential land valued at $1,576,000 and $7,633,000, respectively, which may be taken. affected. The community can be characterized as a low density single family residential development. The homes at River Bluffs are primarily stick built, although a few manufactured homes are also present. Virtually all of the homes are all primary residences and are occupied year round. Many of the residents are families with minor children residing in the home. Evacuation/relocation would have a major adverse impact on the River Bluffs community.

West of the City of Okeechobee, north of Route 70, there are 33 residential structures and 9.0 acres of land valued at $586,000 and $716,000 which would be taken. Those residences are mostly mobile homes on pads and manufactured housing. The neighborhood can be characterized as high density residential. Residents include a mix of retirees and seasonal residents. Evacuation/relocation would have an adverse impact on the community.

North of Yates Marsh, at Platt's Bluff, 11 residential structures may be affected and 142.4 acres of residential land. Those properties are valued at $434,000 and $2,847,000, respectively. The development in that area can be characterized as low density single family residential. The 13 structures which may be affected are all of the homes at Platt's Bluff. The area is largely undeveloped and the homes are situated on lots of more than 1 acre each. The homes are primary residences which are ordinarily occupied year-round. There are also 6 miscellaneous structures valued at $168,000 which would be taken. Evacuation/relocation would have a major adverse impact on small residential community at Platt's Bluff.

The total monetary impact of the project in the Lower River Basin is estimated at $28,642,000 for residential, and $39,713,200 agricultural. The total just value of real property in the Lower Basin in 1990 was $3.7 billion. The taxable value of real property classified as single family residential, commercial and agricultural was $755.08 million, $355.5 million, and $310.2 million, respectively. The properties affected by the project constitute 3.8 percent of the total value of property in the single family residential land use classification and 12.8 percent of the value of agricultural real property in the Lower Basin counties. The total value of affected property in the Lower Basin, $68.6 million, comprises 3.1 percent of the total taxable value of real property for the

two Lower Basin counties. This reduction of the property tax base would have a small but potentially significant impact on the fiscal condition of those counties.

TABLE 1

UPPER RIVER BASIN

COUNTY	AREA	# OF STRUCTURES	VALUE OF STRUCTURES	LAND AREA (IN ACRES)	VALUE OF LAND/ EASEMENTS	TOTAL VALUE STRUCTURES AND LAND	HIGH MODERATE, AND LOW VALUES PER STRUCTURES
OSCEOLA	LAKE CYPRESS						
	Northeast side of Cypress Lake	12 Res. 1 Comm.	104,000 43,000	3.0 1.0	18,000 20,000	122,000 63,000	(L) (H)
	EASEMENTS						
	Agriculture	N/A	N/A	4403.6	4,403,600	4,403,600	
	EASEMENTS (LAKE JACKSON)						
	Agriculture	N/A	N/A	313.0	313,000	313,000	
	Transitional	N/A	N/A	15.9	47,700	47,700	
	TOTAL COUNTY	13	147,000	4736.5	4,802,300	4,949,300	
POLK	LAKE HATCHINEHA						
	Hatchineha Estates	264 Res.	10,014,000	60.8	3,293,900	13,307,900	(M)
	EASEMENTS						
	Agriculture	N/A	N/A	2,576.0	2,576,000	2,576,000	
	TIGER LAKE						
	Tiger Lake Estates and Camp Tiger	6 Res. 1 Comm.	228,000 42,600	88.4 1.0	530,600 20,000	758,000 62,600	(L)
	EASEMENTS						
	Agriculture	N/A	N/A	111.0	111,000	111,000	(L)
	Transitional	N/A	N/A	25.1	75,300	75,300	
	Residential	N/A	N/A	46.1	276,600	276,000	

TABLE 1 CONTINUED

UPPER RIVER BASIN

COUNTY	AREA	# OF STRUCTURES	VALUE OF STRUCTURES	LAND AREA (IN ACRES)	VALUE OF LAND/ EASEMENTS	TOTAL VALUE STRUCTURES AND LAND	HIGH MODERATE, AND LOW VALUES PER STRUCTURES
POLK	LAKE ROSALIE						
	Tiote Estates & Lake Rosalie	28 Res. 1 Comm.	1,150,000 220,115	40.3 1.0	403,000 20,000	1,553,000 240,115	(M)
	EASEMENTS						
	Agriculture	N/A	N/A	552.0	552,150	552,150	
	Residential (L)	N/A	N/A	181.4	1,088,400	1,088,400	(L)
	Residential (M)	N/A	N/A	13.9	139,000	139,000	(M)
	LAKE KISSIMMEE						
	Lake Kissimmee/ Grape Hammock	14 Res.	370,500	32.09	192,600	563,100	(M)
	EASEMENTS						
	Agriculture	N/A	N/A	7,589.9	7,589,900	7,589,900	
	Residential (L)	N/A	N/A	124.8	748,500	748,500	(L)
	Residential (M)	N/A	N/A	27.6	500,000	500,000	(M)
	Residential (H)	N/A	N/A	2.7	218,400	218,400	(H)
	Commercial (M)	N/A	N/A	.6	56,000	56,000	(M)
	Chandley Point SW of Kissimmee	57 Res.	2,986,000	9.8	784,800	3,770,800	
	Shady Oak Ranch & Rock Fish Camp	50 Res.	1,050,000	27.6	1,515,300	2,565,300	
	TOTAL COUNTY	421	16,061,215	11,512.0	20,691,450	36,751,465	
	GRAND TOTAL	434	16,208,215	16,248.59	25,493,750	41,700,765	

TABLE 2

LOWER RIVER BASIN

COUNTY	AREA	# OF STRUCTURES	VALUE OF STRUCTURES	LAND AREA (IN ACRES)	VALUE OF LAND	TOTAL VALUE STRUCTURES & LAND	HIGH, MODERATE, & LOW VALUES PER STRUCTURES
HIGHLANDS	(LOWER BASIN)						
	River Wood	14	510,000	12.0	240,000	750,000	(L) 20,000 per acre
	Kissimmee River Shores	17	424,000	7.6	608,000	1,032,000	(H) 80,000 per acre
	Kissimmee River Fish Camp	28	553,000	7.4 9.2	592,000 183,000	1,145,000 183,000	(H) 80,000 per acre (L) 20,000 per acre
	Hidden Acres Estates	62	1,301,000	25.5	2,040,000	3,341,000	(H) 80,000 per acre
	Miscellaneous Structures	59	1,793,000	N/A	N/A	1,793,000	N/A
OKEECHOBEE	River Acres	91	2,023,000	135.0	2,700,000	4,723,000	(L) 20,000 per acre
	River Bluffs (S. Yates Marsh)	61	1,576,000	381.6	7,633,000	9,209,000	(L) 20,000 per acre
	Miscellaneous Structures	6	168,000	N/A	N/A	168,000	
	W/ of City of Okeechobee, N. of Route 70	33	586,000	9.0	716,000	1,302,000	(H) 80,000 per acre
	N. Yates Marsh	11	434,000	142.4	2,847,000	3,281,000	(L) 20,000 per acre
	Other Lower Basin Unidentified by County	0	0	90.7	1,715,000	1,715,000	N/A
TOTALS		382	9,368,000	820.4	19,274,000	28,642,000	

TABLE 3

REAL PROPERTY VALUES
TAXABLE VALUES AND JUST VALUES
UPPER BASIN COUNTIES

(in millions of dollars)

COUNTY NAME	TYPE STRUCTURE	JUST VALUE	TAXABLE VALUE
OSCEOLA	Single Family	1,442.6	1,024.0
	Mobile Homes	111.4	53.9
	Other Residential	628.3	610.1
	Sub-total residential	2,182.3	1,688.0
	Agricultural	805.5	136.1
	Commercial	1,040.2	1,037.4
	Other Structures	942.5	685.2
	TOTALS	4,970.5	3,546.7
POLK	Single Family	4,312.5	2,677.0
	Mobile Homes	455.4	213.3
	Other Residential	709.4	933.9
	Sub-total residential	5,477.3	3,824.2
	Agricultural	911.1	488.7
	Commercial	1,570.2	1,563.5
	Other Structures	3,259.3	1,631.5
	TOTALS	11,217.9	7,507.8

TABLE 4

REAL PROPERTY VALUES
TAXABLE VALUES AND JUST VALUES
LOWER BASIN COUNTIES

(in millions of dollars)

COUNTY NAME	TYPE STRUCTURE	JUST VALUE	TAXABLE VALUE
HIGH-LANDS	Single Family	970.6	609.6
	Mobile Homes	101.3	48.1
	Other Residential	356.0	339.1
	Sub-total residential	1,427.8	997.1
	Agricultural	388.7	185.9
	Commercial	269.4	267.3
	Other	451.9	135.3
	TOTALS	2,537.8	1,585.6
OKEE-CHOBEE	Single Family	225.9	145.4
	Mobile Homes	149.8	98.6
	Other Residential	106.1	104.7
	Sub-total residential	481.8	348.7
	Agricultural	435.9	124.3
	Commercial	88.9	88.2
	Other	143.6	59.2
	TOTALS	1,150.2	620.5

TABLE 5

SUMMARY OF AGRICULTURAL LAND PURCHASES AND EASEMENTS BY CONSTRUCTION SEGMENT LOWER BASIN

LAND PURCHASES

AREA	AREA IN ACRES	COST PER ACRE	TOTAL COST ($1,000s)
Pools A, B, C	19,807.2	1,000.0	19,807.2
Pool D	8,842.9	1,000.0	8,842.9
Pool E	10,004.8	1,000.0	10,004.8
TOTAL	38,654.9		38,654.9

EASEMENTS

AREA	TYPE OF EASEMENT	AREA IN ACRES	COST PER ACRE	TOTAL COST ($1,000s)
Pools A, B, C	FLOWAGE	4,240.6	100.0	421.1
	LEVEE	22.3	1,000.0	22.3
	CHANNEL	12.4	1,000.0	12.4
SUBTOTAL		4,275.3		458.8
Pool D	FLOWAGE	2,298.8	100.0	229.9
	LEVEE	47.6	1,000.0	47.6
	CHANNEL	30.0	1,000.0	30.0
SUBTOTAL		2,376.4		307.5
Pool E	FLOWAGE	2,603.2	100.0	260.3
	LEVEE	19.4	1,000.0	19.4
	CHANNEL	12.3	1,000.0	12.3
SUBTOTAL		2,634.9		292.0
TOTAL		9,286.6		1,058.3

IMPACTS ON SOCIAL WELL-BEING

Introduction

In addition to the direct project impacts discussed previously, the project would have impacts on the social well-being of the people who live in the study area. One of the problems with social well-being is that it is an inherently subjective concept. Well-being is as much a feeling one has about one's life as an objective state. Among other things, well-being is defined in relationship to expectations of the conditions that should prevail in one's life. One of the primary indicators of social well-being is the perceptions of individuals who reside in the study area.

Perceptions of Community and Social Well-being

Although residents' perceptions do not always correspond exactly with objective changes, perceptions can have a powerful influence on individual and social action. If people perceive that they do not have access to resources, they are as closed off from resources as if a formal system blocked their availability. The behaviors and attitudes resulting from perceptions can thus produce very real social impacts. In addition, given the inherently individualized nature of perceptions, measurement of residents' perceptions of well-being prior to the proposed action is an essential element in determining and evaluating changes in social well-being that might be caused if the action were taken. In order to determine perceptions and attitudes toward the proposed project and to identify impacts on social well-being, a survey questionnaire was developed and distributed to 450 study area residents. The survey procedures are discussed below.

Survey Procedures

The questionnaire was developed from the U.S. Army Corps of Engineers' (Corps) publication titled *Approved Questionnaire Items for Collection of Planning Data*. The questions used were developed specifically for social impact assessment. Approximately 400 questionnaires were distributed to residents who attended a series of workshops held throughout the Kissimmee River basin during the week of 28 October, 1991. Of the 400 forms distributed, 154, or 38.5 percent were completed and returned.

The workshops were designed specifically to solicit the views of residents of the study area. Homeowners associations for the communities affected by the proposed project and study area residents who had previously attended public meetings were contacted prior to the workshops and provided assistance in notifying other residents. In order to assure confidentiality, names were not

associated with the questionnaires. A postage paid return mail envelope was provided with each questionnaire.

The questionnaires are divided into four parts. Part 1 asked respondents opinions first regarding national priorities and second regarding priorities specifically related to impacts of the proposed project. Part 2 asked respondents opinions regarding alternative methods of reducing susceptibility to flood damages, including floodproofing, construction of flood walls or levees, and relocation outside of the flood plain. Part 3 asked respondents to provide basic descriptive information about themselves, including age, education, employment and membership in organizations or groups. Part 4 asked respondents opinions about the public participation process and how well they are being kept informed about the study.

ANALYSIS OF DATA

Description and Interpretation

In part 1 of the survey, residents were presented with a list of 14 problems or programs of national scope and asked if too much, to little, or about the right amount of money was being spent on each. An index based on the survey responses was used to rank the priority given to each problem or program. An index number greater than 2 indicates a perception that too little money is being spent, an index of 2 indicates that spending is about right, and an index of less than 2 indicates that too much money is being spent. The highest possible index is 3 and the lowest possible index is 1. The indexes and ranks are shown in table 6.

TABLE 6

RANKING OF NATIONAL SCOPE PROBLEMS/PROGRAMS

Subject	Rank	Index
Improving and Protecting the Nation's Health	1	2.78
Improving the Nation's Education System	2	2.74
Halting the Rising Crime Rate	3	2.64
Dealing With Drug Addiction	4	2.34
Solving the Problems of Rural Areas	5	2.32
Solving the Problems of the Big Cities	6	2.16
Support for Agriculture	7	2.10
Reducing Flood Damages	8	1.89
Improving and Protecting the Environment	9	1.86
The Military, Armaments and Defense	10	1.77
Improving the Conditions of Minorities	11	1.76
Welfare	12	1.56
Space Exploration Program	13	1.60
Foreign Aid	14	1.07

The table indicates that study area residents do not assign a high priority to environmental improvement and protection, the purpose of the proposed project. They are most concerned with health issues, which is probably due to the relatively high average age (58.6 years) of the sample population. The relatively low ranking assigned to environmental issues indicates conflict between the study area residents desires and the goals of the proposed project.

The conflict between the desires of study area residents and the goals of the proposed project is even more apparent in the responses to the remaining questions included in Part 1. Residents were presented with three statements about the affects of the recommended plan and the no-action plan. Each statement discussed some of the good or bad consequences of a particular course of action. Residents were asked to indicate whether they agreed or not with each statement. The survey questions and results are shown below.

Statement: The recommended plan for restoration of the river would increase flood damages downstream. This would require government acquisition of up to 354 homes and 67,843 acres of land in the river basin for mitigation of increased flood damages. Do you agree the that the river should be restored, even if it requires government land acquisition?

Response: (percent)	Strongly Agree	Agree	Slightly Agree	Disagree	Strongly Disagree
	5.8	6.5	5.2	7.1	73.4

Statement: The no action plan would maintain the current level of flood protection without requiring land acquisitions. However, no improvements to fish and wildlife habitats would occur and degradation of the environment would continue. Would you agree that no action should be taken to restore the river, even if it means continued degradation of the environment?

Response: (percent)	Strongly Agree	Agree	Slightly Agree	Disagree	Strongly Disagree
	46.8	16.2	9.7	11.0	15.6

Statement: Biologists say the recommended plan would return the restored portion of the Kissimmee River ecosystem to conditions similar to those of the 1930's. The proposed project would recreate favorable conditions for increases in wetland vegetation, native aquatic life and wetland wildlife; and also benefit the recovery of three endangered species: bald eagles, snail kites and wood storks. The project would have a minor, but negative effect on employment,

tax values and property values in the local economy. Would you agree to trying to restore the environment, even if it has a negative effect on the local economy?

Response: (percent)	Strongly Agree	Agree	Slightly Agree	Disagree	Strongly Disagree
	6.5	7.2	9.1	12.3	63.6

The responses to the first statement indicate that a large majority of residents (nearly three to one) strongly disagree with land acquisition as the preferred method of mitigation for increased flood susceptibility. The responses to the second question indicate even more clearly the conflict between the values of the study area residents and the goals of the proposed project. Residents agreed by a more than two to one margin that continued environmental degradation would be preferable to the proposed plan. The responses to the third statement again reiterate the low priority placed by study area residents on environmental restoration, by a margin of three to one residents indicated that the environmental benefits resulting from the project would be out-weighed by even a minor negative impact on the local economy. Clearly, the responses of the study area residents indicate that they do not support the ends (environmental restoration) or the means (land acquisitions) of the proposed project.

Part 2 of the survey asked the residents opinions on some of the alternative measures for mitigation of increased flood susceptibility caused by the proposed project. The questions focused on possible effects of levee construction, floodproofing, and flood plain evacuation. The questions and responses are summarized below:

If a new levee or flood wall were built near your home, what major concerns would you have? (Check all that would apply.)

Item of Concern	Rank	Percent Checked
Impact on property value	1	83.8
Safety during floods	2	70.8
Type of construction (concrete flood wall or earthen levee)	3 (tie)	60.4
It's distance from the home	3 (tie)	60.4
It's appearance	5	59.7
Impact on activities around the home	6	57.1
It's visibility from the home	7	49.4
Other	8	22.7

If your home had to be floodproofed (for example, if it were elevated), what would be your greatest concerns? (Check all that would apply.)

Item of Concern	Rank	Percent Checked
Change in market value	1	69.5
Appearance of the home	2	55.2
Disruption during construction work	3	48.7
Change in use of the home	4	44.2
Other	5	27.3

If your home had to be removed because of the Kissimmee River Restoration project, what would be your biggest concerns? (Check all that would apply.)

Item of Concern	Rank	Percent Checked
Getting a fair price for your property and moving expenses	1	95.5
High cost of financing a new home	2	72.1
Finding a good neighborhood to move to	3	63.6
Locating a suitable house or apartment to live in	4	45.5
Other	5	36.4
Maintaining old friendships after moving	6	33.8
Finding schools for your family	7	15.6

If your home had to be removed because of the Kissimmee River Restoration project, where would you prefer to live instead?
(Check all that would apply.)

Item of Concern	Rank	Percent Checked
Other (none of the above, don't want to move)	1	26.6
Other (out of the state)	2	16.9
Sebring	3	16.2
Lake Placid	4	14.2
Other (Okeechobee)	5	13.0
Other (in state, out of study area)	6	9.7
No response	7	8.4
Lorida	8	7.1
Lakeport	9	6.5
(all others less than 5 percent each)		

The responses to the first three questions indicate that financial concerns are of primary interest to the study area residents, in decisions regarding alternative measures for flood protection. Their first concern regarding construction of levees or flood walls was the impact on property values. Their first concern regarding floodproofing was any change in market values of their property. Their first concern regarding relocations was getting a fair price for their property and moving expenses.

Responses to the question on preferences for different areas, if relocated, indicate strong opposition to relocation by the study area residents. Although the intent of the question was to determine whether residents would prefer to remain within the study area, if relocated; the largest number of responses did not check any location and instead expressed opposition to the concept of relocation in general. Of those who did express a relocation preference, 36.2 percent checked other and indicated a location out of the state or the study area. The high percentage of other responses (nearly 50 percent of respondents checked other) indicates strong opposition to the concept of relocation by study area residents. The responses also indicate that a sizable percentage of residents would leave the study area if relocated, which would result in losses in population and income for the study area counties.

Part 3 of the survey asked residents to provide basic information about themselves. Questions regarding location of residence, age, education, employment status, etc. provide insight into the demographic makeup of the residents responding to the survey. Those responses are summarized in the following paragraphs.

The first question asked which community respondents resided in. The majority of respondents (85.7 percent) reside in the lower basin counties of Highlands and Okeechobee. The two communities with the greatest response to the survey were Hidden Acres Estates, located in Highlands County and River Acres, located in Okeechobee County. The composition of the survey respondents by area is shown in table 7.

TABLE 7

SURVEY RESPONSE BY COMMUNITY OF RESIDENCE

	Number of Responses	Percent of Total
Osceola County		
Kissimmee	1	0.6
County Total	1	0.6
Polk County		
Hatchineha Estates	3	1.9
Lake Kissimmee/Grape Hammock	2	1.3
Rock Fish Camp	2	1.3
Tiger Lake Estates	1	0.6
Lake Rosalie/Tiote Estates	1	0.6
Chandley Point	1	0.6
Lake Wales	1	0.6
Haines City	1	0.6
County Total	12	7.8
Highlands County		
Hidden Acres Estates	35	22.7
River Wood	7	4.5
Avon Park	7	4.5
Kissimmee River Shores	5	3.2
Kissimmee River Fish Camp	3	1.9
Tut'n'Lue Fish Camp	2	1.3
County Total	59	38.3
Okeechobee County		
River Acres	48	31.2
Platt's Bluff	11	7.1
Basinger	6	3.9
Okeechobee	5	3.2
River Bluff	3	1.9
County Total	73	47.4
Other and No Response	9	5.8
TOTAL - ALL RESPONSES	154	100.0

Respondents were also asked how long they had lived at their current address. The results were that 32.5 percent lived at their current address for 5 years or less, 28.6 percent for 5 to 10 years, 23.4 percent for 10 to 20 years and 11.0 percent for more than 20 years, while 4.5 percent did not respond to the question. The average length of residence was 11.7 years, the median was 7 years. These results suggest that a large number of those who would be affected by the proposed project are long-time residents.

Other questions focused on the education, age and employment status of the respondents. Respondents averaged 12 years of formal education (completion of high school) and 12 years was also the median value and the mode. The average age of respondents was 58.6 years, the median was 61 and the mode was 66. 48.1 percent of respondents were retired, 41.6 percent were employed for pay or self-employed, 5.8 percent were disabled, 1.9 percent were temporarily unemployed and 2.5 percent checked other or did not respond. 62.6 percent of those responding were males and 37.2 percent were females.

The final part of the survey, Part 4, focused on how well people were being informed about the proposed project. In general, respondents felt that they were being well informed about the project. Asked whether they were receiving enough information about the Corps study of Kissimmee River Restoration to satisfy their interest, 95.5 percent responded affirmatively. Asked how actively they were involved with the Kissimmee River Restoration Project Studies, 92.2 percent indicated that they had read news articles, 85.1 percent had attended meetings, 85.1 percent had discussed the project with family or friends, 64.9 percent had written letters, and 61.7 percent had talked with officials; however, only 24.0 percent said that they were on the mailing list for the study. Asked how they would like to kept informed about the study, 72.7 percent indicated public meetings, 72.1 percent indicated newspaper articles and 59.1 percent indicated radio and television.

SUMMARY AND CONCLUSIONS

Without implementation of flood proofing measures, the proposed project may require the relocation of up to 431 homes and 1,100 people in the upper basin and up to 356 homes and 900 people in the lower basin. Based on the results of the social impact survey, many of the residents who may be affected by the project are older, retired people who have no desire to relocate. The residents strongly oppose the project's goal of environmental restoration, and particularly oppose flood plain evacuation/relocation. The proposed project would have a major adverse impact on the communities located along the Kissimmee River and the upper basin lakes. Many of the residents would move out of the study area, if relocated, resulting in adverse indirect impacts on the

regional economy. Adverse impacts on the property tax bases of the study area counties would be small, in percentage terms, but potentially significant in the lower basin counties of Highlands and Okeechobee.

Therefore, implementation of flood proofing measures consistent with the restoration project should be the primary consideration when addressing possible impacts to residents and lands.

ANNEX I

AGRICULTURAL IMPACT ASSESSMENT

ANNEX I

AGRICULTURAL IMPACT ASSESSMENT

GENERAL

The objective of the Kissimmee River Restoration Plan is to restore the area's ecological balance and specifically to increase the quantity and quality of wetlands in the area. With the ecosystem restoration, environmental benefits which include increases in the quantity and quality of desired wildlife, cleaner waters and enhanced aesthetic enjoyment are expected to occur. Such gains in environmental benefits will produce economic and financial impacts which will affect the agricultural community. It is the financial impacts that are to be estimated here. The general measure of these impacts are the losses in net returns to land, owned and borrowed capital, and management. Specifically, the evaluation includes primary financial impacts on cattle and dairy businesses that would occur as a result of implementing the Restoration plan in the local area.

LOCATION AND DESCRIPTION

The 785-square-mile Lower Kissimmee River Basin includes the area tributary to the Kissimmee River between the outlet from Lake Kissimmee and Lake Okeechobee. Most of the area in the Lower Basin consists of low relief, poorly drained sands. The watershed is crisscrossed by numerous natural sloughs and lesser man-made channels that drain either directly or indirectly to oxbows of the original Kissimmee River. There are large areas devoted to improved and unimproved pasture in the Lower Basin, and about 13 percent of the watershed north of S65-E is wetland. Most of the area is grassy prairie with scattered palmetto growths. The Avon Park Air Force Bombing Range is in the Lower Basin east of Arbuckle Creek running east to the Kissimmee River. The bombing range, which occupies 107,057 acres, provides an area for training aircrews in bombing, strafing, and electronic warfare. Much of the land has been maintained in a natural state, and large areas of marsh are located throughout the area.

EXPECTED IMPACTS

The purpose of the recommended plan formulation for restoration is to produce the best wetlands possible for fish and wildlife and water quality

purposes. The resulting water flow regime is expected to be incompatible with existing rangeland management practices for cattle and dairy businesses within the 5-year flood plain. Since productivity of the land will be reduced or lost, the land associated with the restoration will be purchased. In addition, flowage easements will be acquired on all lands located between the 5 year and 100 year with project flood plain. In theory, actual negotiated purchase prices and easements should compensate agricultural businesses for all losses from their specific business operation. The purpose of this section is to identify and quantify to the best extent possible the costs to agricultural businesses involved with the Restoration Plan. These costs include the following:

* Direct losses of net returns associated with the removal of agricultural activity within the 5 year flood plain.

* Increased flood damage susceptibility expected with the Restoration Plan in the area between the 5 year and 100 year flood plain.

* Potential losses in economies of scale in rangeland management practices due to lands taken out of production.

* Potential losses to dairy operations due to the increased cost of maintaining current water quality restrictions.

* Fencing costs as an additional regulation expense.

The investigation of these impacts has been divided into two separate analyses. The first consists of an analysis of the expected impacts on current cattle ranching in the study area. The second part of the investigation is an analysis of the impacts on the existing dairy cattle operation. The analysis is confined to the Lower Kissimmee River Basin. There are no significant impacts on truck cropping activities and only minimal effects in Pools D and E to citrus production. Information utilized to assess dairy and cattle impacts are by necessity averages for all businesses affected and are not to be interpreted as a representation of any one owner. Impacts are displayed by land use and county where possible to allow some measure of regional impact. The assumptions, methodology utilized, and calculations performed in each of these studies are discussed in the following paragraphs.

ASSUMPTIONS

The assumptions used in the analysis include the following:

* The land within the Restoration Plan 5 year flood plain will be purchased in fee simple. It is expected that lease-back operations will be considered by the South Florida Water Management District (SFWMD) as an option to minimize any adverse effects on beef cattle and dairy operations. There is not a consensus however, that leaseback is an appropriate action in the environmental community. In addition conversations with SFWMD officials have indicated that leaseback agreements tend to be complicated and quite restrictive. This analysis considers the agricultural effects induced by the Restoration plan in the 5 year flood plain assuming no leaseback options will be available and the land will be removed from agricultural use.

* Existing lease back operations of state and federally owned land within the 5 year flood plain of the Restoration Plan will not be renewed with project implementation.

* Flowage easements will be acquired on all agricultural land between the 5 year and 100 year flood plain. The only Federal requirement will be that any structures in the area will be flood proofed at or above the 100 year flood plain. It is assumed that there will be no additional environmental regulations or changes in water quality requirements associated with the easements.

* It is assumed that fencing will be the appropriate rangeland management practice for beef cattle control. If grazing on purchased Water Management Lands is to be prevented, then the 5 year flood plain boundary must also be fenced. Although costs are computed for this item, it is not known whether this cost will be borne by the SFWMD or the landowners. It is expected that this item will be negotiated when the land and easements are actually acquired.

ANALYSIS METHODOLOGY

Loss of net returns to beef cattle ranching with purchase of the 5 year flood plain.

Land Use

Within the year flow regimes are expected to be incompatible with existing rangeland management practices for beef cattle within the 5-year flood plain. Since productivity of the land will be reduced or lost, the land within the

Restoration Plan 5 year flood plain will be purchased in fee simple. The cessation of use of these areas by the agricultural community represents lost income or net returns to the businesses affected. The major pasture types used for the production of beef cattle include improved pasture, unimproved pasture, rangeland, and wetland. In this analysis, rangeland is used interchangeably with unimproved pasture. Of the wetland classifications shown in Table 1, only non-forested wetlands have productive capability to support cattle grazing. Non-forested wetlands generally include sloughs, herbaceous prairies, and other foragable natural grasses.

Cattle Carrying Capacities

Past discussions with representatives of the Soil Conservation Service (SCS) and the Institute of Food and Agricultural Science (IFAS) at the University of Florida in Gainesville, have indicated that the potential carrying capacity of non-forested wetlands is equal to carrying capacities for improved pasture. Actual carrying capacities, however, are dependent upon the supply of beef to be produced as a function of price and the intensity of management practices which precludes over-grazing of wetland areas. The affect of mixed operations on net returns are not known at this time. Estimates by the University are only available for improved pastures and native range.

In this study, it is assumed that non-forested wetlands have approximately the same carrying capacity as improved pasture, but are available for grazing only part of the year. Some forms of wetland vegetation can support from 4 to 5 animal unit months per acre on a yearly basis. The carrying capacity, therefore, can be expressed as slightly more than 1/3 of the carrying capacity of improved pasture on an annual basis.

Net Return Losses

To determine impacts upon cattle operations, the net return used in the evaluation for different types of productive rangeland must be defined. Economic budgeting criteria requires that all financial profit in a business operation be allocated to three basic factors of production. These factors of production are land, capital and management. Net losses incurred to all factors of production is a direct measure of impact to the agricultural businesses. Additional factors which are non-economic such as effects upon the quality of life of owners and personal likes and dislikes are also important determinates to the actual management decisions which will be made with the restoration plan. These decisions however, are beyond the scope of this annex. In the cattle ranching business, losses to capital and management with the Restoration plan are considered minimal. While it is true that cattle operations may have to be downsized with land purchases required by Kissimmee

restoration, it is believed that there are numerous opportunities in the same industry available in the region that will allow cattle operation managers to continue to utilize their talents. No net losses to management, therefore, are claimed. Capital investment for agricultural businesses can be classified into two types of assets; moveable and non-moveable assets. In the cattle industry, the primary type of capital asset is livestock. Since livestock is a moveable asset, losses to capital are assumed to be minimal with the restoration project for the same reason losses to management are minimal. The measure of impact for the cattle operations therefore, are the lost returns to the land.

Commercial Lease Rates

The actual net returns attributable to different types of pasture land will vary depending upon the intensity of use and management. A measure of this residual return after all other costs, including management costs and capital costs have been paid is the commercial leasing rate for such land. Leasing rates represent what cattle operations are willing to pay in a specific region for the use of improved and unimproved pasture. In other words, the lease rate represents the willingness to pay to run cattle on an acre of pasture land consistent with current profitability of cattle operations. If the land is removed from cattle production by purchase of the 5 year flood plain, the estimated annual opportunity cost of removing the land from cattle production and using the land for environmental purposes is reflected in the lease rates per acre.

Lease rates for improved and unimproved pasture in South Florida are estimated to be $19.00 and $7.00 per acre respectively.[1] As discussed above the rate used for non-forested wetland is slightly more than 1/3 of $19.00 or approximately $7.00 per acre. Since non-forested wetlands are used to stockpile forage, it would be expected that the return per acre would be at least equivalent to the return for unimproved pasture.

Wetland Utilization

Although all non-forested wetlands have the potential to be grazed, actual usage is unknown. Potential and actual capacities of pasture land and non-forested wetlands are dependent upon the rangeland management practices in each land holding. Land holdings are not exclusively improved forms of pasture or wetlands, but most often include both in varying quantities. The use of these lands will vary over time since practices are sensitive to price and the cattle cycle. Since the definition of individual rangeland management

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[1]Source: "Citrus Land Values Decline As Florida Farmland Market Weakens", Florida Food and Resource Economics, Institute for Food and Agricultural Sciences (University of Florida) and Florida Cooperative Extension Service; July-August, 1991, Publication 101, Table 2.

practices was beyond the scope of this annex, no attempt was made to determine the actual use of these wetlands. Instead, impacts were computed for two sets of assumptions. The first set assumes all non-forested wetlands are grazed. The second set assumes all non-forested wetlands are not grazed. The actual impact should be within this range.

Annual Losses

Annual losses of net returns to the cattle industry are estimated to be approximately $414,300 assuming all wetlands are grazed and approximately $258,500 assuming no wetlands are grazed. Losses with wetlands should represent the maximum potential losses to cattle businesses with the removal of 5 year flood plain lands from productive service. Since dairies are treated separately in a later section, land loss to dairies was not included in this tabulation. Annual losses of returns are shown by County and land use classification in Table 1.

Loss of net returns to beef cattle ranching between the 5 year and 100 year flood plain.

Introduction

The measure of losses in the 5 to 100 year flood plain is the change in inundation damages (flood damages) with the proposed project. The impacts included in the inundation damage category consist of damages to land use activities caused by increased durations of flooding during flood events. These damages are lost income sustained by the land use activity. The Restoration Plan includes provisions for obtaining easements on all lands between the 5 year and the 100 year with project flood lines. The general effect of the Restoration plan will be to compensate for all additional flood damage susceptibility to the 100 year flood level.

Evaluation Process

The evaluation of increased flood damage susceptibility included an examination of the without and with project flooding effects in the study area. Different magnitude floods were examined for each condition and the duration of water each specific type of land use was exposed to was estimated. Damage to agricultural lands are primarily a function of the duration of flooding, frequency of occurrence within the year, and the particular use. Only the agricultural area between the 5 year and the 100 year flood plain with and without the project was considered. Areas above the 100 year flood plain would not contribute much damage on an annual basis since it would only be affected by very rare events. The area contained within the 5 year flood plain is

assumed not to be grazed and therefore, incurs no increased flood damage susceptibility. The procedure utilized to calculate flood damage included cataloguing the type of land use and estimating the corresponding topographic elevation and duration of flooding for flood events. Damage relationships which relate the duration of flooding to total damage per acre were constructed in the Jacksonville District. These relationships include losses in weight to the calf crop, supplemental feed, cattle mortality and pasture renovation. Induced damages are computed on an average annual basis. Since dairies are treated separately in a later section, flood damages to dairies have not been included in this tabulation.

Increased Flood Damages

Flood damage for the 100 year flood event with and without the Restoration Plan for the agricultural areas between the 5 year and the 100 year flood plain is estimated to be $310,000 and $18,900 respectively. Average annual damages are estimated to $20,300 and $1,240 with and without the Restoration plan. Induced average annual damages are the difference between the with and without project average annual flood damage estimates and are estimated to be $19,060. It is assumed in these calculations that all non-forested wetlands can be grazed. If non-forested wetlands can not be grazed, induced average annual damages are estimated to be $14,500. These values can be interpreted as an additional cost of doing business for agricultural interests in the flood plain.

Anticipated losses to economies of scale to the beef cattle ranching industry

Potential losses to economies of scale due to land purchases, increased flooding costs, and potential increased regulatory costs to cattle ranching operations have not been computed for this study. Current discussions with professional agricultural economists[2] have indicated that cattle operations typically have relatively few economies of scale after a certain optimum point of output is achieved. Therefore, although buying out the 5-year flood plain will have an effect upon the total cow-calf output, it is assumed in this study that management operations of optimum size have sufficient flexibility to adjust to these changes and average costs would remain essentially unchanged. Future studies are necessary to document this assumption. These studies would include the examination of ownerships in the basin to determine business size, examination of the size of the parcel being purchased in conjunction with current rangeland management practices by ownership, and

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[2]Dr. Gary Lynne, and Dr. William G. Boggess, Resource Economist and Agricultural Economist, Gainesville, Florida, acted as professional consultants and advised and assisted in the preparation of this annex. Dr. Lynne and Dr. Boggess are referred to as the consultants in the remainder of this annex.

interviews with the affected cattle businesses to determine what if any induced damages or changes in net returns would result.

In addition to increased flood damage susceptibility, which is measured as losses of weight of the calf crop, costs associated with the health of the herd, supplemental feed, and pasture renovation, increased regulatory costs could be associated with the loss of the 5 year flood plain. The current SFWMD phosphorus runoff concentration standard for cattle ranches is 0.35 milligrams per liter. In addition, there are maximum density designs by type of pasture dictated by the SFWMD. Smaller operations may have difficulty maintaining this target with proposed land purchases.

Another regulatory cost which might be required of cattle ranchers and dairy operations would be fencing cattle out of waterways or the fencing of the 5-year flood plain. This is discussed in a later section.

Potential losses to dairy operations due to the increased cost of maintaining current water quality restrictions

Background

Water quality restrictions have been imposed upon the dairy industry in the Lower Kissimmee River Basin to attempt to control phosphorus levels entering Lake Okeechobee. An evaluation of the economic impact of the restrictions or dairy rule, has been prepared by Boggess, Holt and Smithwick. In that report the following is stated:

> *"The Department of Environmental Regulation has ruled that dairies in the Okeechobee drainage basin must have an approved system for collecting the wastewater and runoff from milking parlors and high intensive use areas. Such systems must include some form of land treatment or disposal before discharging into State waters.*
>
> *Dairymen's responses to the 'rule' varied: some signed dairy ceasing operations agreements and either quit dairying or moved their dairies to other areas; the others made the necessary investments to continue dairying in the drainage basin. To date, 19 out of 49 dairy barns that were in the basin when the 'rule' was passed, have or are in the process of closing, and dairy cow numbers in the basin are down about one-third. Of these dairies, 18 received a payment of $602 per cow in exchange for agreeing to cease dairy operations. The other dairy property was purchased outright by the SFWMD.*
>
> *To help the remaining dairymen absorb the impact of the dairy rule, the State has dispersed approximately $8 million to area dairymen which, at best, covered 75 percent of the initial estimated cost of construction required by the rule. The*

remainder is being borne by the dairy owners who are making significant investments in preserving Lake Okeechobee." [3]

To better understand how the dairy rule currently impacts the dairy businesses and to determine how the dairies might operate with the Restoration project in place, representatives from the SFWMD and the Soil Conservation Service (SCS) were contacted. It was determined that the dairy rule provides construction standards for wastewater facilities specifically aerobic holding areas, waste storage areas and sprayfield areas. The design criteria is for 9 inches of rainfall in a 24 hour period. The Department of Environmental Regulation (DER) is responsible for ground water monitoring, the SFWMD is responsible for surface water monitoring and the SCS is responsible for monitoring the integrity of the system construction.

Dairy businesses are capital intensive. Milking herd pasture is used primarily as a holding area for cows and can be grazed. The area is usually located in a circular or semi-circular configuration around the barn or milking parlor. High intensity areas (HIA) are usually contiguous to the barn and use ditches and dikes to prevent surface water runoff. The runoff collected is typically treated in a two stage process. The runoff is collected in anaerobic lagoons and eventually drain into storage or holding ponds. Water containing nutrients in these holding ponds then can be piped to upland spray fields. Hay grass, sorghum silage or corn, can then be grown to take up nutrients and harvested to be used as feed for cattle. Although expensive, this can work well as long as there is sufficient area in the operation to spray. DER regulations will not allow spraying unless the water table is at least 18 inches below the surface. Therefore, any increases in the water table could severely hamper the operation. Other innovative measures such as chemical treatments using iron sulfate to combine with phosphorus in lieu of spraying has been attempted to comply with the dairy rule.

EVALUATION

The 5 year and 100 year flood lines were digitized and overlaid on existing land use in the Kissimmee River Basin using a Geographic Information System (GIS). Site plans were edited and provided to the consultants by the SFWMD Okeechobee area office. The controlled site plans were entered into the GIS and the flood lines were then overlaid on the site plans. After discussions with the consultants as to the likely severity of the problem, three

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[3]Excerpts are from "The Economic Impact of the Dairy Rule on Dairies in the Lake Okeechobee Drainage Basin", prepared by Dr. William G. Boggess, Dr. John Holt, and Robert P. Smithwick, Food and Resource Economics Department, University of Florida, Institute of Food and Agricultural Sciences, Gainesville, Florida, November, 1991.

dairy owners were contacted by telephone concerning five dairy operations affected in the flood plain. The location of the 5 year and 100 year flood plain in respect to their infrastructure was discussed. The effects of the 5 year flood plain land purchase and increased flood damage susceptibility upon each operation was also discussed. Possible remedies which would include additional land investment, the purchase of additional capital equipment, or movement of existing infrastructure were explored. Although each dairy business was affected differently many common problems emerged. Results of discussions are listed below.

The barns of two of the five dairy businesses' are located within the 5-year flood plain. Since the barn is the hub of the dairy business and includes much of the capital equipment for the operation, the barn would either have to be moved or the business would cease operation. Movement of the barn does not seem to be feasible at these sites.

Additional land purchases within the 5 year flood plain would severely restrict dairy operations. All dairy businesses interviewed are having difficulty complying with environmental regulations now without the land purchases. With the designation of upland areas as spray fields and the corresponding regulation that these areas cannot be sprayed during periods when the water table is less than 18 inches below the ground has left little flexibility in dairy operations whose land purchases were configured without this use. Originally, these areas were selected as dairy sites based upon the flood protection provided by C-38. This year (1991) has been a particularly wet year. During this period, the wet condition of the property caused by secondary drainage restrictions and the backing up of upland tributaries during heavy rainfall has caused a muddy situation all year. Some of the owners felt this could be tolerable for a few months of the year, but not year round. Increased losses of dry pasture and possible increases in water table elevations with the Restoration plan will aggravate cow mortality, injuries, and disease.

Most owners agreed that only two options were available. They must either reduce cow numbers or cease operations. Additional land purchases do not seem to be feasible since the land must be contiguous to the current operation. This decision would also require additional costs to move the current infrastructure. Additional capital investment in ring levees around barns or around pasture does not solve the drainage problem and would require additional pumps to move water out of the containment areas. Since the dairy industry is capital intensive, reducing cow numbers would increase the average costs per cow and probably cut profit margins substantially. On the whole, most owners have already cut their herds from 20% to 33% with the dairy rule in place. The owners want to know exactly what if any policy changes will be made in the dairy rule in the future with the Kissimmee Restoration plan and

any other foreseeable restrictions. Most have made and are continuing to make substantial investments in their dairies for the purpose of environmental quality. At least one owner stated he is subsidizing the costs of construction at one dairy with the profits from another. These owners do not want to continue this investment to discover they can no longer operate at a later point in time.

CONCLUSIONS

Further detailed study is necessary to comprehensively evaluate the magnitude of impacts to dairy operations with the Restoration Plan. No recommendations therefore, are offered in this annex. However, based upon telephone interviews with the dairy owners and discussions with the consultants, a maximum loss of net returns can be determined based upon the loss of the five dairy businesses interviewed. It should be noted that these potential impacts are attributable to both the dairy rule and the Restoration plan and are not solely attributable to the Restoration plan. If the businesses do cease operation or move, losses to the businesses could also include any portions of capital investments made for the purpose of environmental quality not covered in the dairy rule cost sharing. It is estimated that the State has covered approximately 75% of the cost of construction mandated by the dairy rule.[4] However, these costs are not covered in this study.

To determine impacts upon dairy operations, a net return must be defined. Economic budgeting criteria requires that all financial profit in a business operation be allocated to three basic factors of production. These factors of production are land, capital and management. As in the cattle ranching business, losses to management are considered minimal. However, primary revenue producing capital in the dairy industry includes both fixed and moveable assets. The market value of the milk is not only dependent upon the product produced by the cow but significant value is added by the operation of milking equipment and the proximity of this equipment to the herd. Therefore, returns to both land and capital are used as the measure of return.

Net returns to land, capital, and management for a typical South Florida dairy budget with the dairy rule components is shown in Table 2. As mentioned previously, return to management is minimal given current milk prices in this table. It is estimated that the average size of a medium dairy operation in the basin includes approximately 1050 head. Discussions with owners indicate all the operations totalled have approximately 5,500 to 6,000 cows. A typical cow in South Florida will produce 140 hundred-weights (cwts)

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[4]ibid.

of milk per year. It is assumed that a typical South Florida Dairy with the dairy rule in place can develop a net return to land and management of approximately $1.19 per cwt of milk produced. Losses of annual net returns for the dairy industry with the closing of these five dairies is estimated to be approximately $1,000,000 annually. (6000 cows X 140 cwt of milk /per cow /per year X $1.19 net return per cwt.)

The net returns to dairy operations are sensitive to the prices received for milk. In recent years milk prices have ranged from $14 to a high of $18 per hundred-weight (cwts). The expenses identified in Table 2 are not expected to significantly vary with the price of milk. The expected losses of annual net returns could vary from -$260,000 at $14 per hundred-weight to $3,100,000 annually at $18 per hundred-weight.

Future investigations will focus on the feasibility of flood proofing measures which may avoid the need for land acquisition. If buyouts are necessary, federal policies for relocation of businesses would be followed and owners would be fully compensated.

Fencing costs as an additional regulation expense

If cattle are to be kept off the 5 year flood plain for reasons explained earlier, then fencing the 5 year flood plain will be the appropriate best management practice (BMP) for both cattle and dairy operations. Presently, there seems to be little interest in requirements for fencing of secondary streams between the 5 year and 100 year flood plain. The distance of the 5 year flood plain with the Restoration Plan is estimated to be 200 miles.[5] Fencing costs for 5-strand barb wire are estimated to be approximately $0.71 per foot and are shown in Table 3.[6] Total construction costs are estimated to be $749,760. (5280ft./mi X 200 mi. X $0.71/ft.) Additional maintenance costs are estimated to be $0.07 per foot per year or approximately $74,000 per year. Although costs are computed for this item, it is not known whether this cost will be borne by SFWMD or the landowners. It is expected that this item will be negotiated when the purchases and easements are actually acquired.

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[5]Estimate is from the measurement of the 5 year flood line provided to the consultants.

[6]Table is reproduced from Doanes Agricultural Report Vol. 54, No. 39-6, Doanes Agricultural Services: St. Louis, Missouri, September 27, 1991.

TABLES

Table 1
Lower Kissimmee River Restoration Project
5 Year floodplain area
Annual loss of net returns
Assumes all Non-forested Wetlands are Grazed

	Polk County			Osceola County			Okeechobee County			Highlands County		
Land Use Classification	Acreage	Returns per Acre ($)	Returns Lost ($)	Acreage	Returns per Acre	Returns Lost	Acreage	Returns per Acre	Returns Lost	Acreage	Returns per Acre	Returns Lost
Urban or Open	4	N/A	N/A	0	N/A	N/A	738	N/A	N/A	74	N/A	N/A
Citrus	0	Unknown	Unknown	0	Unknown	Unknown	9	Unknown	Unknown	41	Unknown	Unknown
Dairy	0	N/A	N/A	0	N/A	N/A	416	N/A	N/A	893	N/A	N/A
Improved Pasture	419	19.00	7,961.00	76	19.00	1,444.00	5463	19.00	103,797.00	2306	19.00	43,814.00
Unimproved Pasture	0	7.00	0.00	0	7.00	0.00	3814	7.00	26,698.00	2623	7.00	18,361.00
Rangeland	786	7.00	5,502.00	178	7.00	1,246.00	5119	7.00	35,833.00	1983	7.00	13,881.00
Forested Wetlands	39	0.00	0.00	0	0.00	0.00	4723	0.00	0.00	838	0.00	0.00
Barren land	0	0.00	0.00	0	0.00	0.00	804	0.00	0.00	399	0.00	0.00
Non-forested Wetlands	2908	7.00	20,356.00	4298	7.00	30,086.00	7561	7.00	52,927.00	8285	6.33	52,444.05
Miscellaneous	25	0.00	0.00	19	0.00	0.00	197	0.00	0.00	141	0.00	0.00
Water	295	0.00	0.00	257	0.00	0.00	1081	0.00	0.00	1015	0.00	0.00
Total	4,476		$33,819.00	4,828		$32,776.00	29,925		$219,255.00	18,598		$128,500.05

Lower Kissimmee River Restoration Project
5 Year floodplain area
Annual loss of net returns
Assumes no Non-forested Wetlands are Grazed

	Polk County			Osceola County			Okeechobee County			Highlands County		
Land Use Classification	Acreage	Returns per Acre ($)	Returns Lost ($)	Acreage	Returns per Acre	Returns Lost	Acreage	Returns per Acre	Returns Lost	Acreage	Returns per Acre	Returns Lost
Urban or Open	4	N/A	N/A	0	N/A	N/A	738	N/A	N/A	74	N/A	N/A
Citrus	0	Unknown	Unknown	0	Unknown	Unknown	9	Unknown	Unknown	41	Unknown	Unknown
Dairy	0	N/A	N/A	0	N/A	N/A	416	N/A	N/A	893	N/A	N/A
Improved Pasture	419	19.00	7,961.00	76	19.00	1,444.00	5463	19.00	103,797.00	2306	19.00	43,814.00
Unimproved Pasture	0	7.00	0.00	0	7.00	0.00	3814	7.00	26,698.00	2623	7.00	18,361.00
Rangeland	786	7.00	5,502.00	178	7.00	1,246.00	5119	7.00	35,833.00	1983	7.00	13,881.00
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Barren land	0	0.00	0.00	0	0.00	0.00	804	0.00	0.00	399	0.00	0.00
Non-forested Wetlands	2908	0.00	0.00	4298	0.00	0.00	7561	0.00	0.00	8285	0.00	0.00
Miscellaneous	25	0.00	0.00	19	0.00	0.00	197	0.00	0.00	141	0.00	0.00
Water	295	0.00	0.00	257	0.00	0.00	1081	0.00	0.00	1015	0.00	0.00
Total	4,476		$13,463.00	4,828		$2,690.00	29,925		$166,320.00	18,598		$76,056.00

Table 2 [1]

Typical South Florida Dairy Budget
With Dairy Rule Components
1991 Data

No. Milk Cows	1050
Milk Per Cow (cwts)	140
Price of Milk ($ / cwt)	$15.50
Range of total assets ($ / cow)	($2,600.00 - $3,200.00)

<u>Summary of Receipts and Expenses ($ /cwt)</u>

Receipts:	
Total milk receipts	$15.50
Dairy Livestock Sales	$ 2.30
Other	$ 0.00
Total Farm Cash Receipts	$17.80
Expenses:	
Variable Cash Expenses	
Livestock Variable Expenses	$ 3.45
Purchased Feeds	$ 7.69
Hired Labor	$ 1.90
Total Variable Cash Expenses	$ 13.04
Fixed Expenses	
Fixed Farm Overhead	$ 1.76
Farm Taxes and Insurance	$ 0.56
Actual Debt Expense	$ 1.25
Total Fixed Expense	$ 3.57
Total Expenses	$ 16.61
Net Return to Capital and Management[2]	$ 1.19

1. Prepared by Dr. W. G. Boggess for the Army Corps of Engineers' Environmental Restoration Report, Kissimmee River, Florida.

2. Return to land is included in return to capital.

Table 3
Fencing Costs

Fence type	Cost per 100 feet		
	Materials	Labor	Total
Woven wire + 1 barb	$70	$25	$95
5-strand barb	44	27	71
10-strand high-tensile	55	20	75
3-strand high-tensile electric	20	4	24
1- wire portable electric	6	-	6

Table is reproduced from Doanes Agricultural Report Vol. 54, No. 39-6, Doanes Agricultural Services: St. Louis, Missouri, September 27, 1991.