

SECTION 10 IMPLEMENTATION PLAN

The ultimate success of the Comprehensive Plan described in *Section 9* will be a reflection of its implementation over a period of more than 20 years. Simply stated, the hard work lies ahead in terms of restoring this important ecosystem. It will take a well coordinated strategy that, like the plan itself, is based on a set of principles that recognize that first and foremost, ecosystem restoration is the overarching objective. This objective will in turn be the principle driving force behind the sequence and pace at which we undertake the specific project features.

This Implementation Plan will begin to reverse, in a relatively short time, the pattern of ecological degradation that has been occurring in the natural system for many decades. As a result, the natural wetland systems of south Florida will be ecologically healthier by the year 2010.

Implementation of the recommended Comprehensive Plan will require integration of many related projects and tasks. The Comprehensive Plan is comprised of more than sixty major components representing literally hundreds of small projects that all need to be coordinated with each other and with other Federal, state and local programs and projects. Implementation will require an intense and innovative project management effort. This Section describes the project implementation process and the schedule developed to implement the recommended Comprehensive Plan described in *Section 9*.

10.1. INTRODUCTION

Development of the Implementation Plan began after selection of the Initial Draft Plan in June 1998. Due to the complexity of this effort, an Implementation Plan Team was formed to address the development of the Implementation Plan. Invitations to participate on the Implementation Plan Team were extended to Federal agencies, state agencies, local governments, and tribal representatives. In addition to team meetings, five public workshops specific to the development of the Implementation Plan have been held with stakeholders. The first four workshops took place on July 29, 1998, August 27, 1998, November 23, 1998, and December 11, 1998. Public participants together with Implementation Plan Team members brainstormed ideas regarding: decision making guidelines for project prioritization; Implementation Plan principles; and the process that would be used to further develop the Implementation Plan. At each subsequent public meeting, an overview of the implementation planning process to date was presented. The status of the development of initial authorization options was also shared with the public from whom comments and suggestions were solicited.

During the public comment period on the draft report, the public expressed a desire to have the opportunity to review and comment on the revised Implementation Plan prior to its inclusion in this final report. Accordingly, the revised draft Implementation Plan was released for public review on January 25, 1999. A fifth Implementation Plan public workshop was held on February 1, 1999, to present the revised Implementation Plan and solicit comment. The public comment period on the draft Implementation Plan ended February 5, 1999. All public comments were considered while the Implementation Plan was finalized.

The Implementation Plan consists of a set of guidelines, the identification of a process for developing project components beyond this study, a schedule of project level activities, and an implementation program that includes pilot projects and other components recommended for initial authorization.

Because of the large number of complex features that will be developed over a long period of time and the benefits that will be gained in the south Florida ecosystem, the strategy for implementation of the recommended Comprehensive Plan will be pursued as a program. Approaching implementation as a program will allow flexibility in the management of the schedule and funding. Using a programmatic approach will allow for a structured management strategy. This strategy will allow the flexibility to continuously monitor implementation (both physical and operational) and will allow managers to take advantage of new information as well as provide for the refinement of the Implementation Plan to account for new and/or emerging information and technologies.

The magnitude of the effort involved in the implementation of the Comprehensive Plan does not lend itself to the traditional Corps of Engineers methodology for implementing water resources projects. This is due to the need to integrate many related features contained within the sixty plus components with each other as well as integrating the components with numerous ongoing Federal, State, tribal and local efforts. The need for an intense and innovative project management effort is clearly necessary to achieve the Restudy's goals and objectives within the timeframe laid out in this Implementation Plan. To meet this need, each component or group of components will be implemented as a project itself, but will additionally be linked to the overall Comprehensive Plan. As part of the next step of component development, a Project Management Plan will be developed and provide a detailed schedule of activities necessary to complete each portion of the project. The Project Management Plan will identify resource requirements and outline the management strategy for the completion of the related work. This programmatic approach will provide the flexibility to holistically manage the cost sharing in a manner equitable to the Federal government and the local sponsor.

10.2. GUIDELINES FOR IMPLEMENTING THE COMPREHENSIVE PLAN

The Implementation Plan Team created a set of basic principles called guidelines. The guidelines include management strategies for ensuring that the comprehensive plan is implemented in a manner consistent with the goals and objectives of the Restudy effort. Further, the Implementation Plan Team used these guidelines as they developed the implementation schedule for the Comprehensive Plan. The guidelines are presented in *Table 10-1* and discussed in detail in the following sub-sections.

**TABLE 10-1
IMPLEMENTATION PLAN GUIDELINES**

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| Utilize Interdisciplinary and Interagency Teams |
| Incorporate Outreach and Public Involvement |
| Maintain Regional System Focus |
| Integration with Ongoing and Future Projects |
| Integrate Contingency Planning |
| Address Water Quality Needs |
| Plan Evaluation Through Adaptive Assessment |
| Addressing Uncertainties |
| Assurances to Water Users |
| Development and Refinement of Models and Tools |

10.2.1. Utilize Interdisciplinary and Interagency Teams

The Restudy effort has been an open, collaborative process involving Federal and state agencies, local governments and tribal participation. Use of the Internet has allowed Restudy Team members to interact and review information in real-time, thus reducing evaluation turn-around time and making meetings more productive. This interagency process was, and still is very effective, efficient and successful. The Restudy interagency team approach will continue throughout the implementation period to review, evaluate and adaptively manage the design, construction, monitoring, and implementation of the Comprehensive Plan. This interagency approach will be utilized for the development of pilot projects as well.

10.2.2. Incorporate Outreach and Public Involvement

The Restudy outreach and public involvement efforts have been integral parts of the process used to develop the Comprehensive Plan and will continue throughout the planning, design, construction, monitoring, and implementation of the Comprehensive Plan. The objective of all outreach activities is to ensure that the public is informed about the Restudy and that the plan that is implemented is reflective of the input received from stakeholders and the public throughout the project's implementation. *Section 11* of this report describes the outreach and public involvement efforts on the Restudy.

10.2.3. Maintain Regional System Focus

The Comprehensive Plan was developed and evaluated with respect to its contribution to the system-wide goals and objectives of the Restudy. Due to the size and complexity of the Comprehensive Plan, implementation of the plan will require that it be divided into smaller implementable packages of components. As these packages are further planned and designed, analyses and evaluations that measure the package's overall contribution to system-wide goals will be conducted in order to determine, and thus assure, that the system-wide goals and benefits of the Comprehensive Plan are being realized. This process will allow the Comprehensive Plan to be refined and revised as necessary as part of the adaptive assessment process described in a later sub-section.

10.2.4. Integration With Ongoing And Future Projects And Programs

There are a number of Federal, state, tribal and local water resources projects presently underway or authorized in the study area, including:

- Kissimmee River Restoration;
- C-111 Project;
- Modified Water Deliveries to Everglades National Park;
- Approved Critical Projects; and
- Everglades Construction Project.

The Comprehensive Plan includes modifications or additions to some of these projects. Consequently, implementation of all ongoing projects must be closely coordinated, and thus linked, with ongoing implementation of the Comprehensive Plan. The basic strategy will be to identify common features between the Comprehensive Plan and these projects. A review of the ongoing project's plan will then occur to ensure that all the ongoing projects and the Comprehensive Plan are consistent. It is important that these ongoing restoration projects be implemented in an expeditious manner.

In addition to these ongoing projects in the study area, there are numerous water resources planning and/or study efforts underway that are expected to affect implementation of the Comprehensive Plan. Some of the major planning efforts at the state and Federal level are:

- Lower East Coast Regional Water Supply Plan
- Lake Okeechobee Regulation Schedule Study
- Caloosahatchee Water Management Plan
- Lower West Coast Water Supply Plan
- Charlotte Harbor National Estuary Program
- Indian River Lagoon National Estuary Program

- Biscayne Bay Feasibility Study
- The Critical Project "Studies" (e.g., Florida Keys Carry Capacity Study)
- SW Florida Environmental Impact Statement (Corps wetland permitting)
- Indian River Lagoon Feasibility Study
- Water Preserve Areas Feasibility Study
- Florida Keys National Marine Sanctuary Management Plan and Water Quality Protection Program

Water Supply Plans under development by the South Florida Water Management District address the District's statutory responsibility to provide for water supplies to meet the reasonable beneficial needs of the region and form a critical connection with the Restudy. These plans are linked directly to the District's capital improvement funding process, the regulatory program for consumptive use permitting and operational protocols for C&SF Project facilities. The plans will evaluate the benefits from the existing C&SF Project and new C&SF Project facilities proposed in the Restudy with respect to the availability of water for allocation to human uses or reservation from use for protection of natural systems. Thus, the processes for developing the water supply plans is a critical element in addressing the issues related to assurances for existing legal users, discussed in *Section 10.2.9*. The South Florida Water Management District has four regional water supply plans. The boundaries of the largest plan, the Lower East Coast Regional Water Supply Plan, have extensive overlap with C&SF Project boundaries.

To avoid duplication of effort, in 1997, the South Florida Water Management District merged its Lower East Coast Regional Water Supply Plan analysis of major proposed water supply storage facilities into the Restudy. The water supply plan process will now incorporate appropriate Restudy features into the state planning process to determine how much water can be made available from the modified regional system for human users and the natural system through the state regulatory program. The state water supply planning process will verify the construction sequencing of the proposed Restudy elements through a year 2020 time frame in order to protect existing reasonable and beneficial water users, protect the water resources and environment from harm, and balance the future water needs of the region. Likewise, the other water supply plans (Lower West Coast, Upper East Coast and the Kissimmee Valley) will consider the potential benefits from proposed Restudy projects in their current and future planning efforts and determine the availability of water for allocation and reservation under the appropriate state processes.

In addition to these studies, the Comprehensive Plan proposes several new feasibility studies for the planning area. These are:

- Florida Bay and the Keys Feasibility Study
- Southwest Florida Feasibility Study

- Comprehensive Integrated Water Quality Plan

A concerted coordination effort of all those involved is needed to ensure that information flowing from these studies is efficiently integrated on a system-wide basis into Comprehensive Plan component development. The strategies to ensure coordination and provide system-wide feedback are proposed in the Project Implementation Process described later in this section.

10.2.5. Integrate Contingency Planning

The Restudy Team recognized that there were technical and cost uncertainties associated with some of the major components included in the recommended Comprehensive Plan. As each component proceeds towards actual implementation, technical uncertainties will be addressed. The question of whether a component performs at the level anticipated within the context of the overall Comprehensive Plan is a most important consideration. For this reason, contingency plans have been explored and will be developed for all appropriate components and technologies.

In order to determine whether or not certain technologies will perform as anticipated, six pilot projects are recommended for immediate implementation. The results of these pilot projects will be used to help determine if alternatives are needed to achieve the same level of performance. The proposed pilot projects are: Lake Okeechobee Aquifer Storage and Recovery; Caloosahatchee River Aquifer Storage and Recovery; Site 1 Aquifer Storage and Recovery; L-31 Seepage Management; Lake Belt (curtain wall) Technology; and Natural Systems Reuse Technology. These pilot projects are described in greater detail in *Section 9* of this report.

Contingency plans will address performance deficiencies and cost-effectiveness issues that may arise as pilot projects and detailed design studies are implemented and completed. Contingency plans for uncertain technologies are described in greater detail in *Section 7* and *Table 7-14 "Component Uncertainty"* in this report.

10.2.6. Address Water Quality Needs

One of the principal guidelines of the Implementation Plan is to ensure that the components are located, designed, and operated consistently with existing and future water quality protection criteria and restoration targets. The Comprehensive Plan includes a number of features (e.g., stormwater runoff treatment areas, treatment for water to be stored in aquifers by Aquifer Storage and Recovery facilities) to protect and improve the quality of water in receiving water bodies related to the operation of specific plan components. In addition,

regional-scale surface storage reservoirs included in the Comprehensive Plan present an opportunity to improve water quality when those reservoirs are located in basins with impaired water bodies (water bodies not meeting designated uses and/or water quality criteria contained in water quality standards). Future detailed planning and engineering activities will consider water quality protection criteria for water bodies when plan components are to be located and designed with operational features necessary to achieve water quality restoration targets.

Other water quality protection efforts by state, tribal, and local agencies (e.g., National Pollutant Discharge Elimination System point and non-point source regulatory programs, routine monitoring activities, development and implementation of Total Maximum Daily Loads and Pollutant Load Reduction Goals) will compliment the implementation of the Comprehensive Plan components and the development of the comprehensive integrated water quality plan. The integration of water quality protection targets into the implementation process, together with monitoring and adaptive assessment of project components and ongoing state, tribal, and local efforts, will ensure that water quality protection is achieved and sustained for the natural and managed environments of the south Florida ecosystem.

10.2.7. Plan Evaluation Through Adaptive Assessment

It is expected that implementation of the Comprehensive Plan components will move restoration in a predicted direction. However, due to the uncertainties inherent in ecosystem restoration, adaptive assessment is an essential strategy.

The adaptive assessment strategy requires incremental implementation of plan components. Each increment will be planned and designed to carry the program one step closer to the ultimate goal of ecosystem restoration. Conceptual models were developed for each natural landscape within the greater south Florida ecosystem (e.g. Lake Okeechobee, Marl Prairies, etc.) to identify the stressors on the natural systems and the attributes that are expected to respond to the restoration plan. The hypotheses generated by the conceptual models, in conjunction with hypotheses about water quality and hydrology, reflect current understanding of how natural and managed systems in south Florida will likely respond to the improvements in hydrological patterns resulting from each increment. After modeling each increment, scientific review of the results will determine whether expectations will be met and whether they are reasonable. Either the hypotheses or the project can be altered at that time. Once a component is implemented, monitoring will confirm whether expectations have been achieved, and again, the opportunity exists to alter either the hypotheses or revisit the plan, as necessary.

Incremental implementation allows testing of hypotheses, thus providing an essential means for learning more about ecological cause and effect relationships with

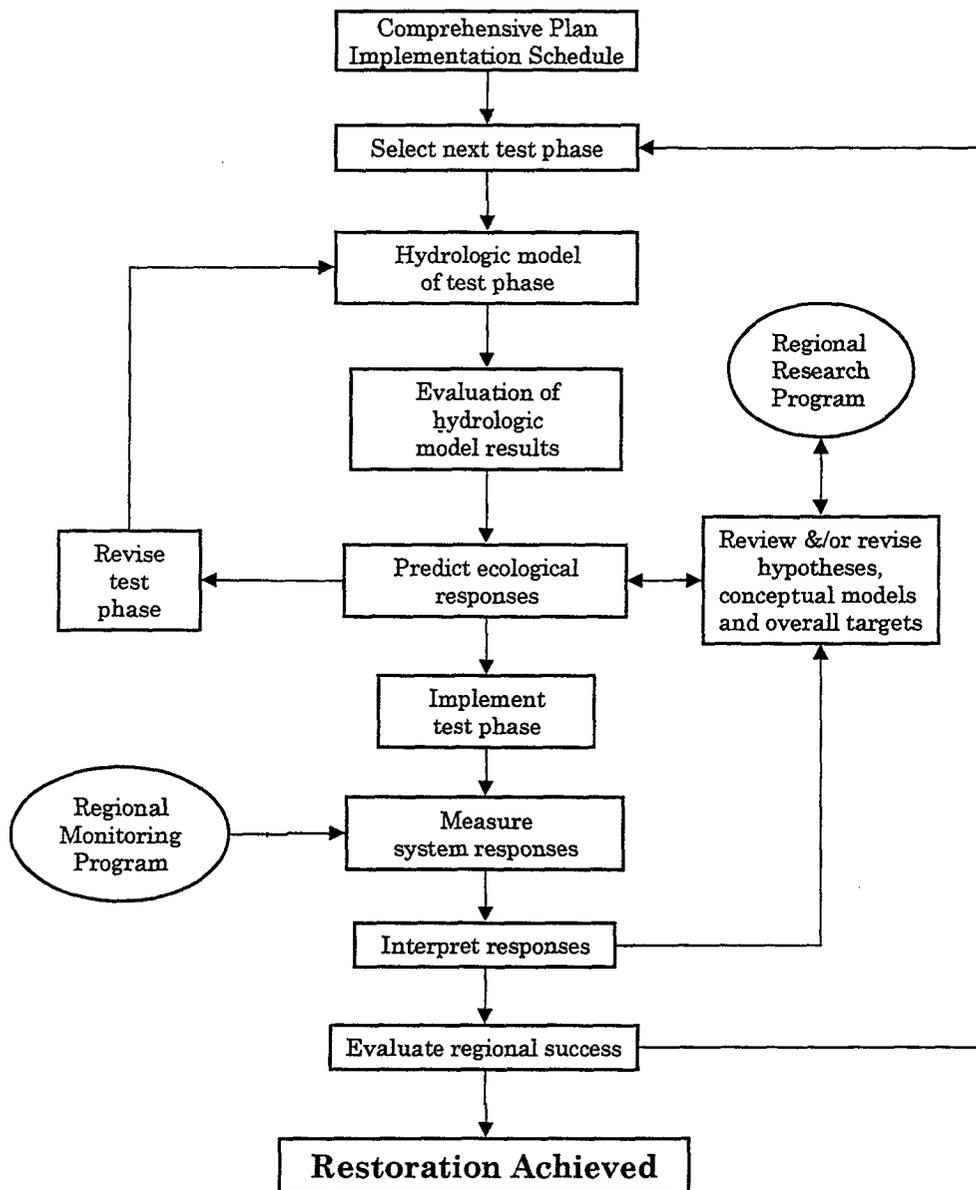
much greater certainty than is possible with ecological models. Incremental implementation also provides opportunities to refine plans to more effectively meet overall program objectives. An incremental process is required for the south Florida ecosystem restoration program because of the large and complex nature of the ecosystem and its problems, and because of the uncertainties regarding the ecological responses that will occur as more natural hydrological conditions are established. These uncertainties are inherent where major alterations in the region's spatial scale and landscape have substantially changed ecological relationships among species, habitats, and communities throughout the region. If an unexpected response occurs, it becomes the basis for reviewing and revising the operating set of hypotheses, which results in an ever-improving focus on the actions required to meet the ultimate restoration objectives.

A schematic flow chart showing how the adaptive assessment process is expected to function during the implementation of the Comprehensive Plan is presented in *Figure 10-1*. The flow chart shows that each phased iteration in the overall restoration plan is modeled within the context of existing conditions, as a basis for predicting the expected ecological responses. During and following implementation of each phase of the projects, a regional monitoring program will provide the means of measuring actual hydrological and ecological responses. Expected and actual responses will be compared with overall project objectives as a means for evaluating the success of that phase. These comparisons provide opportunities for revising the conceptual ecological models and hypotheses being used to predict ecological responses within the plan and to revise either the content or sequencing of future projects within the plan.

For adaptive assessment to be successful, certain specific tasks and responsibilities for actually managing the process must be identified. *Figure 10-1* shows several places of assessment "feed-back" loops where design or sequencing of phases of a plan may be altered, depending on the nature of the responses. The three basic components in the feed-back loop of the adaptive assessment process are shown in *Figure 10-2*. These basic components might require that teams be formed to: (a) review and interpret annual monitoring results in the context of the performance measure targets, and (b) use the annual assessments as a basis for designing and recommending revisions in future phases of the plan. The first of these tasks might be conducted primarily by experienced Everglades and wetland ecologists, and hydrologists; and the second task primarily by modelers and senior management personnel. The products of this internal evaluation and plan formulation process will subsequently be reviewed on a regular basis by the Science Advisory and Review Panel (See *Section 10.4.3.1*). This panel of scientists, to be appointed by the South Florida Ecosystem Restoration Task Force and representing a broad range of expertise including biology, ecology, toxicology, hydrology, agronomy, economics, and other disciplinary backgrounds, will review any revisions to conceptual models and working hypotheses, as well as any recommended plan

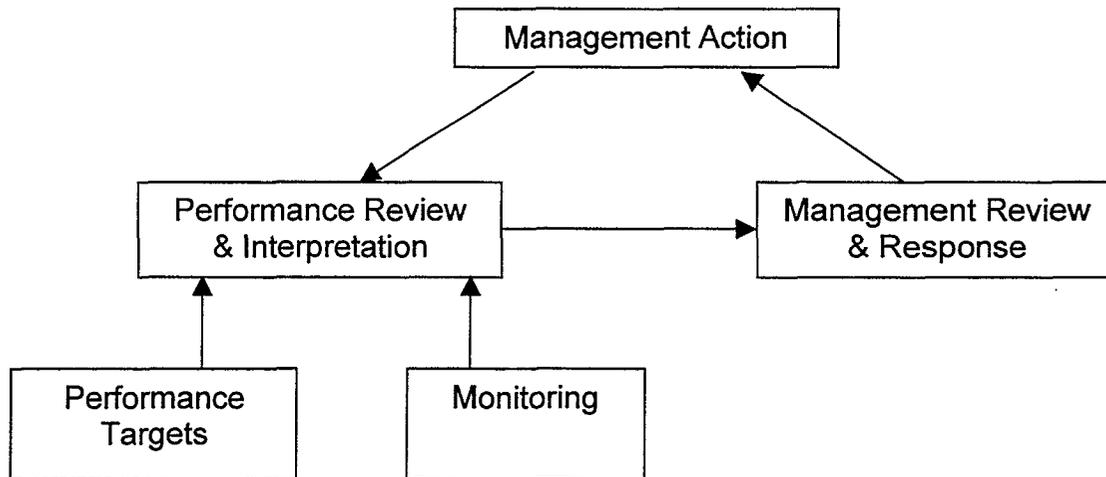
modifications. The current need is to decide how these tasks will be performed, and to make certain that they are adequately integrated into the overall implementation strategy, ensuring that they are routinely conducted over time. These may be tasks that can best be coordinated through the RECOVER team, described later in this section.

**FIGURE 10-1
ADAPTIVE ASSESSMENT FLOW
DIAGRAM**



**FIGURE 10-2
ADAPTIVE ASSESSMENT**

Basic Components



To fully evaluate the success of a restoration program, the monitoring program must measure responses over a wide range of scales, including broad temporal scales. For a number of reasons, some significant system responses may not become apparent until several years after the project specifically responsible for these ecological changes has been completed. The time required for detectable responses may be longer than the intervals between plan iterations. In these cases, detection of cause and effect relationships, and evaluations of separate plan iterations, becomes obscured as a result of the necessary pace of the overall restoration program.

Even when system responses seem to be occurring on shorter time scales, relative to the implementation of discreet components, it may still be difficult to determine specific cause and effect relationships. These complications in the adaptive assessment process, caused by the pace of the overall program and uncertainties in causal relationships, can be substantially moderated in two ways. First, by maintaining strong ecological research and modeling programs concurrently with the implementation of the restoration program, new information necessary to better interpret system responses will consistently be accumulating. And second, by creating the recommended team of senior scientists, the best professional opinions can be focused on the adaptive assessment process. This team would be responsible for reviewing and interpreting system responses, integrating new science into the assessment process, and revising the conceptual models and working hypotheses.

10.2.8. Uncertainties

There are uncertainties associated with some of the technologies proposed in the Comprehensive Plan. Pilot projects and additional studies offer the best way to address the concerns that these uncertainties present prior to full implementation of these project components.

Further specific studies will be developed to provide additional information needed for detailed design and "value engineering" of specific components of the Comprehensive Plan. These studies could potentially include additional or revised estuary targets, flood impacts, ecological effects of reuse water and data collection.

It is likely that new technologies will emerge during the implementation process. New technologies offer the possibility of improving the Comprehensive Plan. The implementation process will allow flexibility to consider and include new technologies as they emerge.

10.2.9. Assurances To Water Users

The concept of "assurances" is key to the successful implementation of the Comprehensive Plan. Assurances can be defined in part as protecting, during the implementation phases of the Comprehensive Plan, the current level(s) of service for water supply and flood protection that exist within the current applicable Florida permitting statutes. Assurances also involve protection of the natural system.

The current C&SF Project has generally provided most urban and agricultural water users with a level of water supply and flood protection adequate to satisfy their needs. Florida law requires that all reasonable beneficial water uses and natural system demands be met. However, the C&SF Project, or regional system, is just one source of water for south Florida to be used in concert with other traditional and alternative water supplies.

The Governor's Commission for a Sustainable South Florida developed a consensus-based set of recommendations concerning assurances to existing users, including the natural system (GCFSSF, 1999). The following text is taken from the Commission's *Restudy Plan Report*, which was adopted on January 20, 1999:

"Assurances are needed for existing legal users during the period of plan implementation. It is an important principle that has helped gain consensus for the Restudy that human users will not suffer from the environmental restoration provided by the Restudy. At the same time, assurances are needed that, once restored, South Florida's natural environment will not again be negatively impacted by water management activities. Getting 'from here to there' is a challenge. The

implementation plan will be the key to assuring predictability and fairness in the process.

Protecting Current Levels of Service (Water Supply and Flood Protection) during the Transition from the Old to the New C&SF Project.

The goal of a sustainable South Florida is to have a healthy Everglades ecosystem that can coexist with a vibrant economy and quality communities. The current C&SF Project has generally provided most urban and agricultural water users with a level of water supply and flood protection adequate to satisfy their needs. In fact, if properly managed, enough water exists within the South Florida system to meet restoration and future water supply needs for the region. However, past water management activities in South Florida, geared predominantly toward satisfying urban and agricultural demands, have often ignored the many needs of the natural system (GCSSF, 1995; transmittal letter to Governor Chiles, p. 2). Specifically, water managers of the C&SF Project historically discharged vast amounts of water to tide to satisfy their mandate to provide flood protection for South Florida residents, oftentimes adversely impacting the region's estuarine communities.

The Commission recommended that in the Restudy, the SFWMD and the Corps should ensure that the redesign of the system allows for a resilient and healthy natural system (GCSSF, 1995; p. 51) and ensure an adequate water supply and flood protection for urban, natural, and agricultural needs (GCSSF, 1996a; p.14). In response to the need to restore South Florida's ecosystem, and in light of the expected future increase of urban and agricultural water demands, the Restudy aims to capture a large percentage of water wasted to tide or lost through evapotranspiration for use by both the built and natural systems. In order to maximize water storage, the Restudy intends to use a variety of technologies located throughout the South Florida region so that no one single area bears a disproportionate share of the storage burden. This direction reinforces the Commission's recommendation that water storage must be achieved in all areas of the South Florida system using every practical option (GCSSF, 1996a; p. 25).

However, concerns have been expressed that a water user would be forced to rely on a new water storage technology before that technology is capable of fully providing a water supply source or that existing supplies would otherwise be transferred or limited, and that the user would thereby experience a loss of their current legal water supply level of service. Any widespread use of a new technology certainly has potential limitations; however, the Restudy should address technical uncertainties prior to project authorization and resolve them before implementation in the new C&SF Project. With the addition of increased water storage capabilities, water managers will likely shift many current water users to different water sources.

Additionally, stakeholders are concerned that a preservation of the current level of service for legal uses would not encompass all the urban uses, some of which are not incorporated in the term 'legal' and covered by permit. Specifically, an adequate water supply is needed to address urban environmental preservation efforts as well as water level maintenance to reduce the impact of salt water intrusion.

The Commission believes that in connection with the Restudy, the SFWMD should not transfer existing legal water users from their present sources of supply of water to alternative sources until the new sources can reliably supply the existing legal uses. The SFWMD should implement full use of the capabilities of the new sources, as they become available, while continuing to provide legal water users as needed from current sources. It is the Commission's intent that existing legal water users be protected from the potential loss of existing levels of service resulting from the implementation of the Restudy, to the extent permitted by law.

The Commission also recognizes that the SFWMD cannot transfer the Seminole Tribe of Florida from its current sources of water supply without first obtaining the Tribe's consent. This condition exists pursuant to the Seminole Tribe's Water Rights Compact, authorized by Federal (P.L. 100-228) and State Law (Section 285.165, F.S.).

However, the issues surrounding the development of specific assurances to water users are exceedingly complex and will require substantial additional effort to resolve.

RECOMMENDATION

- *The SFWMD and the Corps should work with all stakeholders to develop appropriate water user assurances to be incorporated as part of the Restudy authorizations. These water user assurances should be based on the following principles:*
 - A. *Physical or operational modifications to the C&SF Project by the federal government or the SFWMD will not interfere with existing legal uses and will not adversely impact existing levels of service for flood management or water use, consistent with State and federal law.*
 - B. *Environmental and other water supply initiatives contained in the Restudy shall be implemented through appropriate State (Chapter 373 F.S.) processes.*
 - C. *In its role as local sponsor for the Restudy, the SFWMD will comply with its responsibilities under State water law (Chapter 373 F.S.).*
 - D. *Existing Chapter 373 F.S. authority for the SFWMD to manage and protect the water resources shall be preserved.*

Water Supply for Natural Systems

Concerns have been raised about long term protection of the Everglades ecosystem. According to WRDA 1996, the C&SF Project is to be rebuilt 'for the purpose of restoring, preserving, and protecting the South Florida ecosystem' and 'to provide for all the water-related needs of the region, including flood control, the enhancement of water supplies, and other objectives served by the C&SF Project.'

Environmental benefits achieved by the Restudy must not be lost to future water demands. When project implementation is complete, there must be ways to protect the

natural environment so that the gains of the Restudy are not lost and the natural systems, on which South Florida depends, remain sustainable.

A proactive approach which includes early identification of future environmental water supplies and ways to protect those supplies under Chapter 373 F.S. will minimize future conflict. Reservations for protection of fish and wildlife or public health and safety can be adopted early in the process and conditioned on completion and testing of components to assure that replacement sources for existing users are on line and dependable. The SFWMD should use all available tools, consistent with Florida Statutes, to plan for a fair and predictable transition and long term protection of water resources for the natural and human systems.

Apart from the more general goals of the Restudy, there are specific expectations on the part of the joint sponsors - the State and the federal government. The more discussion that goes into an early agreement on expected outcomes, the less conflict there will be throughout the project construction and operation.

RECOMMENDATIONS

- The SFWMD should use the tools in Chapter 373 F.S. to protect water supplies necessary for a sustainable Everglades ecosystem. This should include early planning and adoption of reservations. These reservations for the natural system should be conditioned on providing a replacement water source for existing legal users which are consistent with the public interest. Such replacement sources should be determined to be on line and dependable before users are required to transfer.*
- The SFWMD should expeditiously develop a 'recovery plan' that identifies timely alternative water supply sources for existing legal water users. The recovery plan should consist of water supply sources that can reliably supply existing uses and whose development will not result in a loss of current levels of service, to the extent permitted by law. To assure that long term goals are met, the State and federal governments should agree on specific benefits to water users, including the natural system, that will be maintained during the recovery.*
- In the short term, the Restudy should minimize adverse effects of implementation on critical and/or imperiled habitats and populations of State and federally listed threatened and/or endangered species. In the long term, the Restudy should contribute to the recovery of threatened species and their habitats.*

Protecting Urban Natural Systems and Water Levels

Water supply for the urban environment is connected to water supply for the Everglades and other natural areas targeted for restoration and preservation under the Restudy.

It is essential that the Restudy projects proposed to restore and preserve the environment of the Everglades do not reduce the availability of water to such an extent in urban areas that the maintenance of water levels and the preservation of natural areas becomes physically or economically infeasible.

The successful restoration of Everglades functions is dependent not only upon the establishment of correct hydropatterns within the remaining Everglades, but also upon the preservation and expansion of wetlands, including those within urban natural areas that once formed the eastern Everglades. Some of the westernmost of these areas have been incorporated in the Restudy as components of the WPAs. However, the on-going preservation efforts of local governments have acquired hundreds of millions of dollars worth of additional natural areas for protection both inside and outside of the WPA footprint.

Water supplies for these urban wetlands are not covered by existing permits or reservations and are therefore, not adequately protected. Efforts are underway at both the SFWMD and the local level to preserve these vital areas and assure their continuing function as natural areas and in ecosystem restoration.

Detailed design for the Restudy, in particular the detailed modeling associated with the WPA Feasibility Study, will make possible plans to protect these urban wetlands from damage and to assure maximum integration with Restudy components.

RECOMMENDATIONS

- *The SFWMD and the Corps should acknowledge the important role of urban natural areas as an integral part in the restoration of a functional Everglades system. As a part of the implementation plan, the SFWMD and the Corps should develop an assurance methodology in conjunction with the detailed design and modeling processes, such as the WPA Feasibility Study, to provide the availability of a water supply adequate for urban natural systems and water level maintenance during both implementation and long term operations.*
- *Expand and accelerate implementation of the WPAs. Accelerate the acquisition of all lands within the WPA footprint to restore hydrologic functions in the Everglades ecosystem, and ensure hydrologic connectivity within the WPA footprint. The WPA Feasibility Study process should be given a high priority. The WPA concept should be expanded into other SFWMD planning areas such as the Upper East Coast.*
- *The Restudy should assure that the ecological functions of the Pennsuco wetlands are preserved and enhanced.”*

There is a substantial body of law that relates to the operation of Federal flood control projects, both at the state and Federal level. Much of the Governor's Commission language is directed to the South Florida Water Management District and matters of state law. To the extent that the Governor's Commission's guidance applies to the Corps' actions, the Corps will give it the highest consideration as

Restudy planning proceeds and as plan components are constructed and brought on-line consistent with state and Federal law. The recommended Comprehensive Plan does not address or recommend the creation or restriction of new legal entitlements to water supplies or flood control benefits.

10.2.10. Development And Refinement Of Models And Tools

As implementation of the Comprehensive Plan proceeds, additional models and tools or refinements to existing models and tools will be needed both at the system-wide level as well as at more localized, site-specific levels. For example, the South Florida Water Management Model with its four square mile grid size is not an appropriate tool for the analysis of flooding at a local level. More site-specific models with a much finer grid size will be needed as implementation proceeds. Additionally, the existing tools and models will be refined in order to improve their applicability and usefulness.

An example of more finite model development is depicted in the ongoing Water Preserve Areas Feasibility Study. The South Florida Water Management District is currently developing five hydrologic models in Palm Beach, Broward, and Miami-Dade Counties. These models are known as the North Palm Beach, South Palm Beach, Broward, North Miami-Dade and South Miami Dade groundwater models. Further, numerous other modeling tools have been identified that will promote a better understanding of the ecologic response of the Comprehensive Plan. These include the Everglades Landscape Model, Lake Okeechobee Water Quality Model, Florida Bay Circulation Model, Biscayne Bay Hydrodynamic Model, and Everglades Water Quality Model.

Additional data will need to be collected to further design the "next" tools needed to implement the Comprehensive Plan. These data will include items such as topographic and geologic data. The southern portion of Florida has unique features such as a very flat topography; a large, highly concentrated human population; and a very unique and fragile ecosystem. Because of this flat topography, a slight change in ground level at one location can significantly impact a large geographic area. The current lack of precision in existing vertical control can result in erroneous estimates to important hydrologic variables. There is an anticipated effort to increase the accuracy of vertical measurement called the Geodetic Vertical Control Survey, which involves second-order class I vertical control over a four-year period.

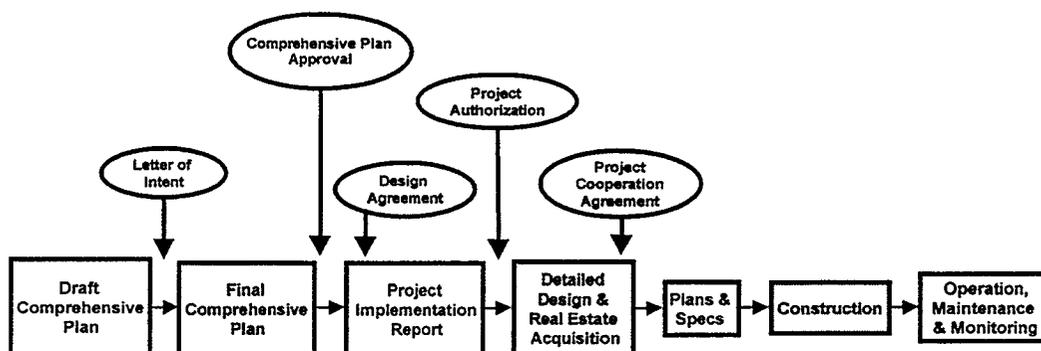
10.3. PROJECT IMPLEMENTATION PROCESS

To ensure continued progress in implementing the Comprehensive Plan, a project implementation process is needed to allow for additional studies that would support project development, and future Congressional authorizations. Further, a

process is needed to reevaluate the Comprehensive Plan, as necessary, using new information that is developed during the component development and design process. This section of the Implementation Plan describes key steps that are necessary to implement the Comprehensive Plan.

Generally, implementation of the Comprehensive Plan will follow the steps shown in *Figure 10-3*. Subsequent to the submittal of this report to Congress, a detailed planning effort in the form of a Project Implementation Report will be developed for each component or a logical group of components. Except for those projects recommended for initial authorization or accomplished under the proposed programmatic authority (described later in this section), each Project Implementation Report will be submitted to Congress for project authorization. Following completion of the Project Implementation Report, detailed design and real estate activities would commence followed by construction and operation of the project.

**FIGURE 10-3
GENERALIZED PROJECT DEVELOPMENT PROCESS**



Components that are authorized for construction prior to the development of a Project Implementation Report (i.e. initially authorized components and programmatic authority components) will still require completion of a Project Implementation Report. For these components, the Project Implementation Report will be completed and submitted to Corps higher authority for approval and the Project Implementation Report will not be submitted to Congress.

10.3.1. Project Implementation Reports

The recommended Comprehensive Plan described in *Section 9* has a level of detail and analysis sufficient for plan selection and cost estimation, but it is not as refined as traditional Corps of Engineers' feasibility report recommendations submitted to Congress for construction authorization. To continue project

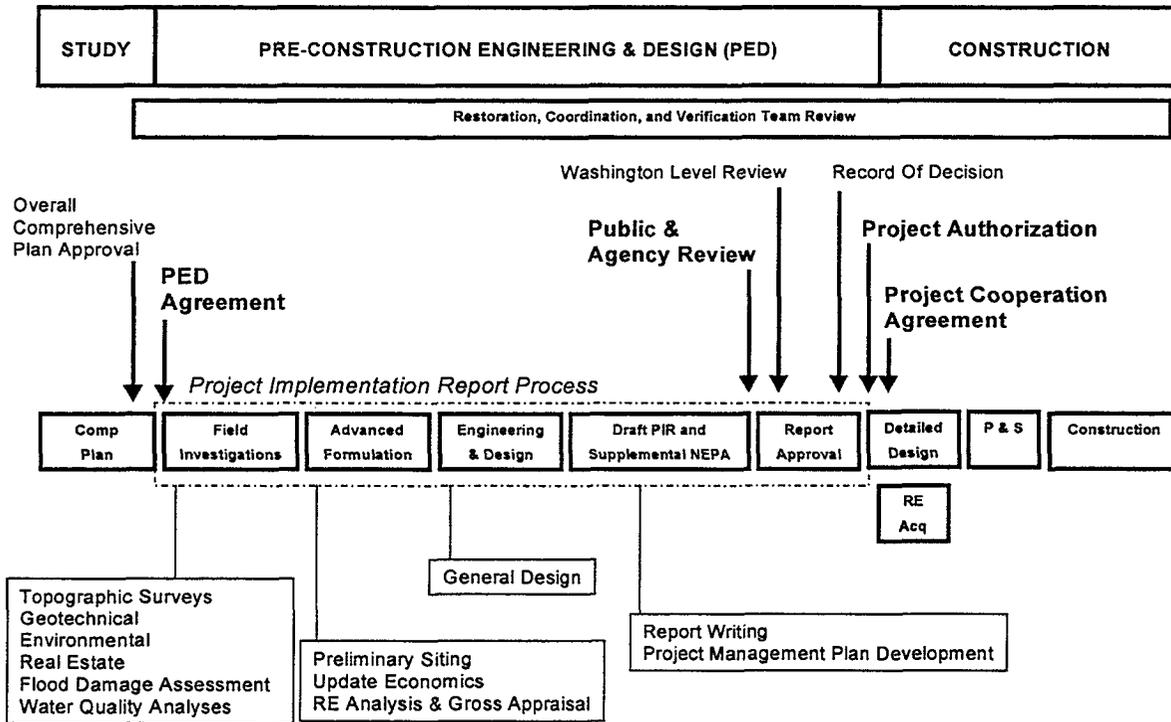
implementation, additional efforts are needed to develop the detailed technical information to implement the project. These additional efforts include:

- Additional Plan Formulation
- Engineering and Design to General Design Memorandum Levels
- Environmental Analyses
- Flood Protection Analyses
- Water Quality Analyses
- Economic Analyses
- Siting and Real Estate Analyses
- Contribution to Comprehensive Plan Performance
- Refinements/Modifications to the Comprehensive Plan
- Supplemental NEPA Document

The results of these additional efforts will be documented in a Project Implementation Report. The Project Implementation Report will bridge the gap between the conceptual design contained in the Comprehensive Plan and the detailed design necessary to proceed to construction. The steps for these future detailed studies are displayed in *Figure 10-4*.

The Project Implementation Report is a new type of reporting document. The Project Implementation Report will be similar to a General Reevaluation Report in that it will contain additional plan formulation and evaluation, and will optimize the components. It will also contain General Design Memorandum level, or higher, engineering and design. Some of the tasks associated with the preparation of the Project Implementation Report will include surveys and mapping, geotechnical investigations, site analyses, design optimization, economics, environmental analyses, flood damage assessment, real estate analyses and preparation of supplemental National Environmental Policy Act documents. Further, each Project Implementation Report will be accompanied by a Project Management Plan. The Project Management Plan will detail schedules, funding requirements, and identify resource needs for final design and construction of the project.

**FIGURE 10-4
PROJECT IMPLEMENTATION REPORT PROCESS**



The objectives of Project Implementation Report are to: (1) more thoroughly investigate water resource solutions identified in the Comprehensive Plan, and (2) recommend appropriate actions. The Project Implementation Report will typically be completed in 18 to 36 months. The Project Implementation Report will document the analyses and results of the studies, and provide the basis for a final decision on the project. The Project Implementation Report will include supplemental National Environmental Policy Act (NEPA) documentation (either an Environmental Assessment or an Environmental Impact Statement). The Project Implementation Report will also contain the results of coordination activities such as the Fish and Wildlife Coordination Act Report and consultation under the Endangered Species Act. As necessary, the Comprehensive Plan will be modified as components are refined and additional information is obtained during the process.

The purpose of the Project Implementation Report is to affirm, reformulate or modify a component, or group of components, in the recommended Comprehensive Plan. All planning analyses, including economic, environmental, water quality, flood protection, real estate, and plan formulation, conducted during pre-construction design studies will be documented and included in the Project Implementation Report. The Project Implementation Report will be the vehicle to

identify, quantify and attempt to resolve the uncertainties surrounding the cost or performance of each major component. These uncertainties are not limited to hydrologic performance of the specific structure component, but also include the uncertainties surrounding the expected ecosystem response to the component. A clear description of the expected environmental outcome of each component will be included in the Project Implementation Report.

The real estate analysis performed as part of the Project Implementation Report process will include siting of specific project features and a gross appraisal for all lands, easements and rights-of-way necessary for component(s) construction and operation. Field investigations will be required to provide needed information for the real estate analysis, as well as for the engineering and design analysis and advance plan formulation. These activities will typically include geotechnical and environmental investigations and topographic surveys.

The supplemental National Environmental Policy Act document prepared as a result of the Project Implementation Report will supplement this Final Programmatic Environmental Impact Statement, which is necessary for compliance with the National Environmental Policy Act. This document would be either an Environmental Assessment or an Environmental Impact Statement.

Each Project Implementation Report will also contain an analysis of the Comprehensive Plan and recommended modifications. The RECOVER team, described later in this section, will play a key role in this analysis.

The studies and preparation of the Project Implementation Report will be accomplished by an interagency interdisciplinary study team, similar to the type of team that developed the Comprehensive Plan.

10.3.2. Restoration, Coordination, And Verification Process

Throughout the project implementation process, system-wide analyses will continue. A feedback loop will be established so that each Project Implementation Report is evaluated for its contribution to the overall system and that the Comprehensive Plan is revised as necessary to reflect new information developed during the project development process.

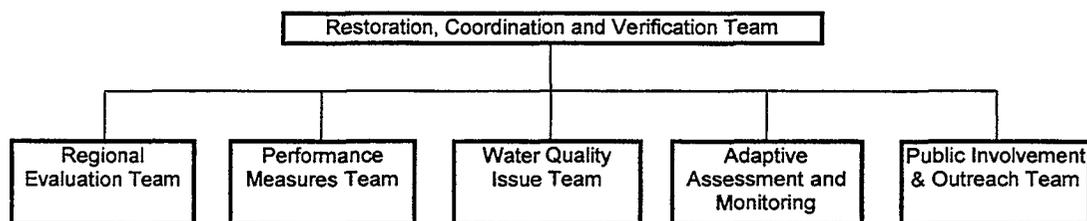
As part of this effort, a Restoration, Coordination and Verification (RECOVER) Team will be established to provide system-wide evaluations and analyses. The RECOVER Team represents the evolution of the multi-disciplinary interagency Restudy Team that was used to formulate the Comprehensive Plan. It is a system-wide evaluation and analysis team that will be responsible for helping to determine the overall regional contributions provided by individual projects and whether or not revisions to the Comprehensive Plan are necessary. The RECOVER

Team is not an oversight or management group. The RECOVER Team responsibilities will include, but not limited to, the following activities and respective coordination thereof:

- Development and Refinement of System Level Analytical Models Tools
- Continuing Re-Analysis of the Comprehensive Plan
- Development of an Information Needs Program
- Coordination of Peer Review of all Science
- Modeling Effects of Project Elements on the Comprehensive Plan
- Development and Implementation of Adaptive Assessment Protocols
- Coordination of Monitoring Program
- Interpretation of Monitoring Results as a Basis for Conducting the Adaptive Assessment Process
- Further Development and Refinement of Performance Measures and Targets
- Linkage and Coordination with Other Ongoing Projects.
- Public Involvement and Outreach
- Issue Resolution Process

The RECOVER Team will form sub-teams for specific technical evaluations as needed. Examples of currently anticipated sub-teams include: Regional Evaluation; Performance Measure Refinement and Development; Implementation Plan; Water Quality; Adaptive Assessment and Monitoring; and Public Involvement and Outreach (See *Figure 10-5*). All RECOVER sub-teams will report status and findings to the overall RECOVER Team, and then as a team, recommendations will be developed. RECOVER Team responsibilities will not replace normal agency roles or required coordination. For example, Fish and Wildlife Coordination Act responsibilities, consultations under the Endangered Species Act, and other National Environmental Policy Act activities will not be replaced or duplicated by the RECOVER Team.

**FIGURE 10-5
RECOVER TEAM COMPOSITION**



The RECOVER Team is responsible for addressing system-wide issues through evaluations and analyses. These evaluations include, but not limited to

addressing, hydrologic, ecological, water quality, flood protection, water supply and interim operations. This coordination activity will require the RECOVER Team, or its delegated sub-team, to provide specific input to each on-going project team regarding the linkages and affects that projects and designs have on each other.

It is envisioned that during and throughout the project development process the RECOVER Team will interactively work with the respective project team to evaluate system-wide performance and regional contributions that will be realized from full implementation of specific projects. RECOVER will utilize the most current system-wide models and evaluation tools together with the most recent performance measure information for each region. A resulting product from this effort will be a Comprehensive Plan update, which will be included within each Project Implementation Report. This update will include recommendations for Comprehensive Plan modifications if needed. This report will also act to document any changes that occurred to the project(s) formulation and design as a result of the system-wide evaluations.

In a sense the RECOVER Team will be building the system-wide incremental model by adding projects in their time-phased sequence (as they occur in the planning process) and evaluating their system-wide contribution to overall ecosystem restoration. This incremental system-wide approach will assist the adaptive assessment and monitoring sub-teams by enabling them to use the incremental information to formulate their assessments and recommendations.

10.3.3. Independent Scientific Peer Review

Sound science has always served as the basis for restoration of the south Florida ecosystem. At the heart of preserving the integrity of the science, peer review has been used to provide independent review of the science being applied to restoration efforts and to solicit advice on difficult issues.

In past years, independent panels have been formed to: (a) provide annual reviews of the overall Florida Bay science program (the Boesch panel); (b) review and advise on specific issues, such as the perceived conflict among endangered species restoration objectives (kites vs. storks), the overall high water research program, and the Cape Sable seaside sparrow research program; and (c) provide guidance and review for the Kissimmee River restoration program's ecological objectives and research and monitoring protocols.

10.3.3.1. Peer Review Previously Conducted

Fundamental documents used by the Everglades restoration planners have also received independent review. For example, the 31 chapters in *Everglades: The Ecosystem and Its Restoration* (Davis & Ogden, 1994) are a primary source for the basic hypotheses and technical understandings of the Everglades system. Each of

the 31 chapters was anonymously refereed by three or more outside reviewers. Additionally, much of the natural systems research conducted by the state and federal land management agencies is published in peer-reviewed journals.

The process for developing conceptual ecological models and the models themselves have been reviewed. A team of scientists from the Restudy's participating agencies and the University of Miami's Rosenstiel School for Marine and Atmospheric Science jointly developed and managed the process of organizing existing facts and hypotheses into a format that would support the planning and evaluation of the restoration programs. The process was designed specifically to support the development of performance measures and restoration targets to guide the Everglades restoration program. The Restudy's Alternative Evaluation Team used these conceptual ecological models as a basis for developing conceptual hydrologic and biological performance measures and targets during the plan formulation and selection process. The University of Miami scientists provided the initial training and review for the conceptual models. The conceptual models were fully reported in an invited session of the 1997 annual Conference of the Society for Ecological Restoration.

The South Florida Water Management District has an "Expert Assistance" program for bringing outside experts to advise and review the scientific work of District staff. This process was used to review the River of Grass Evaluation Methodology (ROGEM). ROGEM was used during the plan formulation, evaluation, and selection process to determine the relative ecological value of different alternative plans.

The models used in the conceptual planning stage have been reviewed both to certify their integrity and to determine if they are being used appropriately. The South Florida Water Management Model has been documented (MacVicar et al., 1984 and SFWMD, 1997i) and the documentation peer reviewed (Loucks et al., 1998.). Likewise, the Natural Systems Model, Version 4.3 was reviewed by the Department of Interior, U. S. Geological Survey (Bales et al., 1997). Modifications to the Natural System Model recommended as a result of the U.S. Geological Survey review were incorporated in the version of the model that the Comprehensive Plan development process used.

10.3.3.2. Future Peer Review

The adaptive assessment protocol proposed for evaluating ecosystem responses during implementation of the restoration program includes a team of senior Everglades and wetland ecologists and hydrologists, charged with the responsibility of reviewing and interpreting system responses, revising conceptual models and working hypotheses, and recommending plan modifications. The

products of this internal review process will be subsequently reviewed on a regular basis by the Science Advisory and Review Panel (SARP).

The SARP will be appointed by and provide independent scientific advice to the South Florida Ecosystem Restoration Task Force, chaired by the Secretary of the Interior. To help ensure the success of the adaptive assessment process, the SARP will at the request of the Task Force, review the science associated with the south Florida ecosystem restoration effort, including the implementation of the Comprehensive Plan on an ongoing basis. Since the Comprehensive Plan is the central component of the south Florida ecosystem restoration, the SARP will take into account the broad objectives of the Restudy as defined in the Water Resources Development Act of 1996:

The Secretary [of the Army] shall develop, as expeditiously as practicable, a proposed comprehensive plan for the purpose of restoring, preserving, and protecting the South Florida ecosystem. The comprehensive plan shall include such features as are necessary to provide for the water-related needs of the region, including flood control, the enhancement of water supplies, and other objectives served by the Central and Southern Florida Project. (Public law 104-303, October 12, 1996).

The SARP will be comprised of scientists representing a broad range of expertise, including biology, ecology, toxicology, hydrology, agronomy, economics, and other disciplinary backgrounds necessary to evaluate the full range of scientific issues associated with implementation of the Comprehensive Plan and the restoration of the south Florida ecosystem.

Members of the SARP will be individuals who are not personally involved in south Florida research and monitoring activities. Members will be expected to serve three to four years, rotating off the Panel at intervals that ensure sufficient continuity of activities.

The SARP will be a key element of the adaptive assessment process. The restoration of a large and complex ecosystem such as that in south Florida is a dynamic process that is continually influenced by the results of research and monitoring activities. The Science Coordination Team assists the Task Force by managing the broad range of scientific activities being undertaken by university, and Federal, state, tribal, and local governments. The SARP will evaluate the effectiveness of this scientific effort and ensure that the restoration of the south Florida ecosystem is based on the highest quality of scientific standards.

In addition to its responsibilities for providing broad scientific review during the implementation of the Comprehensive Plan, the SARP may periodically

undertake special reviews or provide science advice on future directions of the program at the request of the Task Force. This may include evaluating the quality of specific research, modeling, and monitoring activities, as well as providing guidance on the significance of research results and their implications for management and restoration of the ecosystem. In addition, the SARP may be asked to identify individuals who might participate in peer review and advisory activities in specialized subject areas.

10.3.4. Water Quality Considerations

The initial authorization request includes plan components expected to provide significant regional water quality benefits (e.g., C-44 Basin Storage Area, Taylor Creek/Nubbin Slough Storage and Treatment Area, etc.). Subsequent detailed planning, engineering and design, and review by the interagency RECOVER Team, as part of the implementation process, ensures that the construction and design of initially authorized components will maximize water quality benefits to the maximum extent possible consistent with the overall performance objectives for those components.

The Project Implementation Report process described in this section includes several steps in which water quality considerations can be integrated into the overall implementation process (pre-construction, engineering and design; advanced formulation; RECOVER Team review; detailed planning and engineering; National Environmental Policy Act analyses). This will assure that water quality problems do not impede overall implementation and it will maximize opportunities to protect and restore water quality through the implementation process.

10.3.5. Flood Protection

Due to the conceptual nature of the Comprehensive Plan and the modeling tools used for the alternative analyses, detailed flood damage assessment was not performed for the Comprehensive Plan. However, maintaining levels of flood protection remains an important purpose of the C&SF Project and an objective of the Comprehensive Plan. Project Implementation Reports for individual or groups of components will include a detailed review of flood protection for the area affected by the components. Opportunities for enhancing flood protection in conjunction with other design objectives will be investigated.

10.3.6. Project Management

The magnitude of the effort involved with the implementation of the Comprehensive Plan presents a unique opportunity to utilize Federal, state, local, and tribal resources to achieve the Restudy's goals and objectives. Further, the comprehensive nature of the Restudy does not lend itself to the traditional Corps of Engineers methodology for implementing water resource projects. This is due to the

need to integrate many related features contained within the sixty-plus recommended components that constitute dozens of separable project elements, as well as integrating the components with numerous ongoing Federal, State, tribal, regional and local efforts. Implementation of the Comprehensive Plan may involve multiple sponsors and numerous funding mechanisms. Coupled with a significant increase in the Jacksonville District and the South Florida Water Management District's annual programs, the need for an intense and innovative project management strategy will be necessary to complete implementation of the recommended Comprehensive Plan in a timely manner.

The scope of the recommended Comprehensive Plan warrants a management approach that is programmatic in nature. This "program" will require a management structure that is integrated into both the Corps and the local sponsor's executive, managerial, and technical staffs. The program's resources must be based on a sound strategy for implementation that includes identification of system-wide efforts, assigns responsibility for component development, and provides a projection of funding and manpower requirements supported by appropriate agreements for local cooperation. This management strategy will provide the conceptual framework for Federal, State, local, tribal, and private efforts to protect and restore the south Florida ecosystem.

The implementation process will continue to be open to the public in a manner that maximizes agency and stakeholder review and input. This Implementation Plan and the associated schedule are considered to be a "living" document. Changes to the Implementation Plan will be made when necessary by future information that is gained from pilot projects and additional studies, and other factors such as actual funding, real estate acquisition and certification, and opportunities to re-sequence portions of the project for various reasons.

10.4. SCHEDULE DEVELOPMENT

Development of the Comprehensive Plan implementation schedule was based on guidelines established by the interagency Implementation Plan Team. With these guidelines, a set of rules and assumptions were developed to form the sequencing and scheduling for components of the Comprehensive Plan. The schedule that has been developed for the Implementation Plan is consistent with the level of detail contained in the Comprehensive Plan. That is, the Implementation Plan provides a conceptual level schedule for the Comprehensive Plan. To trouble-shoot the Implementation Plan Team's sequencing of components a quality assurance and quality control modeling analysis was incorporated into the Implementation Plan Schedule development process. The results of this analysis are discussed in more detail in a later part of this section.

10.4.1. Assumptions And Rules

There are three major assumptions made in the preparation of the Implementation Plan prepared for this report. They are related to: project authorization, pilot projects and additional studies, and funding and manpower resources. These are described in the following sections. A set of factors and rules were also developed to guide development of the Implementation Plan. These factors and rules are also described in more detail in the following sections.

10.4.1.1. Project Authorization

In order to expeditiously realize the benefits of the Comprehensive Plan, implementation will be structured so that the work is not subject to institutional delays. Development and approval processes will be streamlined and time between phases will be minimized. Accordingly, it is assumed that Congressional authorizations for project elements will occur so as not to impact project sequencing and scheduling.

10.4.1.2. Pilot Projects and Additional Studies

For the purpose of developing the Implementation Plan, it is assumed that the pilot projects and needed additional studies will not substantially change the recommended Comprehensive Plan. This assumption was made in order to avoid unnecessary complexities in scheduling and sequencing of project components at the conceptual level. This alleviates the need to build every conceivable alternative solution into the network of activities. Such a level of complexity would be problematic in developing the Implementation Plan. This assumption does not negate the need to address contingency or assurance planning in this or any follow-on project document. The Implementation Plan is expected to be revised as the pilot projects and further studies are completed.

10.4.1.3. Funding and Manpower Resources

For planning purposes, the schedule for implementing the Comprehensive Plan uses an annual funding guideline of approximately \$400,000,000. This annual funding guideline reflects the best professional judgement of the Implementation Plan Team. Furthermore, this guideline was coordinated between the Corps and the South Florida Water Management District to insure consistency between the potential cost sharing partners and the capability of both organizations to execute a program of this size. It is recognized that this level of funding is viewed by some as being very aggressive, and by others as not being aggressive enough. The schedule developed for this plan should be considered a model that provides scheduling data (start and completion dates) for the generalized activities associated with component development identified in the Implementation Plan, as well as projecting

funding requirements by distributing the estimated activity's cost over the projected activity's duration. The Implementation Plan's schedule has been developed in a manner that provides the ability to be adjusted for different funding levels.

It is assumed that adequate manpower resources will be available to implement the Comprehensive Plan components at this funding level. Further, it is also assumed that management responsibilities for the construction of projects would be shared by the Corps and the South Florida Water Management District.

10.4.1.4. Sequencing Rules

In order for the Implementation Plan Team to develop the project implementation schedule, it first identified a series of factors and rules to consider in developing the sequence of project implementation. Factors that could expedite component implementation include:

- Components that have physiographic and functional connectivity
- Components that can provide immediate benefits
- Components that contribute to the overall system
- Components that can be implemented through ongoing projects
- Components that need to be implemented to avoid lost opportunity potential

Factors that would typically limit the ability to implement component(s) include:

- Components that have operational limitations
- Components that are dependent on other components
- Components that have land acquisition constraints

As stated previously, the implementation of the recommended Comprehensive Plan will require the integration of many related projects and tasks. The identification of component dependencies and the linking of various activities are complex tasks. The set of general sequencing rules developed by the Implementation Plan Team helped develop a sequence order for all of the components contained in the Comprehensive Plan. These rules provided the Implementation Plan Team with a starting point for establishing the overall project implementation schedule and are as follows:

- Consider earlier sequencing of components according to when the need occurs.
- Consider earlier sequencing of components that are prerequisites to other components.
- Consider earlier sequencing of components that provide replacement function.

- Consider earlier sequencing of components that provide significant benefits.
- Consider earlier sequencing of components that are most likely to provide multiple system-wide benefits.
- Consider earlier sequencing of components whose costs are expected to escalate if implementation is delayed.
- Consider earlier sequencing of tests, studies and pilot projects for components whose technical and permitting feasibility are needed to implement components at a full scale.
- Consider earlier sequencing of components that solve acute problems (i.e., degraded water quality).
- Consider earlier sequencing of components that can be implemented under existing authorizations and appropriations.
- Consider earlier sequencing of components, which if delayed, means "Loss of Opportunity."
- Consider earlier sequencing of components that have design already initiated.
- Consider earlier sequencing of components that provide definite benefits and resolve the existing conditions currently degrading the natural systems.
- Consider earlier sequencing of components that reduce losses of water from the regional system.
- Consider later sequencing of components that primarily serve to meet targets having the greatest level of uncertainty and whose revision may indicate that the component should be eliminated.

10.4.1.5. Integration With Ongoing Projects and Programs

The development of south Florida's water management system has been continuous since the original C&SF Project's authorization. Numerous efforts are currently underway to modify the project. Ongoing efforts within the planning area that are sufficiently developed to be considered in the Comprehensive Plan implementation schedule are:

- C-111 Project
- Modified Water Deliveries to Everglades National Park
- Everglades Construction Project
- Lower East Coast Regional Water Supply Plan
- Kissimmee River Restoration
- Minimum Flows and Levels
- SWIM Plans

Integration of these efforts with implementation of the Comprehensive Plan is critical. Components or features that have been identified in the Comprehensive Plan and are consistent with the authorization of other ongoing efforts will be

pursued under the ongoing effort. To accomplish this, additional coordination with the ongoing Project Team will occur during the detailed planning efforts. For the purposes of this Implementation Plan, when a Comprehensive Plan component or feature will be implemented by an ongoing effort, the completion of this action will be represented as a milestone and will mark the completion of the event. No time or funding will be associated with this component or feature in the Comprehensive Plan Implementation Plan.

10.4.1.6. Modeling Preliminary Implementation Schedule

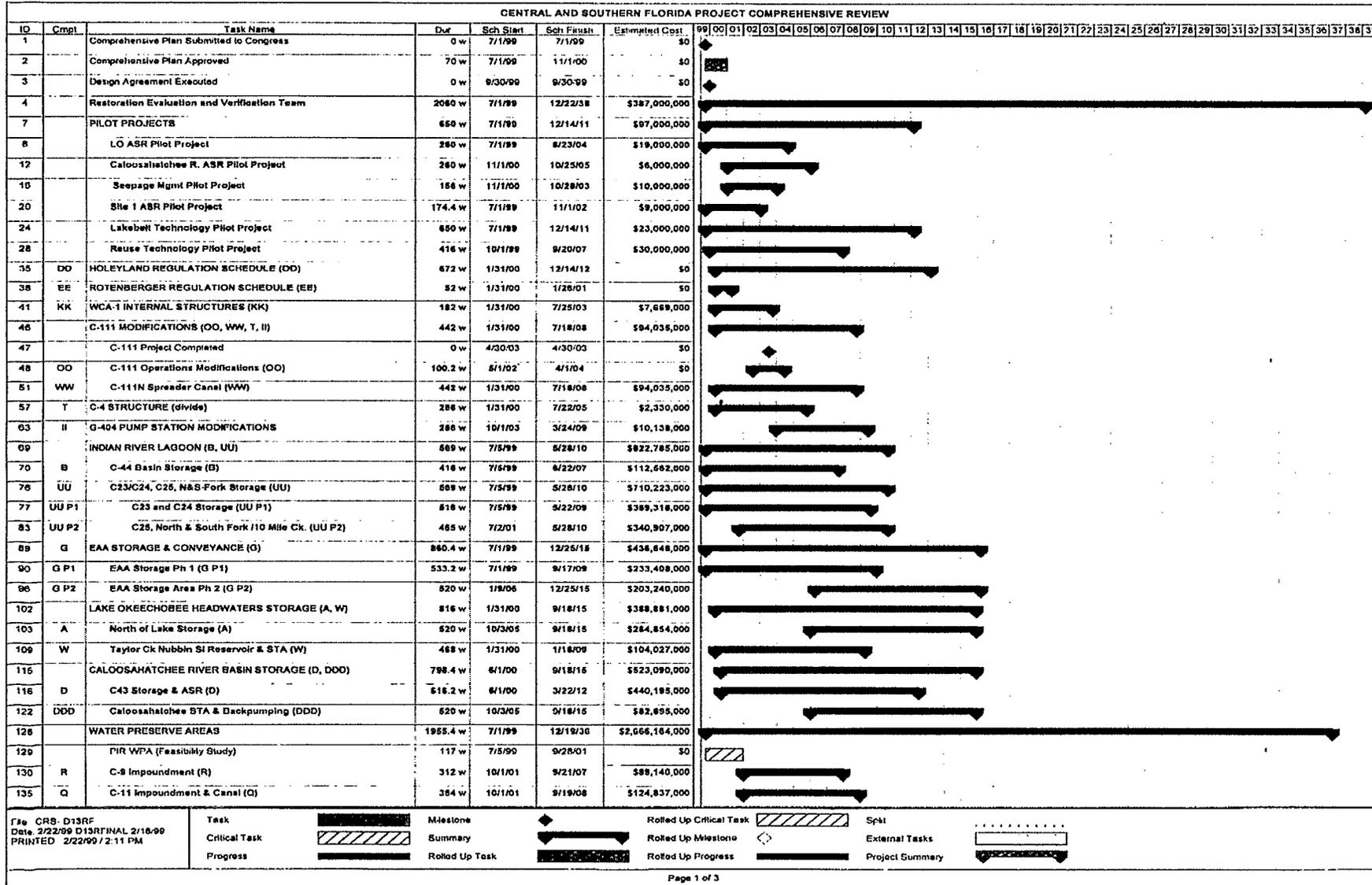
A modeling analysis for the purpose of trouble-shooting the Implementation Plan Team's preliminary sequencing of components was performed and evaluated. The results of the analysis, the 2010 Case Study, were used to aid in the development of the Implementation Plan schedule. The purpose of the analysis was to make sure that the implementation sequencing would not cause any detrimental or unanticipated adverse effects. As a result, the sequencing of some components were modified to correct identified problem areas.

This analysis consisted of identifying the components that were scheduled to be complete and fully operational by the end of year 2010. Those components were then modeled to evaluate whether the sequencing would cause ecological or water supply conditions worse than the 1995 Base Case or the 2050 future without project condition to any area or user. The modeling analysis and evaluation of the components utilized the same performance measures as the alternative plan formulation process. This analysis was used to identify problem areas and validate that the schedule was constructed in a logical order that furthered the project's goals and objectives. It is anticipated that this method will be used during further component development to identify interim solutions that will minimize further degradation of the existing system and maximize interim construction configurations and operations in the most beneficial manner as individual components are brought on-line.

10.4.2. Implementation Schedule

The implementation schedule depicted in *Figure 10-6* represents scheduling of the components contained in the Comprehensive Plan. This schedule represents the Implementation Plan Team's best professional judgement and technical implementation solution for the scheduling of components using the guidelines, assumptions, and rules described earlier in this section. This Gantt chart shows the relative timeline, depicted as a "rolled-up" time scaled bars, for each component recommended in the Comprehensive Plan using the \$400,000,000 annual funding guideline. A more detailed task Gantt schedule is presented in *Appendix M - Implementation Plan Scheduling and Sequencing*.

FIGURE 10-6
ROLLED-UP SCHEDULE



As noted previously, \$400,000,000 per year served as an approximate annual funding guideline. When this guideline was applied to the component sequencing and the estimated duration associated with more detailed planning, design, real estate acquisitions, land availability and construction, all plan components, except for the Lake Belt elements, are fully implemented by the year 2020. Additionally, there are a number of years that annual funding requirements will exceed \$400,000,000 in order to achieve this schedule. The North and Central Lake Belt storage components will not be fully constructed until the year 2037 due to rock mining in the area, which will not be completed for a number of years. An analysis of the project schedule that removed the \$400,000,000 guideline resulted in no significant savings in time to complete implementation of the Comprehensive Plan when compared to the schedule in this report

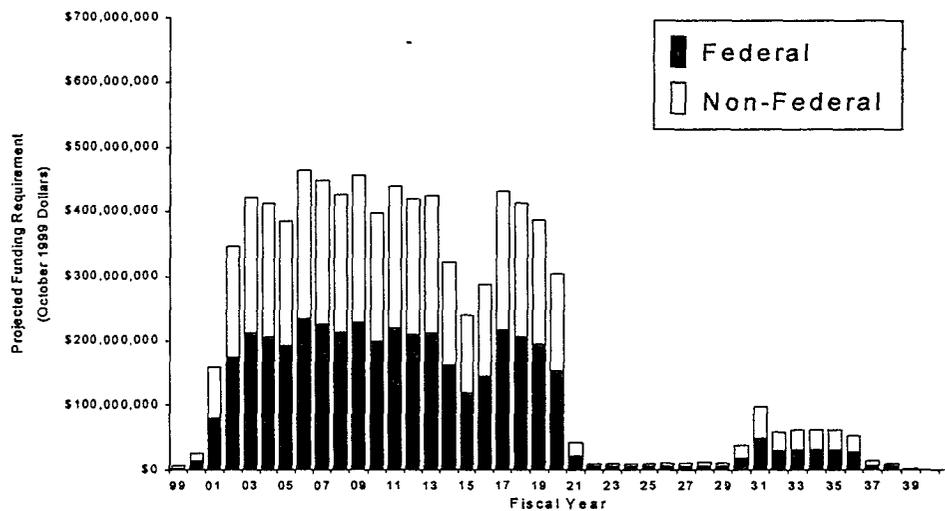
Modifications to the implementation schedule will be made as more information concerning factors that may affect future implementation are identified. Such factors would include, but not limited to future authorizations and actual funding levels. As implementation progresses, adjustments to the schedule will be made as necessary to adjust for the current situation and provide opportunities to advance work consistent with the project's purposes.

10.4.3. Funding Stream

To establish a projected annual funding requirement, the estimated cost of a given activity (Project Implementation Report preparation, Detailed Design, Plans and Specifications, Real Estate Acquisition, Construction, etc.) required to implement a component was evenly distributed over the estimated duration of that activity. It is recognized that a prorated distribution may differ from historical expenditures for construction and other types of activities. The software was limited in distribution technique: therefore, a straight-line distribution was used to establish the funding stream of the schedule developed using the \$400,000,000/year funding guideline. The resulting annual funding projections are depicted in *Figure 10-7*.

Figure 10-7 shows the annual distribution of estimated project costs for the project schedule reflected in October 1999 dollars. These annual costs will be adjusted on an annual basis as implementation progresses past the final report date. Adjustments will be based on further analyses that will be performed by the respective Project Implementation Teams during the more detailed planning and design phases.

**FIGURE 10-7
C&SF RESTUDY IMPLEMENTATION PROJECTED ANNUAL COST**



10.4.4. Evaluation Of The Project Schedule

This section discusses the conditions that may exist in the natural system of south Florida at approximately the half-way point in the implementation of the Comprehensive Plan, about the year 2010. Because restoration of the natural system is the principle goal of the Comprehensive Plan, this discussion uses ecological and biological criteria as measures of natural system conditions in 2010. The accuracy of predictions of system conditions for any given period in the future is substantially influenced by the quality of the models used for this purpose, and by understandings of how systems are likely to respond to specific combinations of features in the plan. These predictions will be difficult to make for any specific time-period prior to the completion of the full plan. System responses will be occurring at many different temporal scales, including some that will occur over multi-year time-frames, and some that may initially exhibit response lags. In addition, we understand less about how natural systems will respond to subsets of the total package of features in the complete plan, than we do about responses to the total package of features. Conceptually, it is agreed that the recovery of NSM-like hydrological patterns throughout the remaining natural system is likely to maximally recover the health of these systems. However, because of the weak understandings of ecological thresholds in the south Florida systems, the degree of recovery towards what are considered to be healthy systems are difficult to predict for different stages prior to full implementation.

Nevertheless, it is worthwhile to attempt to predict what these systems will be like at key stages during the implementation of the plan. This will be a useful contribution to an on-going process of plan re-evaluation and adaptive assessment. The following narrative offers an entirely conceptual and qualitative view of 2010

conditions. Just as the details of the plans will continue to be improved throughout the life of this restoration program, so too will the predictions of system responses be improved. These early predictions should be treated as guidelines for on-going evaluations of an evolving Implementation Plan, and not as concrete descriptions of conditions at a specific time in the future.

10.4.4.1. Reasonable Expectations

In general, the large scale hydrological improvements that will be necessary to stimulate large scale ecological improvements will only come once the features of the Comprehensive Plan which substantially increase water storage capacities of the regional system and the infrastructure needed to move this water, are in place. To the extent that certain features of the Comprehensive Plan must be in place before the additional storage and distribution components can be constructed and operated, some of the major ecological improvements anticipated by the Plan will not occur in the short-term. This unfortunate "reality" should not be viewed with surprise, when one realizes how substantially altered and degraded the south Florida ecosystem has become.

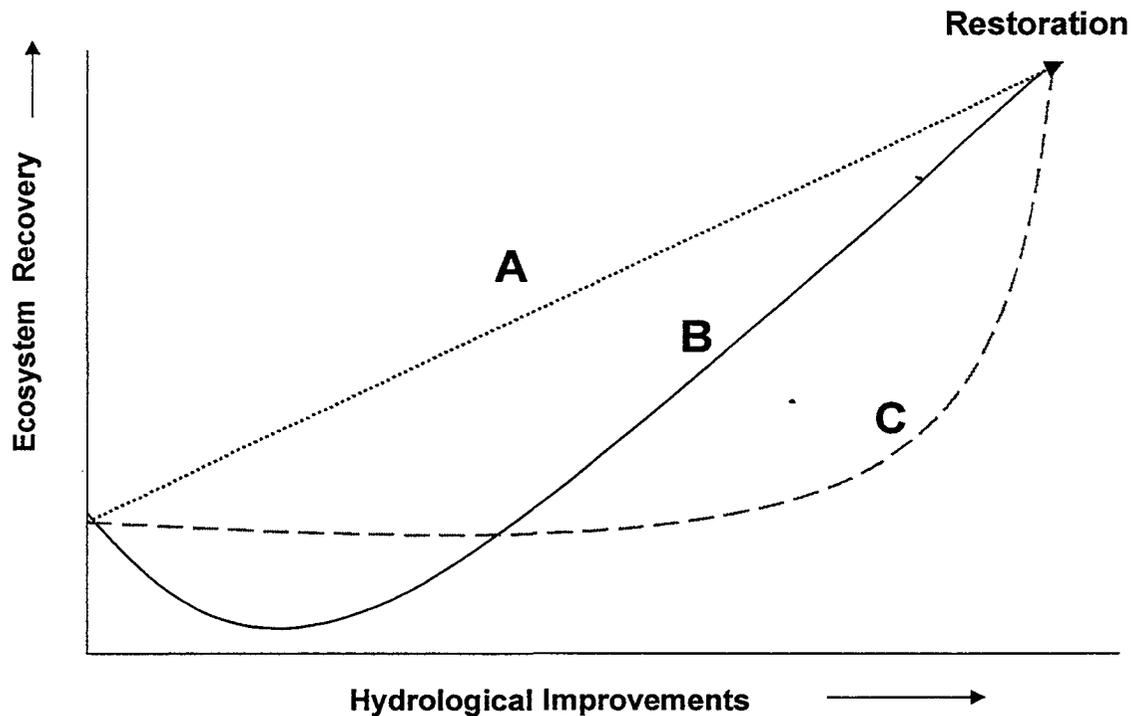
The features of the Comprehensive Plan currently proposed to be fully implemented by 2010 include the components (e.g., seepage control, land acquisition, reservoir construction, development of water preserve areas) that must be in place to set the stage for the addition of substantial amounts of clean water into the natural system. For example, in order to bring water from the urban east coast into the natural system and avoid additional water quality problems, the features required to clean that water must be in place. In order to decompartmentalize the interior Everglades and avoid additional over-drainage problems in Lake Okeechobee and the northern Everglades, the features required to substantially increase the regional storage capacity must be in place. Overall, the strategy of the Comprehensive Plan is to substantially improve hydrological performance within the remaining natural system while at the same time removing water control structures from within the natural areas. The structures that must be relocated outside of the natural system in order to make these internal improvements must be completed before the full benefits of the restoration plan will be achieved.

10.4.4.2. Ecological Responses

Notwithstanding the above considerations, the recovery of healthy ecosystems is most likely to occur in one of three ways (*Figure 10-8*). The simple, conceptual models shown in this figure depict three hypothetical ways that wetland ecosystems and the biological components within these systems can respond to improvements in hydrological conditions. Model "A" suggests that recovery can have a linear relationship with hydrological improvements. Model "B" suggests that changes in hydrological patterns can cause an initial, short-term negative

response, followed by recovery. The third model "C," accounts for the effects of ecological thresholds and lag responses in the recovery process.

FIGURE 10-8
CONCEPTUAL ECOSYSTEM RECOVERY MODELS



Current understandings of organisms in the Everglades suggest that while responses to improvements in hydrological conditions may occur in all three ways, depending on the scales and the organisms measured, most response patterns will resemble "C." It is widely believed that much of the ecological recovery in the south Florida wetland systems will lag behind hydrological improvements, at a wide range of mostly unknown temporal scales. Some responses may occur within months (short-term responses, e.g., shifts in periphyton species composition), some may require one to several years (mid-term responses, e.g., recovery of fish biomass), and some may require decades (long-term responses, e.g., recovery of pre-drainage soil and plant community patterns). The expected hydrological conditions at year 2010 should result in ecological recovery at local spatial scales (e.g., at the scale of alligator holes) and at short-term temporal scales, but is unlikely to show substantial recovery for the mid-term and long-term elements of the systems.

Patterns of recovery resembling the "B" model may occur where hydrological change is more rapid than ecological responses, to the extent that the change can cause relatively short-term but reversible degradation in habitat conditions for specific organisms. A possible example might be in the first one or two years after increased flows reach the mainland mangrove estuaries below Shark Slough, resulting in reduced densities of the large sized fishes preferred by foraging wood storks. Longer periods of high flows will eventually result in increases in prey fish above current average levels. The status of organisms showing this recovery pattern, at any given point in the process of improving hydrological conditions, will depend on whether these organisms are on the early or late portions of the recovery "curve."

Model "A" patterns of recovery may be rare in the real world. It is possible that average rates of recovery over multiple years of good habitat conditions may produce recovery patterns similar to "A." Such recovery rates might be possible in populations of small fishes or aquatic invertebrates. 2010 conditions could produce hydrological patterns conducive to this type of recovery at local spatial scales.

10.4.4.3. Summary

In summary, the natural wetland systems of south Florida will be ecologically healthier by the year 2010 than they are today. This improvement reverses a pattern of ecological degradation in the natural systems that have been occurring for many decades. Most of the improvements will be at comparatively local spatial scales and among the ecological components that exhibit short-term response times. For example, alligator holes in certain regions will be healthier than today, wading birds will have a larger area of favorable feeding habitat, and estuarine conditions in such areas as the St. Lucie system will be substantially improved. The magnitude of hydrological improvements expected by 2010, and the longer time-frames required for responses by many organisms and communities in the greater Everglades basin, mean that many of the ecological benefits of the Comprehensive Plan will be realized during the second half of the project.

10.5. IMPLEMENTATION PROGRAM

Implementation of the Comprehensive Plan will require both a long-term program, which will take place over the next several decades, as well as a commitment of resources from the Federal, State, South Florida Water Management District, and local governments in the region. The recommendations for the implementation program are based on input from the Implementation Plan Team, public meetings, state and agency review, local sponsors, South Florida Water Management District's Letter-of-Intent, Governors Commission for a

Sustainable South Florida, South Florida Ecosystem Restoration Task Force and Working Group.

The implementation program was developed based on an analysis of the scheduling of plan features and ongoing Federal and State programs, such as the C-111 Project and the Everglades Construction Project. This implementation program assumes:

1. Congressional approval of the Comprehensive Plan as a framework and guide for authorization;
2. initial authorization of a specific set of key components and pilot projects in the Water Resources Development Act (WRDA) of 2000;
3. a programmatic authority similar to the existing Critical Projects authority contained in WRDA 1996;
4. future Congressional authorization of components in subsequent WRDAs;
5. implementation of some components without further Congressional action;
6. completion of additional feasibility studies.

10.5.1. Approval of the Comprehensive Plan

Upon transmitting this report to the Commander of the South Atlantic Division in Atlanta, Georgia, and a favorable review by the Division office, the Division Engineer will issue a "Division Engineer's Notice." This notice announces the completion of this feasibility report by the Jacksonville District Engineer. Concurrently with the notice, the Division Engineer will transmit the report to Corps Headquarters in Washington D.C. This feasibility report will receive a final policy compliance review by Headquarters' staff prior to releasing the report for final 30-day Federal agency review. A copy will also be provided to the State of Florida (via the Governor's office) for final State review and comment. Corps headquarters will file the Programmatic Environmental Impact Statement with the Council on Environmental Quality. This will result in a mandatory 30-day review of the Programmatic Environmental Impact Statement. These mandatory review periods will run simultaneously. After addressing comments that are provided through the final review and making any necessary changes to the report, a "Chief of Engineer's Report" will be issued. This report along with the Chief of Engineer's Report will be transmitted to the Assistant Secretary of the Army for Civil Works (ASA(CW)) for review and transmittal to Congress (typically for inclusion in a Water Resources Development Act). By Congressional direction on the Restudy, this must occur by July 1, 1999. Congressional hearings may be held on the plan prior to Congressional action. It is currently anticipated that Congress, through enactment of a Water Resources Development Act of 2000, will approve the Comprehensive Plan as a framework and guide for authorization and implementation and will authorize construction of certain components.

10.5.2. Initial Authorization

Careful attention was given to developing an initial authorization recommendation for pilot projects and key specific components. A number of factors were considered when considering which components should be recommended for initial authorization. Consideration was given to include projects that will provide immediate system-wide water quality and flow distribution benefits to the ecosystem. Initial authorization of components associated with ongoing Federal, state and local programs will allow for integration of components from the Comprehensive Plan with these ongoing projects as soon as possible. For example, immediate authorization will allow development of comprehensive solutions to ongoing Federal and state projects such as the Modified Water Deliveries Project and the Everglades Construction Project that otherwise could not be pursued under existing authorities. Further, it is anticipated that there may be substantial cost savings by integrating the Comprehensive Plan components with these ongoing programs. The South Florida Water Management and U.S. Department of the Interior have purchased lands associated with a number of components of the Comprehensive Plan. Immediate authorization of the components that utilize these lands will ensure timely and efficient utilization and crediting of these lands.

10.5.2.1. Pilot Projects

Pilot projects are needed to address many of the technical uncertainties of the components. The Implementation Plan Team agreed early in the process that the following pilot projects should be recommended for immediate implementation. *Table 10-2* includes the list of the pilot projects to be recommended for authorization and the estimated cost and completion dates of these projects.

10.5.2.2. Initially Authorized Project Components

As stated previously, careful attention was given to developing an initial authorization recommendation for specific project components. The purpose of seeking authorization of select components of the Comprehensive Plan is to maximize the opportunity to integrate these features with ongoing Federal and state programs. The specific components that are recommended for this initial authorization are displayed in *Table 10-3*.

**TABLE 10-2
PILOT PROJECTS**

| Project | Cost | Completion Date |
|--------------------------|---------------------|-----------------|
| Lake Okeechobee ASR | \$19,000,000 | 2004 |
| Caloosahatchee River ASR | \$6,000,000 | 2005 |
| Site 1/Hillsboro ASR | \$9,000,000 | 2002 |
| Lake Belt Technology | \$23,000,000 | 2011 |
| Seepage Management | \$10,000,000 | 2003 |
| Reuse Technology | \$30,000,000 | 2007 |
| TOTAL | \$97,000,000 | |

**TABLE 10-3
CONSTRUCTION FEATURES FOR INITIAL AUTHORIZATION**

| Component | Report Section ¹ | Project | Cost | Construction Dates |
|---------------------------------|-----------------------------|--|------------------------|--------------------|
| B | 9.1.4.1 | C-44 Basin Storage Reservoir | \$112,562,000 | 6/04 - 6/07 |
| G (Phase 1) | 9.1.5.1 | Everglades Agricultural Area Storage Reservoirs - Phase I | \$233,408,000 | 9/05 - 9/09 |
| M ³ (Phase 1) | 9.1.8.11 | Site 1 Impoundment | \$38,535,000 | 9/04 - 9/07 |
| O ^{2a} | 9.1.8.13 | WCA 3A/3B Levee Seepage Management | \$100,335,000 | 9/04 - 9/08 |
| Q ^{2a} | 9.1.8.13 | C-11 Impoundment & Stormwater Treatment Area | \$124,837,000 | 9/04-9/08 |
| R ^{2a} | 9.1.8.14 | C-9 Impoundment/Stormwater Treatment Area | \$89,146,000 | 9/04-9/07 |
| W | 9.1.1.2 | Taylor Creek/Nubbin Slough Storage and Treatment Area | \$104,027,000 | 1/05-1/09 |
| QQ ^{2b,3} (Phase 1) | 9.1.7.2 | Raise and Bridge East Portion of Tamiami Trail and Fill Miami Canal within WCA 3 | \$26,946,000 | 1/05-1/10 |
| SS ^{2b} | 9.1.7.2 | North New River Improvements | \$77,087,000 | 1/05 - 1/09 |
| WW | 9.1.8.26 | C-111 N Spreader Canal | \$94,035,000 | 7/05 - 7/08 |
| | 9.5 | Adaptive Assessment and Monitoring Program (10 years) | \$100,000,000 | |
| | | TOTAL | \$1,100,918,000 | |

¹ Refer to the appropriate section in this Feasibility Report for a description of these features

^{2a,2b} Project components are dependent upon each other and would be implemented as a single project

³ Although the initial phase of this project component is within the cost limits of the proposed Programmatic Authority, the total cost for the component exceeds that authority and therefore is included with these recommended construction features

10.5.2.3. Implementation of Initially Authorized Projects

Due to the scope of this feasibility report, it is proposed that individual Project Implementation Reports be developed subsequent to authorization for each of the components included in the initial authorization. These Project

Implementation Reports will document advanced planning; engineering and design; real estate analyses; and supplemental requirements under the National Environmental Policy Act. It is anticipated that these reports will be approved by the Secretary of the Army without need for further Congressional action unless major changes to the Comprehensive Plan are recommended. Subsequent to the approval of the Project Implementation Report, recommended features will progress to detailed design and construction. The implementation of the initially authorized features will utilize the process depicted in *Figure 10-9*.

10.5.3. Programmatic Authority

The Water Resources Development Act of 1996 provided authorization (see **Appendix A5**) for Everglades Ecosystem Restoration Projects (Critical Projects). These projects were defined as those projects which would “*produce independent, immediate, and substantial restoration, preservation, and protection benefits.*” A similar programmatic authority is recommended to help expedite implementation of certain components in the Comprehensive Plan. It is proposed that projects included under the programmatic authority will be those components that are part of the Comprehensive Plan and have a total project cost up to \$70,000,000 with a maximum Federal cost of \$35,000,000. The timing of the implementation of projects receiving programmatic authority will be consistent with the schedule that has been developed for implementing the overall Comprehensive Plan. In addition, the process for project development and implementation will be consistent with the implementation of other Comprehensive Plan components recommended for authorization in Water Resource Development Act of 2000 including the development of Project Implementation Reports. The components that could be implemented under this authority are displayed in *Table 10-4*.

**FIGURE 10-9
PROCESS FOR IMPLEMENTING INITIALLY AUTHORIZED COMPONENTS**

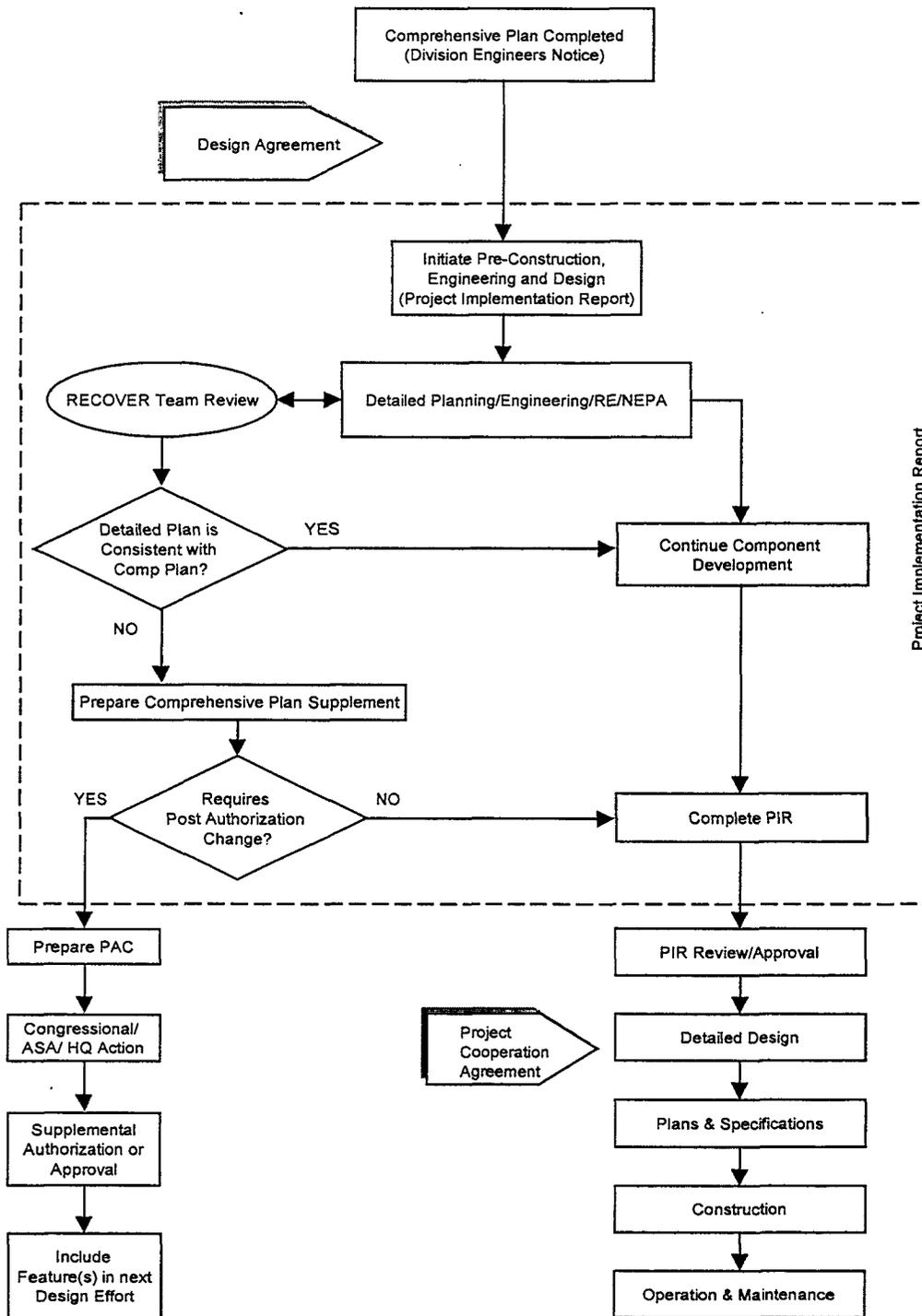


TABLE 10-4
PROGRAMMATIC AUTHORITY PROJECTS
 (Assumes \$35 million Federal limit; 50-50 Cost Sharing)

| Item | Report Section | Project | Cost | Construction Dates |
|------|----------------|---|----------------------|--------------------|
| OPE | 9.1.1.5 | Lake Istokpoga Regulation Schedule Modification | \$50,000 | 7/00-12/01 |
| KK | 9.1.7.3 | Loxahatchee NWR Internal Canal Structures | \$7,669,000 | 7/02-7/03 |
| OPE | 9.1.9.5 | Lake Park Restoration | \$5,166,000 | 6/02-6/04 |
| OPE | 9.1.9.3 | Lake Trafford Restoration | \$15,408,000 | 12/01-12/04 |
| OPE | 9.1.9.2 | Southern Crew Project | \$3,435,000 | 6/03-6/05 |
| OPE | 9.1.9.1 | Southern Golden Gates Estates Hydraulic Restoration | \$45,654,000 | 6/03-6/05 |
| T | 9.1.8.19 | C-4 Divide Structures | \$2,330,000 | 7/04-7/05 |
| OPE | 9.1.10.1 | Florida Keys Tidal Restoration | \$1,251,000 | 9/03-8/05 |
| OPE | 9.1.1.4 | Lake Okeechobee Tributary Sediment Dredging & Phosphorus Removal | \$4,700,000 | 9/04-9/05 |
| OPE | 9.1.9.4 | Henderson Creek/Belle Meade Restoration | \$4,806,000 | 12/03-12/05 |
| OPE | 9.1.8.5 | Winsburg Farms Wetland Restoration | \$14,140,000 | 12/03-12/05 |
| OPE | 9.1.8.25 | Restoration of Pineland & Hardwood Hammocks in C-111 basin | \$600,000 | 3/04-3/06 |
| OPE | 9.1.8.1 | Pal-Mar and J.W. Corbett Wildlife Management Area Hydropattern Restoration | \$10,500,000 | 9/04-9/06 |
| OPE | 9.1.8.3 | Acme Basin B Discharge | \$20,100,000 | 9/04-9/06 |
| OPE | 9.1.8.10 | Protect and Enhance Existing Wetland Systems along Loxahatchee National Wildlife Refuge | \$52,722,000 | 10/05-10/07 |
| BB | 9.1.8.18 | Dade-Broward Levee / Pennsuco Wetlands | \$18,778,000 | 9/04-9/08 |
| X | 9.1.8.6 | C-17 Backpumping and Treatment | \$20,190,000 | 10/05-10/08 |
| Y | 9.1.8.8 | C-51 Backpumping and Treatment | \$32,632,000 | 10/05-10/08 |
| OPE | 9.1.7.4 | Miccosukee Water Management Plan | \$24,459,000 | 12/04-12/08 |
| AA | 9.1.7.2 | Additional S-345 Structures | \$48,450,000 | 1/06-1/09 |
| II | 9.1.7.1 | Modify G-404 Pump Station | \$10,138,000 | 3/08-3/09 |
| RR | 9.1.7.1 | Flow to Northwest and Central Water Conservation Area 3A | \$20,739,000 | 4/05-4/09 |
| CC | 9.1.8.12 | Broward County Secondary Canal System | \$12,898,000 | 6/04-6/09 |
| OPE | 9.1.1.3 | Lake Okeechobee Watershed Water Quality Treatment Facilities | \$62,247,000 | 9/06-9/10 |
| OPE | 9.1.8.4 | Lake Worth Lagoon Restoration | \$2,300,000 | 3/09-3/11 |
| OPE | 9.1.11.1 | Melaleuca Eradication Project and other Exotic Plants | \$5,772,000 | 9/09-9/11 |
| CCC | 9.1.6.1 | Big Cypress/L-28 Interceptor Modifications | \$42,751,000 | 9/12-9/16 |
| | | TOTAL | \$489,885,000 | |

10.5.4. Future Water Resources Development Acts

The recommended components of the Comprehensive Plan that are not initially authorized or eligible for the proposed programmatic authority will be submitted to Congress for construction authorization (as scheduled) in future Water Resources Development Acts. Project Implementation Reports that are completed

by April of a Water Resources Development Act year (assumed to be biennial) will be submitted for Congressional action. Based on an analysis of the current Comprehensive Plan schedule, components will have Project Implementation Reports completed and ready to submit to Congress through fiscal year 2016. The components that will be contained in future authorization acts are contained in *Table 10-5*.

**TABLE 10-5
PROJECTS BEYOND WRDA 2000**

| Item | Report Section | Project | Cost | WRDA | Construction Dates |
|----------------------|----------------|---|------------------------|------|--------------------|
| V; FF ¹ | 9.1.8.21 | L-31N Improvements for Seepage Management and S-356 Structures | \$184,218,000 | 2002 | 10/05-10/10 |
| U | 9.1.8.20 | Bird Drive Recharge Area | \$124,083,000 | 2002 | 12/08-12/13 |
| UU1 | 9.1.4.2 | C-23/C-24 Storage Reservoirs | \$369,316,000 | 2002 | 6/05-5/09 |
| UU2 | 9.1.4.2 | C-25/Northfork and Southfork Storage Reservoirs | \$340,907,000 | 2004 | 7/06-5/10 |
| OPE | 9.1.6.2 | Seminole Big Cypress Water Conservation Plan East & West | \$75,288,000 | 2004 | 6/05-6/08 |
| D | 9.1.3.1 | C-43 Basin Storage Reservoir & Aquifer Storage and Recovery | \$440,195,000 | 2004 | 4/05-3/12 |
| LL | 9.1.8.8 | C-51 Regional Groundwater Aquifer Storage and Recovery | \$132,336,000 | 2004 | 9/08-9/13 |
| VV | 9.1.8.9 | Palm Beach County Agricultural Reserve Reservoir and Aquifer Storage and Recovery | \$124,099,000 | 2004 | 8/09-8/13 |
| K;GGG ^{1,2} | 9.1.8.2 | Water Preserve Area / L-8 Basin | \$415,182,000 | 2006 | 9/07-9/14 |
| M Phase 2 | 9.1.8.11 | Site 1 Aquifer Storage and Recovery | \$92,844,000 | 2006 | 10/10-10/14 |
| FFF;OPE ¹ | 9.1.8.23 | Biscayne Bay Coastal Wetlands | \$299,583,000 | 2006 | 5/12-5/18 |
| DDD | 9.1.3.2 | Caloosahatchee Backpumping with Stormwater Treatment | \$82,895,000 | 2008 | 9/11-9/15 |
| GG | 9.1.2.1 | Lake Okeechobee Aquifer Storage and Recovery | \$1,097,312,000 | 2008 | 7/10-6/20 |
| G Phase 2 | 9.1.5.1 | Everglades Agricultural Storage Phase 2 | \$203,240,000 | 2010 | 7/12-12/15 |
| A | 9.1.1.1 | North of Lake Okeechobee Storage Reservoir | \$284,854,000 | 2010 | 9/11-9/15 |
| QQ Phase 2 | 9.1.7.2 | Water Conservation Area 3 Decentralization and Sheetflow Enhancement | \$59,204,000 | 2012 | 1/15-1/19 |
| S; EEE ¹ | 9.1.8.17 | Central Lake Belt Storage Area | \$489,861,000 | 2012 | 2/15-12/36 |
| XX | 9.1.8.15 | North Lakebelt Storage Area | \$516,061,000 | 2012 | 2/16-6/36 |
| YY; ZZ ¹ | 9.1.8.16 | Diverting Water Conservation Area 2 and 3 Flows to Central Lake Belt Storage | \$79,657,000 | 2012 | 2/14-2/18 |
| HHH | 9.1.8.22 | West Miami -Dade County Reuse | \$437,237,000 | 2014 | 6/16-6/20 |
| BBB | 9.1.8.24 | South Miami-Dade County Reuse | \$363,024,000 | 2014 | 6/16-6/20 |
| TOTAL | | | \$6,211,396,000 | | |

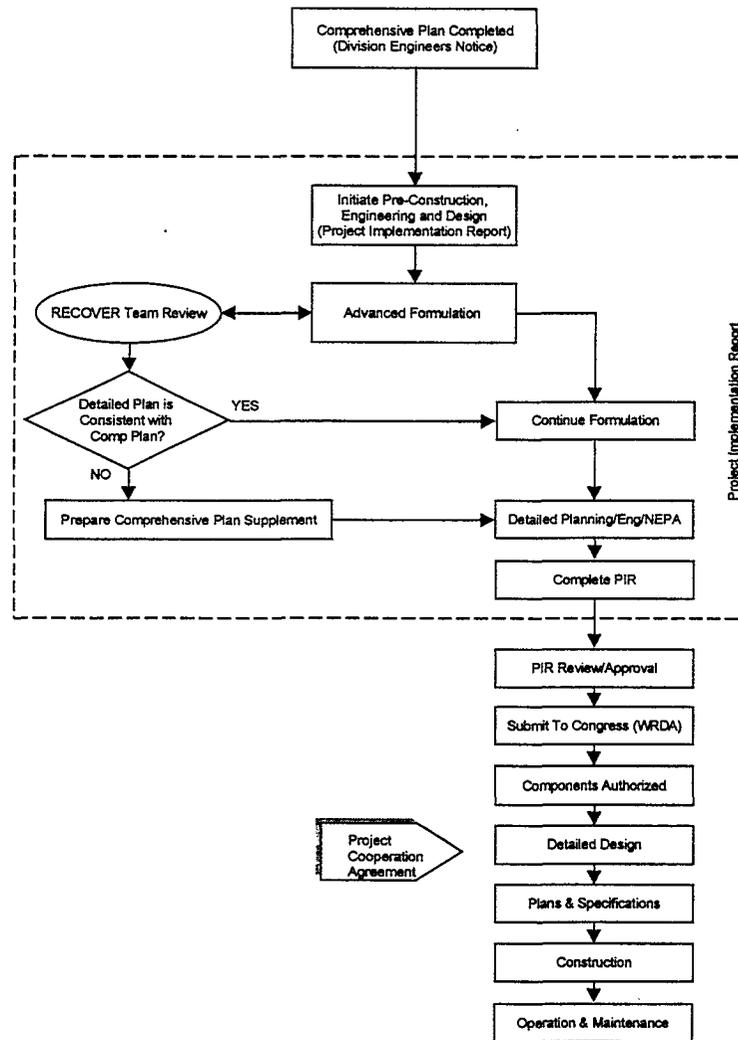
¹ For determining projects for future WRDA authorizations, certain components were combined to form functional component packages for construction features that were clearly dependent

² The reservoir in component GGG may be implemented under a previous authorization

10.5.4.1. Implementation of Projects in Future WRDAs

The implementation of these components would require congressional authorization before construction could commence. Hence, implementation of these components would utilize the process depicted in *Figure 10-10*. Based on the current scheduling, there are occasions when more than one Project Implementation Report will be completed and ready to be submitted to Congress for construction authorization. In this case, multiple components may be packaged together in a Project Implementation Report for a single decision document.

**FIGURE 10-10
PROCESS FOR COMPONENTS TO BE AUTHORIZED IN FUTURE WRDAs**



10.5.5. Components Not Needing Congressional Authorizations

There are several components that do not require additional congressional action to implement. These components are integral to the overall success of the project, but for various reasons (covered under a separate authorization, locally implemented program, etc.) will not require congressional action prior to design and implementation. A list of these components is provided in *Table 10-6*.

**TABLE 10-6
PROJECTS NOT REQUIRING CONGRESSIONAL ACTION**

| Item | Report Section | Project | Explanation |
|------|----------------|---|--|
| F | 9.2.1.1 | Lake Okeechobee Regulation Schedule | Operational change only; implement when appropriate as other facilities come on line |
| E | 9.2.2.1 | Environmental Water Supply Deliveries to the Caloosahatchee Estuary | Operational change only; implement when appropriate as other facilities come on line |
| C | 9.2.3.1 | Environmental Water Supply Deliveries to the St. Lucie Estuary | Operational change only; implement when appropriate as other facilities come on line |
| H | 9.2.4.1 | Everglades Rain Driven Operations | Operational change only; implement when appropriate as other facilities come on line |
| L | 9.2.5.1 | Change Coastal Wellfield Operations | Operational change only |
| DD | 9.2.4.2 | Modified Holey Land Wildlife Management Area Operation Plan | Implement under existing state process |
| EE | 9.2.4.3 | Modified Rotenberger Wildlife Management Area Operation Plan | Implement under existing state process |
| AAA | 9.2.5.2 | Lower East Coast Utility Water Conservation | Implement under existing state process |
| OO | 9.2.5.3 | Operational Modifications to Southern Portion of L-31N and C-111 | Operational change only; implement as part of C-111 Project |

10.5.6. Feasibility Studies

Three new feasibility studies – the Florida Bay and the Florida Keys Feasibility Study, Southwest Florida Feasibility Study, and Comprehensive Integrated Water Quality Plan have been identified for initiation. These studies will be conducted under the authority of the Water Resources Development Act of 1996 that allows for the continuation of studies and analyses that are necessary to further the Comprehensive Plan. For a description of these studies, refer to *Section 9.7*.

10.6. RECOMMENDED FEATURES FOR INITIAL AUTHORIZATION

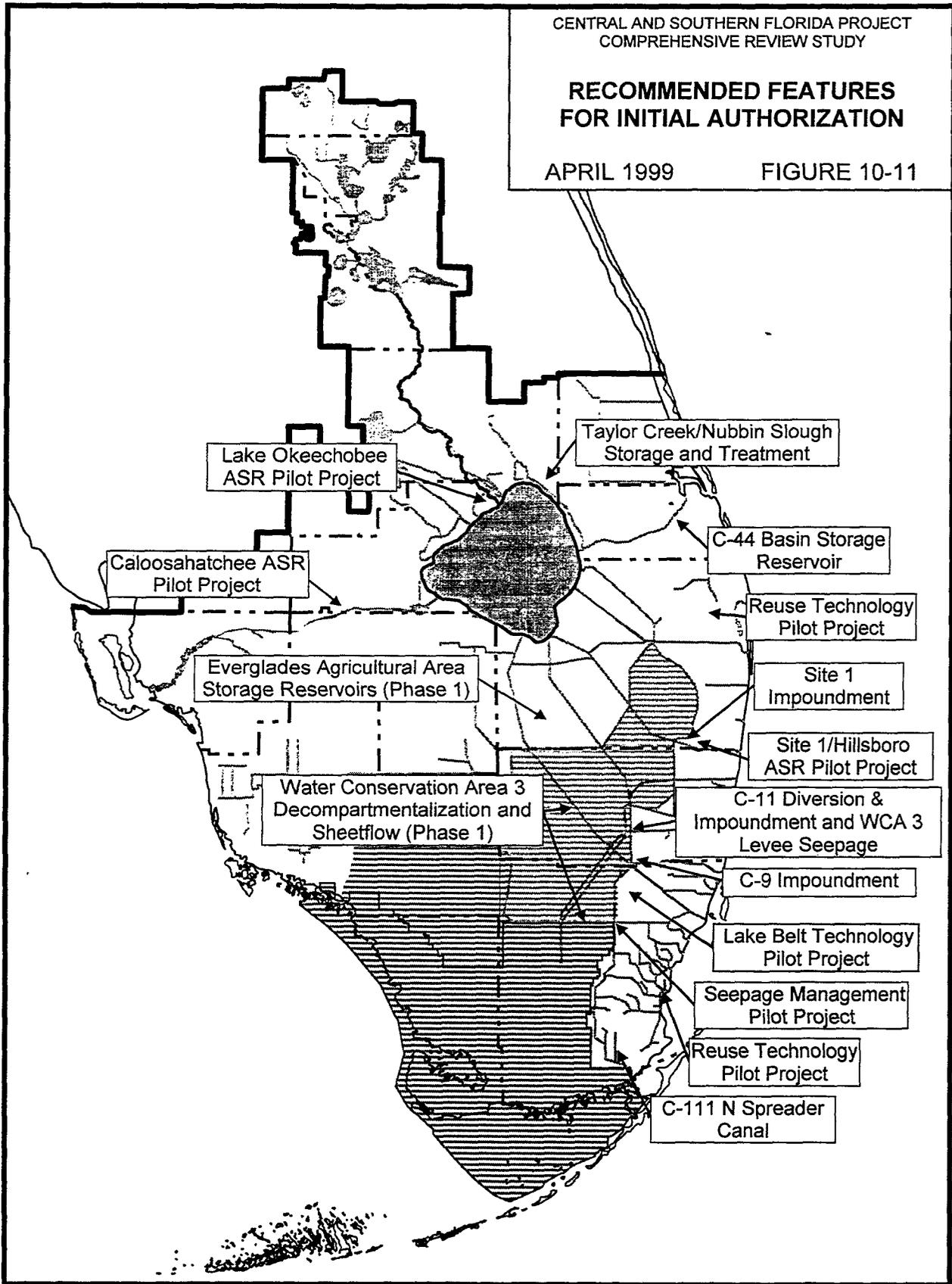
The features of the Comprehensive Plan which are recommended for initial authorization include those projects that are necessary to expedite ecological restoration of the south Florida ecosystems. Implementing these features will ensure maximum integration with ongoing Federal, State, and local ecological restoration and water quality improvement programs. The features, which are shown in *Figure 10-11*, consist of pilot projects, initial construction features and an adaptive assessment and monitoring program. This section describes the projects recommended for initial authorization.

Subsequent to Comprehensive Plan, advanced planning and engineering design will be accomplished for each of the major features included in this recommendation. These studies will be conducted over the next few years and will result in Project Implementation Reports as previously described. These reports will document advance planning, engineering design, real estate analyses, and supplemental National Environmental Policy Act documents associated with the construction and operation of these features.

10.6.1. Pilot Projects

Pilot projects are needed to address uncertainties associated with some of the physical features that are proposed in the Comprehensive Plan. To ensure that the Comprehensive Plan is implemented in a timely manner, it is necessary to expedite the pilot projects to resolve issues before further detailed design of these facilities can be initiated. The design and analysis of the pilot projects will be coordinated through the multi-agency RECOVER Team. These pilot projects are designed to determine the feasibility, as well as optimum design, of the features prior to embarking on the full-scale development of these features. These projects include:

- Aquifer Storage and Recovery in each geographic region that the technology is proposed,
- In-ground Reservoir technology in the Lake Belt region of Miami-Dade County,
- Levee Seepage Management technology adjacent to Everglades National Park, and
- Advanced Wastewater Treatment technology to determine the feasibility of using reuse water for ecologic restoration.



10.6.1.1. Aquifer Storage and Recovery Pilot Projects

Aquifer Storage and Recovery is a major element in several components of the Comprehensive Plan. Due to the difference in the geomorphology and the potential for different raw water sources (i.e., surficial ground water or surface water), multiple aquifer storage and recovery pilot projects are proposed. These aquifer storage and recovery pilot projects are necessary to identify the most suitable sites for the aquifer storage and recovery wells in three areas:

- Adjacent to Lake Okeechobee
- Caloosahatchee River Basin
- the Lower East Coast area adjacent to the Site 1 and the Hillsboro Canal

In December 1998, an Aquifer Storage and Recovery Issue Team was formed by the South Florida Ecosystem Restoration Working Group to develop an action plan and identify projects to address the surface water, hydrogeological and geochemical uncertainties associated with regional aquifer storage and recovery facilities (SFERWG, 1998a). This report will serve as the basis for developing the aquifer storage and recovery pilot projects which will determine the specific water quality characteristics of waters to be injected and the water quality characteristics of the receiving aquifer. In addition, the pilot projects will provide information on the hydrogeological and geotechnical characteristics of the upper Floridan Aquifer System within the regions, and the ability of the upper Floridan Aquifer System to store injected water for future recovery.

10.6.1.2. In-Ground Reservoir Technology Pilot Project

Several components use areas where lime rock mining will have occurred (see *Sections 9.1.8.2, 9.1.8.15 and 9.1.8.17*). The initial design of these reservoirs includes subterranean seepage barriers around their perimeter in order to enable drawdown during dry periods, prevent seepage losses and prevent water quality impacts due to transmissivity of the aquifer in these areas.

The In-ground Reservoir Technology Pilot Project is required to determine construction technologies, storage efficiencies, impacts on local hydrology and water quality effects. Water quality assessments will include a determination as to whether the in-ground reservoirs and seepage barriers will allow for storage of untreated waters without concerns of ground water contamination.

10.6.1.3. L-31N Seepage Management Pilot Project

Hydrologic modeling results have shown that controlling seepage from the Everglades produces desirable hydrologic conditions within the Everglades. However, the proposed technologies to control the seepage may have unintended

consequences that must be investigated before full-scale implementation of the proposed project features. These features included reducing levee seepage flow across L-31N adjacent to Everglades National Park via a levee cutoff wall (see *Section 9.1.8.21*). This feature was designed to reduce groundwater flows during the wet season by capturing groundwater flows with a series of ground water wells adjacent to L-31N, then backpumping those flows to Everglades National Park.

The purpose of the L-31N Seepage Management Technologies Pilot Project is to investigate seepage management technologies technology to control seepage from Everglades National Park. The pilot project will provide necessary information to determine the appropriate amount of wet season groundwater flow to return to the Park while minimizing potential impacts to Miami-Dade County's West Wellfield and freshwater flows to Biscayne Bay.

10.6.1.4. Wastewater Reuse Technology Pilot Project

The Comprehensive Plan includes two advance wastewater treatment facilities (see *Sections 9.1.8.22 and 9.1.8.24*) to increase the quantity of water available for ecological restoration. However, the high cost and the issues concerning the quality of the water must be further investigated through a pilot project.

This pilot project will address water quality issues associated with discharging reclaimed water into natural areas such as the West Palm Beach's Catchment Area, Biscayne National Park, and the Bird Drive Basin, as well as determine the level of superior treatment and the appropriate methodologies for that treatment. A series of studies will be conducted to help determine the level of treatment needed. In addition, a small advanced wastewater treatment facility that was previously included as a Critical Project will be constructed to treat wastewater that is presently disposed by deep well injection from the East Central Regional Wastewater Treatment Facility. This treatment will be accomplished by using advanced and superior wastewater treatment processes to remove nitrogen and phosphorus. After treatment the wastewater will be used to restore 1,500 acres of wetlands and to recharge wetlands surrounding the City of West Palm Beach's wellfield. A portion of the treated wastewater will be used to recharge a residential lake system surrounding the City's wellfield and a Palm Beach County wellfield.

Besides serving as a pilot project, this project will reduce the City's dependence on surface water from Lake Okeechobee during dry or drought events. In addition, approximately 2,000 acres of wetlands would be created or restored. Other benefits include aquifer recharge and replenishment, reduction of water disposed in deep injection wells and a reduction of stormwater discharge to tide.

10.6.1.5. Pilot Project Costs

The total estimated cost of the Pilot Projects is \$97,000,000, at October 1999 price levels. These costs include \$9,411,000 for planning, engineering and design; \$9,800,000 for real estate; and \$77,789,000 for construction and associated monitoring. *Table 10-7* displays the total cost for the proposed pilot projects. The long-term operation cost of the pilot projects are accounted for in the operation and maintenance cost of the full-scale project feature.

10.6.2. Initial Features for Authorization

This section identifies the major features recommended for initial authorization including location, the need for early authorization, the project description, the benefits of these features, the costs of each feature and the need for additional studies as needed.

10.6.2.1. C-44 Basin Storage Reservoir

This feature is located in the Upper East Coast region of south Florida in southern Martin County and is shown in *Figure 10-12*. The storage reservoir will be constructed in close proximity to the C-44 Canal within the C-44 Basin. The exact location of the reservoir has not been identified at this time. The location will be determined during detailed design as a result of recommendations of the Indian River Lagoon Feasibility Study.

This feature is included in the initial authorization for a number of reasons. Preliminary analyses has shown that the majority of the Restudy benefits to the natural areas will not be realized until most of the major storage features, such as reservoirs like this, are in place. Early authorization of this component is expected to provide significant regional water quality benefits, specifically to the St. Lucie River and Estuary and the Indian River Lagoon, in the form of nutrient reduction. In addition, early authorization will provide the opportunity to moderate damaging releases to St. Lucie estuary from Lake Okeechobee and the surrounding basin as soon as possible. The Indian River Lagoon and the St. Lucie Estuary experienced significant impact as a result of releases made from the lake during the spring of 1998. In addition, Martin County has shown strong support for the Restudy passing a resolution in late 1998 to generate a funding source for land acquisition for environmental restoration in the county.

This feature includes an above ground reservoir with a total storage capacity of approximately 40,000 acre-feet located in the C-44 Basin in Martin County. The initial design of the reservoir assumes 10,000 acres with the water levels fluctuating up to 4 feet above grade. The final location, size, depth and

configuration of this facility will be determined through more detailed analysis to be completed as a part of the ongoing Indian River Lagoon Feasibility Study.

The purpose of the feature is to capture local runoff from the C-44 Basin, then return the stored water to the C-44 Canal when there is a water supply demand. The reservoir will be designed for flood flow attenuation to the estuary, water supply benefits including environmental water supply deliveries to the estuary, and water quality benefits to reduce salinity and nutrient impacts of runoff to the estuary.

During the wet season, this large storage component will aid in the prevention of damaging regulatory releases to the estuary while reducing basin flooding by capturing and storing excess stormwater runoff. Subsequently, during the dry season, water supply, including environmental water supply to the estuary, will be enhanced, as stored water is metered out to the system as needed. Inflows to the storage facility include local basin runoff and releases from Lake Okeechobee when the lake stage is greater than 14.5 feet NGVD. The initial design includes inflow pump capacity of 1,000 cfs and outflow structure capacity of 800 cfs. This feature is currently scheduled for construction initiation in June 2004 with completion in June 2007.

Regulatory releases were made from Lake Okeechobee through the C-44 Canal from December 1997 until late April 1998. These regulatory releases ranged from 2,500 cfs to 7,000 cfs for most of the duration. The St. Lucie River and Estuary and the Indian River Lagoon experienced reduced salinity concentrations outside the range of the established minimums for a healthy ecosystem. During this release event, approximately 33 species of lesioned fish were discovered by local fisherman, 450 individual lesioned fish were sent to the Florida Marine Research Institute for analysis, local citizens became concerned for human health related to water quality in surrounding waters, and in addition, silting of the offshore reef system was discovered. The actual cause of the epidemic of lesioned fish is still unknown, but scientists are working from the theory that the heavy freshwater discharges and the associated water quality are connected (SFERWG, 1998).

By capturing excess stormwater runoff and storing it, harmful wet season regulatory releases will be reduced, protecting oysters, seagrasses and other estuarine organisms. Water quality benefits include protecting the estuary from excessive freshwater pulses that drastically reduce salinities, and protecting the estuary from the nutrients inherent in stormwater runoff. Controlled releases of the stored water during the dry season will protect the estuary from high salinities during the dry season as well. These freshwater deliveries to the St. Lucie Estuary will protect and restore more natural estuarine conditions. The stored water will also be returned to the C-44 Canal when needed to meet agricultural water supply demands.

Minimum and maximum flows were identified which would cause poor water quality conditions for the estuary. This feature, in combination with component UU (storage features in the C-23, C-24, C-25, Northfork and Southfork Basins) and modifications to the Lake Okeechobee operation schedule, will require development of a series of operational rules for all associated facilities. These rules will help to maintain optimal salinity conditions in the estuary in order to support a range of aquatic vegetation, seagrass, invertebrates, and fish communities.

There are other ongoing efforts in the areas affected by this feature of the Comprehensive Plan. They are the South Florida Water Management District's Upper East Coast Water Supply Plan, the Indian River Lagoon Surface Water Improvement and Management Plan and the Indian River Lagoon Feasibility Study.

The total initial cost for construction of the C-44 Basin Storage Reservoir is \$112,563,000 at October 1999 price levels. This includes planning costs of \$902,000, engineering and design costs of \$602,000, real estate costs of \$90,675,000 and construction costs of \$20,384,000. The annual operations, maintenance, repair, replacement and rehabilitation costs are \$760,000. The real estate land requirement for the C-44 Basin Storage Reservoir is estimated at 10,000 acres in Martin county.

Operation and maintenance costs for the C-44 Reservoir are based upon the following: levee mowing on a regular basis; routine maintenance and equipment replacement based upon an annual investment for control structures; canal maintenance that includes removal of floating and submerged vegetation plus shoreline spraying; and maintenance, operation and replacement costs for an unmanned electric inflow pump station and seepage pumps.

10.6.2.2. Everglades Agricultural Area Storage Reservoirs Phase-1

This feature is located on lands in the Everglades Agricultural Area in western Palm Beach County on lands being purchased with Department of Interior Farm Bill funds, with South Florida Water Management District funds, and through a series of exchanges for lands being purchased with these funds. The location of the Phase 1 lands, which includes both the Talisman Land purchase (including exchanges) and the Carroll Property, are shown in *Figure 10-13*. The area presently consists of land that is mostly under sugar cane cultivation. This feature will be implemented consistent with the Farm Bill land acquisition agreements.

This feature is included in the initial authorization for three reasons: 1) lands needed for the project have been or will be acquired by the U.S. Department of Interior and the South Florida Water Management District, 2) it provides the opportunity to construct the facility in a manner that is mutually beneficial for the

Comprehensive Plan and the sponsor's Everglades Construction Project, 3) expedites construction of this facility which provides multiple environmental, water supply, and flood protection benefits. This feature will improve timing of environmental deliveries to the Water Conservation Areas including reducing damaging flood releases from the Everglades Agricultural Area to the Water Conservation Areas, reduce Lake Okeechobee regulatory releases to estuaries, meet supplemental agricultural irrigation demands, and increase flood protection within the Everglades Agricultural Area.

This feature includes above ground reservoir(s) with a total storage capacity of approximately 240,000 acre-feet located on land associated with the Talisman Land purchase in the Everglades Agricultural Area. Conveyance capacity increases for the Miami, North New River, Bolles and Cross Canals are also included in the design of this feature. The initial design for the reservoir(s) assumed 40,000 acres, divided into two, equally sized compartments with the water level fluctuating up to 6 feet above grade in each compartment. As originally envisioned, Compartment 1 would be a 20,000-acre reservoir at 6 feet maximum depth with inflow pumps with a capacity of 2,700 cfs from the Miami Canal Basin and 2,300 cfs from the North New River Canal Basin for diversion of Everglades Agricultural Area runoff. Outflow to the Everglades Agricultural Area would be through a 3,000 cfs structure to Miami Canal Basin and a 4,400 cfs structure to North New River and Hillsboro Basins. Compartment 2 would be a 20,000-acre reservoir at 6 feet maximum depth with inflow pumps with a capacity of 4,500 cfs from the Miami Canal Basin and 3,000 cfs from the North New River Canal Basin for diversion of Lake Okeechobee regulatory releases. Outflow to the Everglades Construction Project's Stormwater Treatment Areas 3 and 4 would be through a 3,600 cubic foot per second structure. Canal conveyance capacities would be increased by 200 percent for the Miami, North New River and Bolles and Cross Canal in order to direct Lake Okeechobee regulatory releases to the reservoir. The Project Implementation Report for the project will address the specific location and sizing of the facility as well as more site-specific design of levees and pump stations. In addition, the extent of conveyance improvements for the North New River Canal, the Miami Canal, and the Bolles and Cross Canal will be identified.

As originally designed, Compartment 1 of the reservoir would be used to meet Everglades Agricultural Area irrigation demands. The source of water is excess Everglades Agricultural Area runoff. Overflows to Compartment 2 could occur when Compartment 1 reaches capacity and Lake Okeechobee regulatory discharges are not occurring or impending. Compartment 2 would be used to meet environmental demands as a priority, but could supply a portion of Everglades Agricultural Area irrigation demands if environmental demands equal zero. Flows will be delivered to the Water Conservation Areas through Stormwater Treatment Areas 3 and 4. The sources of water are overflow from Compartment 1 and Lake Okeechobee regulatory

releases. Compartment 2 will be operated as a dry storage reservoir and discharges made down to 18 inches below ground level.

Operation and maintenance costs are based upon levee mowing on a regular basis; control structure maintenance and annualized equipment replacement; canal maintenance including removal of floating and submerged vegetation and shoreline spraying; unmanned seepage control pump maintenance, power and annualized equipment replacement; and manned diesel pump station maintenance and operation costs including direct labor, fuel and power, annualized equipment replacement and overhaul and structural maintenance and repair.

The benefits to the project derived from this feature include improved storage and conveyance features that will enhance the water supply to the natural areas and support better timing of water deliveries to the Water Conservation Areas by capturing and managing flood releases from the Everglades Agricultural Area to the Water Conservation Areas. This component will reduce the need to make damaging regulatory releases from Lake Okeechobee to the St. Lucie and Caloosahatchee estuaries and will help meet Everglades Agricultural Area irrigation needs while increasing flood protection in the area.

The total initial cost for this feature is \$233,408,000, which includes planning costs of \$9,621,000, engineering and design costs of \$6,414,000, no real estate costs and construction costs of \$217,373,000. No real estate costs are included in the initial cost for this feature, as the land being purchased with Department of Interior Farm Bill funds, with South Florida Water Management District funds, and through a series of exchanges for lands being purchased with these funds. Cost sharing allocations between the Federal government and the South Florida Water Management District for this will be determined during the Project Implementation Report. The annual operation costs are \$14,458,000.

10.6.2.3. Water Conservation Area 3 Decompartmentalization and Sheetflow Phase - 1

These project modifications will occur within the Water Conservation Areas and Everglades National Park in Broward and Miami-Dade Counties and is shown in *Figure 10-14*.

This project is included in the initial authorization for two reasons; 1) to provide immediate opportunities for enhanced sheetflow within Water Conservation Area 3 and between Water Conservation Area 3 and Everglades National Park and 2) to integrate with ongoing modifications that are being made in the detailed design and construction of the Modified Water Deliveries to Everglades National Park project.

This project as originally envisioned includes backfilling the Miami Canal in Water Conservation Area 3 from one to two miles south of the S-8 pump station down to east coast protective levee. To make up for the loss of water supply conveyance to the Lower East Coast urban areas from the Miami Canal, the capacity of the North New River Canal south of the proposed Everglades Agricultural Area Storage Reservoir will be doubled to convey additional water supply deliveries to Miami-Dade County as necessary. The capacities of S-351 and S-150 to pass additional water supply deliveries down the North New River Canal to Miami-Dade County will be doubled. In addition, the conveyance of the L-33 and L-37 borrow canals on the west side of US 27 between L-38W and the Miami Canal will be increased as necessary to pass the additional flows. Modifications will also be made to the eastern section of Tamiami Trail which includes elevating the roadway through the installation of a series of bridges between L-31N Levee and the L-67 Levees. The eastern portion of L-29 Levee and Canal will also be degraded in the same area as Tamiami Trail modifications. The Project Implementation Report will address the scope and method to be used for Miami Canal backfilling, conveyance improvements to the North New River Canal and, the bridging of Tamiami Trail, and L-29 modifications that are necessary to enable unrestricted flow from Water Conservation Area 3 into Everglades National Park. The sequencing of these modifications will also be addressed in the Project Implementation Report. These project modifications will be coordinated with the existing Modified Water Deliveries to Everglades National Park Project as well as the development of rainfall driven operational schedules for Water Conservation Area 3 and Everglades National Park.

The modifications described above will provide the initial increment of more integrated passive management of Water Conservation Area 3 and Everglades National Park. It is anticipated that these modifications will be made in association with the implementation of rainfall driven operational schedules for both Water Conservation Area 3 and Everglades National Park.

Operation and maintenance costs are based upon control structure maintenance and annualized equipment replacement and canal maintenance including removal of floating and submerged vegetation.

The benefits to the project from this feature are that restoring sheet flow will reduce the unnatural discontinuities in the landscape. Depth patterns will be more gradual, aquatic organisms will be able to move more freely, exotic species will not have the advantage of deep water canals that provide thermal refuge or dry levees on which to grow. Normal proportions of predators/prey species in fish populations will be undisturbed. Natural interspersions of different marsh habitats will replace the current system of upstream pools and downstream dry area on either side of barriers. The result will be better quality and more easily accessible habitat for wading birds and other Everglades species.

The total initial cost for this feature is \$104,033,000, which includes planning costs of \$3,205,000, engineering and design costs of \$2,137,000, real estate costs of \$26,279,000 and construction costs of \$72,412,000. The annual operation costs are \$650,000.

10.6.2.4. Site 1 Impoundment

This feature is located in southern Palm Beach County adjacent to the Hillsboro Canal and Loxahatchee National Wildlife Refuge and Water Conservation Area 2A and is shown in *Figure 10-15*.

This feature is included in the initial authorization for several reasons: 1) a large portion of the lands required for the feature have already been acquired by the sponsor, 2) benefits to the ecosystem will be gained from this feature by capturing water that is normally sent to tide and returning it to the system early in the process, and 3) uncertainty in constructing this feature is minimized by postponing the construction of the aquifer storage and recovery portion until after the pilot project for this site is completed. The purpose of this feature is to supplement water deliveries to the Hillsboro Canal during dry periods thereby reducing demands on Lake Okeechobee and Loxahatchee National Wildlife Refuge.

This feature includes an above ground reservoir with a total storage capacity of approximately 15,000 acre-feet. The initial design of the reservoir assumed 2,460 acres with water levels fluctuating up to 6 feet above grade. An inflow pump station with a capacity of 700 cfs, an outflow structure with a capacity of 200 cfs and an emergency outflow structure with a capacity of 700 cfs are proposed. The final size, depth and configuration of these facilities will be determined through more detailed planning and design to be completed as a part of the Water Preserve Areas Feasibility Study.

The reservoir will be filled during the wet-season from excess water pumped from the Hillsboro Canal. Water will be released back to the Hillsboro Canal to help maintain canal stages during the dry-season. If water is not available in the reservoir, existing rules for water delivery to this region will be applied.

Operation and maintenance costs are based upon levee mowing on a regular basis; control structure maintenance and annualized equipment replacement; canal maintenance including removal of floating and submerged vegetation; shoreline spraying; unmanned pump station and seepage control pump maintenance, power and annualized equipment replacement.

The benefits to the project will be a reduction in demands on the Loxahatchee National Wildlife Refuge and Lake Okeechobee during the early dry season as well

as a reduction in the amount of water discharged to tide. By reducing the demands on Lake Okeechobee the littoral zone of the Lake and the marshes in the Refuge will suffer fewer damaging low levels.

There are additional studies planned for this site. They include a small ongoing reservoir pilot project performed by the South Florida Water Management District and as part of this initial authorization, a pilot project for aquifer storage and recovery to address the uncertainty regarding applying the technology at this feature location.

The total initial cost for this feature is \$38,535,000, which includes planning costs of \$616,000, engineering and design costs of \$411,000, real estate costs of \$23,587,000 and construction costs of \$13,921,000. The annual operation costs are \$733,000.

10.6.2.5. Western C-11 Diversion Impoundment and Canal and Water Conservation Areas 3A and 3B Levee Seepage Management

This feature is located in western Broward County east of Water Conservation Area 3A and 3B and is shown in *Figure 10-16*. The diversion canal is located west of US-27 between C-11 and C-9 Canals. The C-11 stormwater treatment area/impoundment is located northeast of the intersection of U.S. Highway 27 and C-11 Canal.

Initial authorization is necessary due to the existing operation of the S-9 pump station. The original C&SF Project design provides for Western C-11 Basin drainage to be pumped into Water Conservation Area 3. This feature will provide the necessary facilities to maintain flood protection within the basin, while reducing flows through the S-9 to Water Conservation Area 3. Other factors supporting initial authorization include: 1) lands were identified as suitable by both the East Coast Buffer Feasibility Analysis and the Water Preserve Areas Land Suitability Analysis; 2) lands are being actively acquired by sponsor; 3) this feature is consistent with ongoing programs such as the Water Preserve Areas Feasibility Study and the Everglades Stormwater Program; and 4) acquisition and utilization of land which is suitable for storage and water quality treatment are rapidly being lost to urbanization.

This feature includes canals, levees, water control structures, and a stormwater treatment area/impoundment with a total storage capacity of 6,400 acre-feet. The initial design of the stormwater treatment area/impoundment assumed 1,600 acres with the water level fluctuating up to 4 feet above grade. The initial design of the diversion canal west of U.S. Highway 27 is for a conveyance capacity of 2,500 cfs. A 2,500 cfs conveyance capacity improvement is envisioned to the C-9 canal between S-30 and the C-9 Impoundment. An intermediate 2,500 cfs pump station in the C-11 canal will be used to direct runoff to the C-11 stormwater

treatment area/impoundment. A seepage collection canal and inflow pump station will also be used on the C-11 stormwater treatment area/impoundment. A 2,200 cfs outflow structure is envisioned to discharge from the impoundment to C-11 west of U.S. 27 to the diversion canal. The final size, depth and configuration of these facilities will be determined through more detailed planning and design to be completed as a part of the Water Preserve Areas Feasibility Study.

Runoff in the western C-11 Canal Basin that was previously backpumped into Water Conservation Area 3A through the S-9 pump station will be diverted into the C-11 Stormwater Treatment Area/Impoundment and then into either the North Lake Belt Storage Area, the C-9 Stormwater Treatment Area/Impoundment, or Water Conservation Area 3A after treatment, as applicable.

Operation and maintenance costs are based upon regular mowing of levee surfaces; control structure maintenance and annualized equipment replacement; manned diesel pump station maintenance and operation costs including direct labor, fuel and power, annualized equipment replacement and overhaul, structural maintenance and repair; canal maintenance including removal of floating and submerged vegetation; and shoreline spraying.

The benefit to the project from this feature is that Water Conservation Area 3A water quality will improve when the poor quality runoff from the western C-11 Canal basin is no longer being backpumped into it through the S-9 pump station. This component diverts that water into the C-11 Stormwater Treatment Area/Impoundment where it then becomes available for either the C-9 Stormwater Treatment Area/Impoundment, the North Lake Belt Storage Area after it is operational or Water Conservation Area 3A after treatment, as applicable. In addition, this feature will help control seepage from Water Conservation Areas 3A and 3B by increasing groundwater elevations directly east of the east coast protective levee.

The C-11 Critical Project is currently under construction at this site and is fully compatible with this feature.

The total initial cost for this feature is \$225,172,000, which includes planning costs of \$2,371,000, engineering and design costs of \$1,581,000, real estate costs of \$167,646,000 and construction costs of \$53,574,000. The annual operation costs are \$783,000.

10.6.2.6. C-9 Stormwater Treatment Area/Impoundment

This feature is located in the western C-9 Basin in Broward County and is shown in *Figure 10-17*.

This feature is included in the initial authorization due to its interaction with the C-11 Stormwater Treatment Area and Impoundment. Other factors supporting initial authorization of this feature include: 1) lands were identified as suitable by both the East Coast Buffer Feasibility Analysis and the Water Preserve Areas Land Suitability Analysis; 2) lands are being actively acquired by sponsor; 3) this feature is consistent with ongoing programs such as the Water Preserve Areas Feasibility Study and the Everglades Stormwater Program; and 4) acquisition and utilization of land which is suitable for storage and water quality treatment are rapidly being lost to urbanization; 5) this area is necessary for diversion of C-11 Basin flows prior to the completion of the North Lake Belt Storage Area which is later in the implementation schedule; 6) improved flood protection in the Western C-9 Basin.

This feature includes canals, levees, water control structures and a stormwater treatment area/impoundment with a total capacity of approximately 10,000 acre-feet. The initial design of the stormwater treatment area/impoundment assumed 2,500 acres with the water level fluctuating up to 4 feet above grade. An inflow pump station with a capacity of 1,000 cfs and an outflow gravity structure with a capacity of 1,000 cfs are also envisioned for the impoundment. A seepage collection canal and pump station with a capacity of 200 cfs are needed to prevent impact to private adjacent land. The final size, depth and configuration of these facilities will be determined through more detailed planning and design to be completed as a part of the Water Preserve Areas Feasibility Study.

Operationally, excess stormwater runoff from the C-11 Basin and Western C-9 Basin will be pumped into the C-9 Stormwater Treatment Area/Impoundment for storage and water quality treatment prior to making water supply deliveries to the C-9, or C-6/C-7 Canals. Seepage from C-9 Stormwater Treatment Area/Impoundment will be collected and returned to the impoundment.

Operation and maintenance costs are based upon levee mowing on a regular basis; canal maintenance including removal of floating and submerged vegetation and shoreline spraying; unmanned seepage control pump maintenance, power and annualized equipment replacement; and manned diesel pump station maintenance and operation costs including direct labor, fuel and power, annualized equipment replacement and overhaul and structural maintenance and repair.

The benefits from this feature will include enhancing groundwater recharge within the basin, provide seepage control for Water Conservation Area 3 and buffer areas to the west thereby keeping more of the natural system's water in the natural system. In addition flood protection for the western C-9 Basin will be enhanced.

The total initial cost for this feature is \$89,146,000, which includes planning costs of \$1,080,000, engineering and design costs of \$720,000, real estate costs of

\$62,939,000 and construction costs of \$24,407,000. The annual operation costs are \$616,000.

10.6.2.7. C-111N Spreader Canal

This feature is located in south Miami-Dade County in the Southern Glades and Model Lands areas as shown in *Figure 10-18*

This feature is included in the initial authorization for several reasons: 1) early authorization will allow for inclusion into the ongoing detailed design and construction of the C-111 project, and 2) inclusion of a stormwater treatment area to provide water quality treatment of agricultural runoff prior to distributing water through the C-111N spreader canal. This feature will improve deliveries and enhance the connectivity and sheetflow in the Model Lands and Southern Glades areas, reduce wet season flows in C-111, and decrease potential flood risk in the lower south Miami-Dade County area.

This feature includes construction, modification or removal of levees, canals, pumps, water control structures, culverts and a stormwater treatment area. This feature enhances the C-111 Project design for the C-111N Spreader Canal with: the construction of a 3,200 acre stormwater treatment area; the enlarging of pump station S-332E from 50 cfs to 500 cfs; increasing the capacity of C-111N for the higher capacity of flow and the extension of the canal approximately two miles under U.S. Highway 1 and Card Sound Road into the Model Lands; and culverts under U.S. Highway 1 and Card Sound Road. The initial design of this feature pumps water from the C-111 and the C-111E Canals through two 250 cfs pump stations into a stormwater treatment area prior to discharging through S-332E to the Southern Glades and the Model Lands through the C-111N Canal. This feature also fills in the southern reach of the C-111 Canal below C-111N to S-197; removal of structures S-18C and S-197; completely backfilling C-110; and removal of adjacent levees and roads. The final size, depth, location and configuration of this feature will be determined through more detailed planning and design.

Operation and maintenance costs are based upon regular mowing of levee surfaces; canal maintenance including removal of floating and submerged vegetation and shoreline spraying; unmanned seepage control pump maintenance, power and annualized equipment replacement; and unmanned electric pump station maintenance and operation costs including power, annualized equipment replacement and overhaul and structural maintenance and repair.

This feature improves deliveries and enhances the connectivity and sheetflow in the Model Lands and Southern Glades areas, reduces wet season flows in C-111, and decreases potential flood risk in the lower south Miami-Dade County area while

improving the quality of water discharged into the Model Lands and Southern Glades areas.

The total initial cost for this feature is \$94,034,000, which includes planning costs of \$1,990,000, engineering and design costs of \$1,326,000, real estate costs of \$45,766,000 and construction costs of \$44,952,000. The annual operation costs are \$60,000.

10.6.2.8. Taylor Creek/Nubbin Slough Storage and Treatment Area

This feature is located northeast of Lake Okeechobee in the Taylor Creek/Nubbin Slough (S-191) Basin. This basin is located in Okeechobee, St. Lucie and Martin Counties. An initial site for a portion of the facilities is located near the northeastern shores of Lake Okeechobee and at the base of Nubbin Slough shown in *Figure 10-19*. The site consists of large areas of improved pasture and hayfields of an existing dairy operation.

This feature is included in the initial authorization for three reasons: 1) a portion of the lands needed for the project have been identified by the sponsor; 2) flows to Lake Okeechobee will be attenuated when lake levels are high or rising and 3) water quality treatment will be provided for flows from the Taylor Creek/Nubbin Slough basin which currently contribute the highest phosphorus inflow concentrations to Lake Okeechobee.

This feature includes an above-ground reservoir with a total storage capacity of approximately 50,000 acre-feet and a stormwater treatment area with a capacity of approximately 20,000 acre-feet in the Taylor Creek/Nubbin Slough Basin. The initial design of this feature assumed a reservoir of 5,000 acres with water levels fluctuating up to 10 feet above grade and a stormwater treatment facility of approximately 5,000 acres. It is anticipated that there will be a series of reservoir and stormwater treatment facilities located throughout the basin. The Project Implementation Report will address the location and sizing of the facilities as well as the design of levees and pump stations for the reservoirs and stormwater treatment areas.

Local runoff from the Taylor Creek/Nubbin Slough Basin will be pumped into the reservoir then into an adjacent stormwater treatment area. The stormwater treatment area will reduce phosphorus concentrations in the runoff from approximately 0.58 mg/l to 0.117 mg/l. Treated water will be pumped into Lake Okeechobee when the lake stage is falling and is at least 0.5 feet below the bottom pulse release zone.

Operation and maintenance costs are based upon levee mowing on a regular basis; canal maintenance including removal of floating and submerged vegetation

and shoreline spraying; unmanned seepage control pump maintenance, power and annualized equipment replacement; and manned diesel pump station maintenance and operation including direct labor, fuel and power, annualized equipment replacement and overhaul and structural maintenance and repair.

This feature will benefit the project by protecting Lake Okeechobee from excessive high levels that impact the littoral zone as well help reduce regulatory releases from the lake to the St. Lucie and Caloosahatchee estuaries. Lake Okeechobee will also benefit from receiving the water when lake levels decline, providing protection from damaging low levels. Water quality treatment will reduce the nutrient load on the lake to the benefit of all of the Lake's native organisms including the substantial fishery.

The total initial cost for this feature is \$104,026,000, which includes planning costs of \$3,064,000, engineering and design costs of \$2,042,000, real estate costs of \$29,700,000 and construction costs of \$69,220,000. The annual operation costs are \$2,164,000.

10.6.3. Adaptive Assessment and Construction Monitoring Program

An extensive Adaptive Assessment Program, which includes a system-wide monitoring program will be conducted to support the ecosystem restoration objectives of the Comprehensive Plan as described in *Section 9.5*. This program will provide an opportunity to continue investigating concepts and issues relative to the overall Comprehensive Plan while implementation of the initial project features are underway. The Adaptive Assessment Program, which will be implemented through the RECOVER Team described in *Section 10.3.3*, will include continued system-wide evaluation and analysis among other planning activities. The construction and regional monitoring program will have a dual focus on the biological and hydrological restoration objectives in the natural systems, and the water supply and flood protection objectives in the urban and agricultural regions.

This Adaptive Assessment Program for the Comprehensive Plan is still under development. Given the conceptual nature of the Comprehensive Plan and the need to integrate the monitoring program portion with other ongoing efforts, it is difficult to prepare a detailed estimate of its cost at the present time. However, based on other ongoing programs including this feasibility study and other ecologic restoration monitoring programs such as the Kissimmee River Restoration Project, the total estimated annual cost for this program is estimated to be \$10,000,000. For Corps of Engineers programming purposes, this cost is assumed to be a "Construction" cost as opposed to Operation and Maintenance cost since it is required to advance the project to completion.

10.6.4. Total Cost for Features Included in this Recommendation

The total cost includes the initial cost of planning, engineering and design, and construction as well the annual operation and maintenance costs of the features recommended for initial authorization.

10.6.4.1. Implementation Cost

The total estimated cost of the initial authorization of the recommended Comprehensive Plan is \$1,198,000,000 (rounded) at October 1999 price levels. The cost estimate is shown in *Table 10-7*. This estimate is the "base line" estimate, and does not account for future price escalation.

**TABLE 10-7
IMPLEMENTATION COST OF INITIAL AUTHORIZATION**

| Project | | IMPLEMENTATION COSTS | | | | | Operation & Maintenance |
|---------------------------|--|----------------------|------------------------|----------------------|----------------------|------------------------|-------------------------|
| | | Planning | Engineering and Design | Real Estate | Construction | Total | |
| B | C-44 Basin Storage Reservoir | \$902,000 | \$602,000 | \$90,675,000 | \$20,384,000 | \$112,563,000 | \$760,000 |
| G (Phase 1) | Everglades Agricultural Area Storage Reservoirs – (Phase 1) | \$9,621,000 | \$6,414,000 | \$0 | \$217,373,000 | \$233,408,000 | \$14,458,000 |
| QQ (Phase 1) and SS | Water Conservation Area 3 Decompartmentalization and Sheetflow (Phase 1) | \$3,205,000 | \$2,137,000 | \$26,279,000 | \$72,412,000 | \$104,033,000 | \$650,000 |
| M (Phase 1) | Site 1 Impoundment | \$616,000 | \$411,000 | \$23,587,000 | \$13,921,000 | \$38,535,000 | \$733,000 |
| Q & O | Western C-11 Diversion and Impoundment and WCA 3A & B Levee Seepage Management | \$2,371,000 | \$1,581,000 | \$167,646,000 | \$53,574,000 | \$225,172,000 | \$783,000 |
| R | C-9 Impoundment/Stormwater Treatment Area | \$1,080,000 | \$720,000 | \$62,939,000 | \$24,407,000 | \$89,146,000 | \$616,000 |
| WW | C-111N Spreader Canal | \$1,990,000 | \$1,326,000 | \$45,766,000 | \$44,952,000 | \$94,034,000 | \$60,000 |
| W | Taylor Creek/Nubbin Slough Storage and Treatment Area | \$3,064,000 | \$2,042,000 | \$29,700,000 | \$69,220,000 | \$104,026,000 | \$2,164,000 |
| | Pilot Projects | \$2,225,000 | \$7,186,000 | \$9,800,000 | \$77,789,000 | \$97,000,000 | |
| | Adaptive Assessment and Monitoring (10 years) | \$100,000,000 | | | | \$100,000,000 | |
| | TOTALS | \$125,074,000 | \$22,419,000 | \$456,392,000 | \$594,032,000 | \$1,197,917,000 | \$20,224,000 |

10.6.4.2. Operation, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) Costs

Annual operation and maintenance costs were estimated for the initial construction features of the recommended Comprehensive Plan. The operation and maintenance costs were determined by extrapolating from operational cost histories supplied by the South Florida Water Management District. The costs reflect projected values based on past trends encountered and represent the difference between with versus without the Comprehensive Plan. Replacement costs were calculated for culverts and mechanical and electrical equipment related to pump plants and spillway structures. The OMRR&R costs are estimated to be \$20,000,000 (rounded).

10.6.5. Cost Sharing

Table 10-8 contains an apportionment of project costs between the Federal government and the non-Federal sponsor based on the cost sharing provisions described in *Section 9.9*.

Annual operation and maintenance costs for the initial features will also be shared equally between the Federal Government and the non-Federal sponsor as described in *Section 9.9.4*. The estimated annual Federal cost is \$10,112,000 and the estimated non-Federal cost is \$10,112,000.

**TABLE 10-8
COST APPORTIONMENT**

| | Total | Federal | Non-Federal |
|------------------------------------|-----------------|---------------|---------------|
| Construction ¹ | \$741,525,000 | \$598,958,500 | \$142,566,500 |
| Lands, Easements, Rights-of-way | \$456,392,000 | \$0 | \$456,392,000 |
| Total | \$1,197,917,000 | \$598,958,500 | \$598,958,500 |
| Rounded | \$1,198,000,000 | \$599,000,000 | \$599,000,000 |

¹ Includes Planning; Preconstruction, Engineering and Design; and Construction Management.

10.6.6. Financial Analysis

It is expected that the South Florida Water Management District will have the capability to provide the required local cooperation for the recommended features identified in this Section. The South Florida Water Management District has provided a statement of financial capability which is included in *Appendix G, Local Cooperation and Financial Analysis*.

10.6.7. 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 pre-construction engineering and design costs will be repaid during the first year of construction.

A project may be initiated only after the sponsor has entered into a binding Project Cooperation Agreement with the Department of the Army, which are normally negotiated during the pre-construction engineering and design phase. Project Cooperation Agreements will be developed for each separable project that is implemented. The Project Cooperation Agreement assigns Federal and non-Federal responsibilities, which, for the Comprehensive Plan, will include as a minimum the following items of local cooperation:

- a. Provide 50 percent of the total project costs as further specified below:
 1. Enter into an agreement, which provides, prior to construction, 25 percent of pre-construction engineering and design (PED) costs;
 2. Provide, during construction, any additional funds needed to cover the non-Federal share of pre-construction engineering and design costs;
 3. Provide all lands, easements, and rights-of-way, including suitable borrow and dredged or excavated material disposal areas, and perform or assure the performance of all relocations determined by the Government to be necessary for the construction, operation, and maintenance of the project;
 4. Provide or pay to the Government the cost of providing all retaining dikes, wasteweirs, bulkheads, and embankments, including all monitoring features and stilling basins, that may be required at any dredged or excavated material disposal areas required for the construction, operation, and maintenance of the project; and
 5. Provide, during construction, any additional costs as necessary to make its total contribution equal to 50 percent of total project costs.
- b. Grant the Government a right to enter, at reasonable times and in a reasonable manner, upon land which the local sponsor owns or controls for access to the project for the purpose of inspection, and, if necessary, for the purpose of completing, operating, maintaining, repairing, replacing, or rehabilitating the project.
- c. For so long as the project remains authorized assume responsibility for operating, maintaining, replacing, repairing, and rehabilitating (OMRR&R) the project or completed functional portions of the project, including mitigation features, with 50 percent of the funding provided by the Federal government, in a manner compatible with the project's authorized purposes and in accordance with

applicable Federal and State laws and specific directions prescribed by the Government in the OMR&R manual and any subsequent amendments thereto.

d. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended, and Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended, which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element.

e. Hold and save the Government free from all damages arising for the construction, operation, maintenance, repair, replacement, and rehabilitation of the project and any project-related betterments, except for damages due to the fault or negligence of the Government or the Government's contractors.

f. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project to the extent and in such detail as will properly reflect total project costs.

g. Perform, or cause to be performed, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601-9675, that may exist in, on, or under lands, easements or rights-of-way necessary for the construction, operation, and maintenance of the project; except that the non-Federal sponsor shall not perform such investigations on lands, easements, or rights-of-way that the Government determines to be subject to the navigation servitude without prior specific written direction by the Government.

h. Assume complete financial responsibility for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the Government determines necessary for the construction, operation, or maintenance of the project.

i. To the maximum extent possible, operate, maintain, repair, replace, and rehabilitate the project in a manner that will not cause liability to arise under CERCLA.

j. Participate in and comply with applicable flood plain management and flood plain insurance programs in accordance with section 402 of Public Law 99-662, as amended.

k. Not less than once each year, inform affected interests of the limitations of the protection afforded by the project.

- l. Publicize flood plain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in preventing unwise future development in the flood plain, and in adopting regulations as may be necessary to prevent unwise future development and to ensure compatibility with protection levels provided by the project.
- m. As between the Federal Government and the non-Federal sponsor, the non-Federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability. To the maximum extent practicable, operate, maintain, repair, replace, and rehabilitate the project in a manner that will not cause liability to arise under CERCLA.
- n. Prescribe and enforce regulations to prevent obstruction of or encroachment on the Project that would reduce the level of protection it affords or that would hinder operation or maintenance of the Project.
- o. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public law 91-646, as amended by title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CFR part 24, in acquiring lands, easements, and rights-of-way, and performing relocations for construction, operation, and maintenance of the project, and inform all affected persons of applicable benefits, policies, and procedures in connection with said act.
- p. Comply with all applicable Federal and State laws and regulations, including Section 601 of the Civil Rights Act of 1964, Public Law 88-352, and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army."
- q. Provide 50 percent of that portion of total cultural resource preservation mitigation and data recovery costs attributable to the project that are in excess of one percent of the total amount authorized to be appropriated for the project.
- r. Do not use Federal funds to meet the non-Federal sponsor's share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is expressly authorized by statute.

10.6.8. Sponsor's Views

As the non-Federal sponsor of this feasibility study, the South Florida Water Management District has worked very closely in partnership with the Corps to ensure that the study and this report fairly and accurately reflected its views. On February

10, 1999, the South Florida Water Management District provided a Letter of Intent, which indicated their strong support for the Comprehensive Plan and the processes described in this report to implement the plan. This included the initial construction features proposed for authorization in the Water Resource Development Act of 2000 as described in this Section. In addition, the Letter of Intent notes that ensuring strong support from the Governor and the State Legislature continues to remain a key goal. The South Florida Water Management District's letter is included in *Appendix G, Local Cooperation and Financial Analysis*.

The South Florida Water Management District's Letter of Intent states that "as the implementation plan crystallizes, several outstanding issues of great importance" to the District and the State of Florida will need to be adequately addressed. These are: (1) capital projects cost share; (2) operation, maintenance and monitoring cost share; (3) permitting of Comprehensive Plan components and projects; (4) assurances to existing legal users; (5) provision of flood protection; (6) impacts on ongoing projects; (7) water quality; and (8) scientific peer review. A more detailed discussion of these issues was developed as an attachment to the Letter of Intent (included in *Appendix G, Local Cooperation and Financial Analysis*).

10.7. CONCLUSION

The Comprehensive Plan recommended in this report is a roadmap that provides critical direction and organizational structure for restoring and protecting the south Florida ecosystem. The comprehensive, system-wide nature of the plan and the linkage of the elements of the plan to each other must be preserved during implementation. Implementation of the plan must proceed using the principles of adaptive assessment as outlined in this Implementation Plan. Appropriate independent scientific peer review is an integral part of the implementation process. This Implementation Plan recognizes fully the need to ensure that once restored, south Florida's natural environment will not again be negatively impacted by water management activities. Consistent with Federal and State law, the requirement to protect existing legal users of water from adverse impacts caused by implementation of the Comprehensive Plan is recognized.

The Comprehensive Plan incorporates a number of technologies such as aquifer storage and recovery, seepage management, and wastewater reuse that have not been implemented on such a large scale. The pilot projects, as described in the Implementation Plan, should be undertaken in order to resolve uncertainties associated with the use of these technologies in the Comprehensive Plan and that their performance be evaluated before full-scale implementation of these technologies is undertaken.

The aquifer storage and recovery wells fall under the provisions of the Safe Drinking Water Act and are regulated by the Underground Injection Control Program. As a result, facilities utilized for treating surface and surficial waters to meet the standards of the Underground Injection Control Program are included in the cost estimate for the Comprehensive Plan. Recently, the U. S. Environmental Protection Agency has indicated their willingness to consider a flexible approach to constructing and permitting the aquifer storage and recovery wells proposed in the Restudy. This approach involves "risk-based" analyses to confirm that this flexible approach is appropriate. If the results of water quality testing and analyses conducted as part of the aquifer storage and recovery pilot projects confirm the appropriateness of this approach, then it is possible that the total cost of the recommended comprehensive plan could be reduced by \$500,000,000 and annual operation and maintenance costs could be reduced significantly as well.

The Comprehensive Plan includes a wastewater reuse facility in south Miami-Dade County. Given its high cost and the uncertainties associated with using reuse to meet the ecological goals and objectives for Biscayne Bay, other potential sources of water to provide freshwater flows to central and southern Biscayne Bay will be investigated before pursuing the reuse facility.

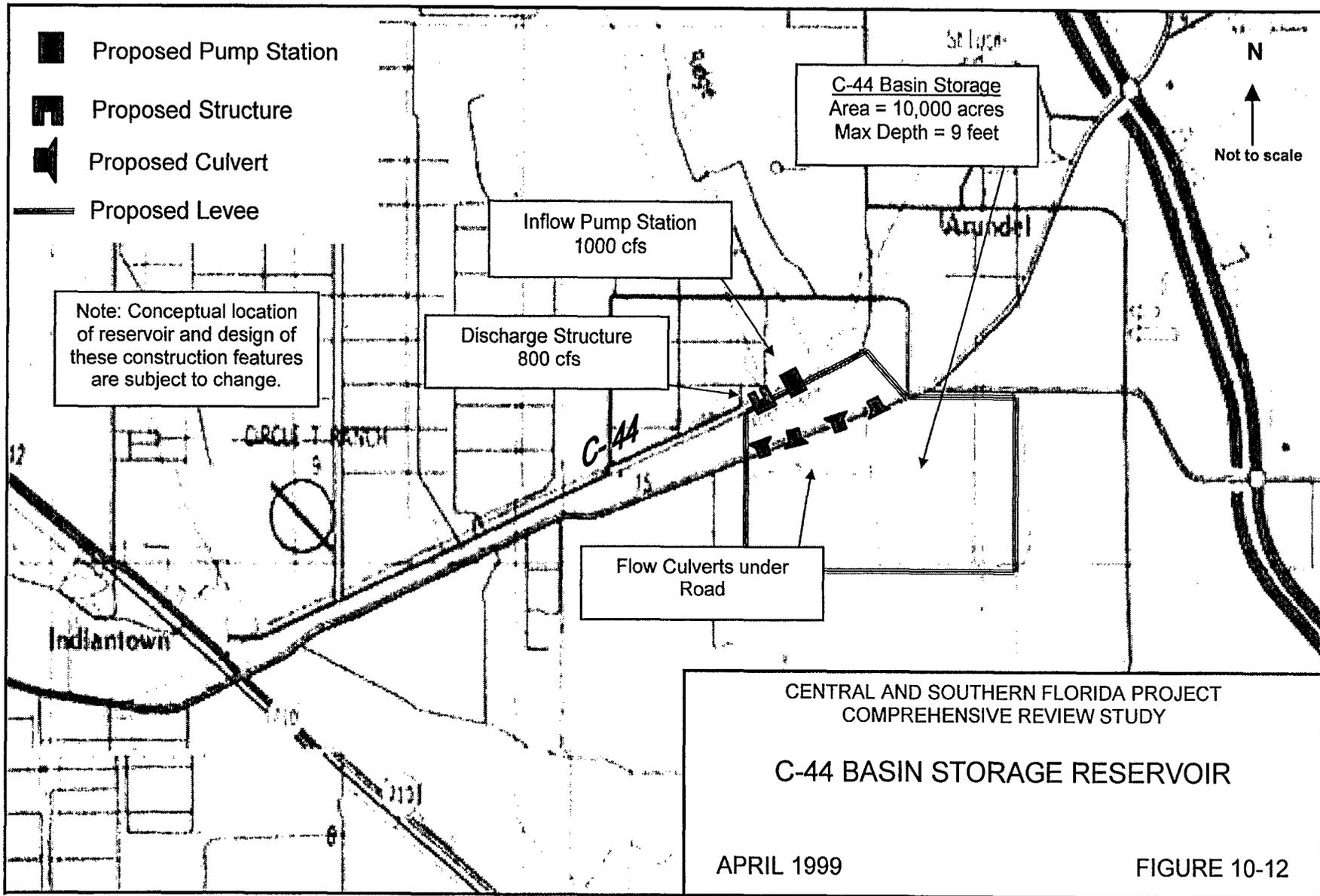
Contingency plans will address performance deficiencies and cost-effectiveness issues that may arise as pilot projects are implemented and detailed design studies are completed as part of the implementation process.

One of the principal guidelines of the Implementation Plan is to ensure that the components are located, designed, and operated consistently with existing and future water quality protection criteria and restoration targets. The Comprehensive Plan includes a number of features (e.g., stormwater treatment areas, treatment for water to be stored in aquifers by aquifer storage and recovery facilities, advanced wastewater treatment by reverse osmosis at wastewater reuse plants) to protect and improve the quality of water in receiving water bodies related to the operation of specific plan components. In addition, regional-scale surface storage reservoirs included in the Comprehensive Plan present an opportunity to improve water quality where those reservoirs are located in basins with degraded water bodies (water bodies not meeting designated uses and/or water quality criteria contained in water quality standards). Future detailed planning and engineering activities will consider water quality protection criteria for water bodies in which plan components are to be located and designed with operational features necessary to achieve water quality restoration targets. Integration of water quality protection targets into the implementation process, together with monitoring and the adaptive assessment process will ensure that water quality protection is achieved and sustained for the natural and built environments of the south Florida ecosystem.

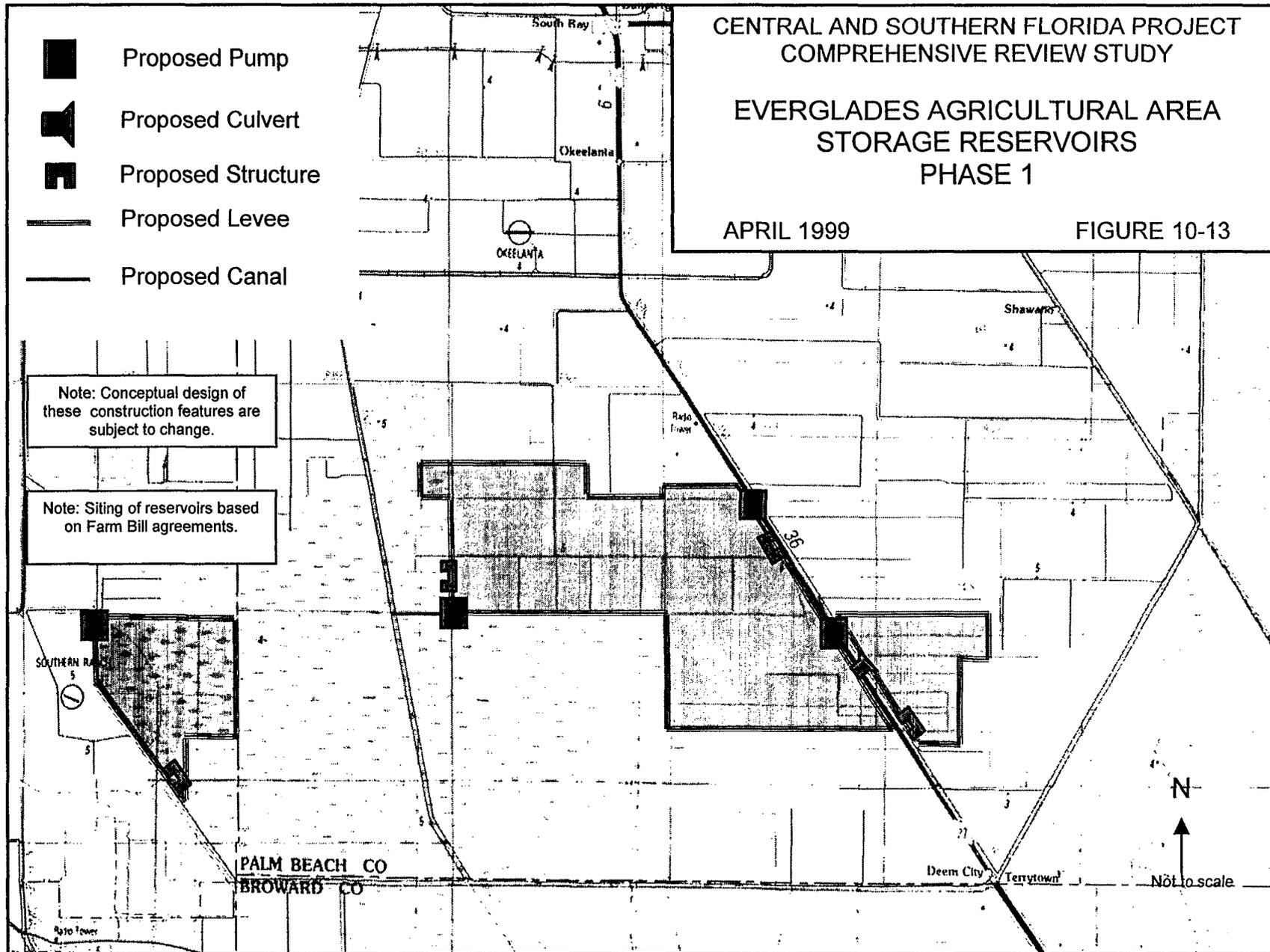
Water quality in the Keys is critical to ecosystem restoration. The Florida Keys Water Quality Protection Plan includes measures for improving wastewater and stormwater treatment within the Keys. Implementation of this plan is critical for restoration of the south Florida ecosystem.

There are a number of Federal, state, tribal, and local water resources projects presently underway or authorized in the study area such as the Kissimmee River Restoration, Modified Water Deliveries to Everglades National Park, C-111, and Everglades Construction Projects. The Comprehensive Plan includes modifications or additions to some of these projects. Consequently, implementation of all ongoing projects must be closely coordinated, and thus linked with ongoing implementation of the Comprehensive Plan.

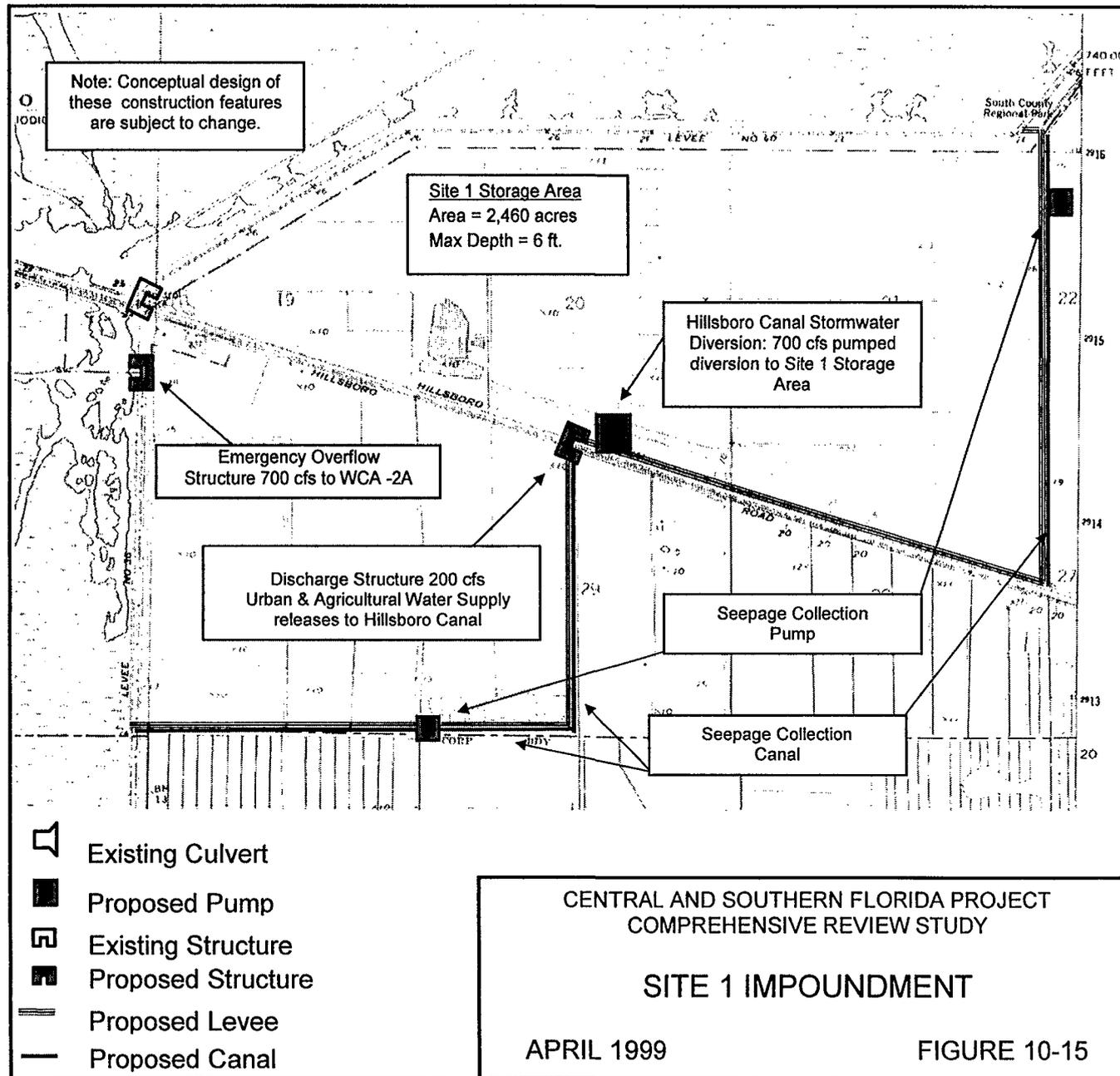
Since 1993, with the creation of the South Florida Ecosystem Restoration Task Force, the Federal government has been working in partnership with State, tribal, and local governments, the private sector, and individual citizens to accomplish ecosystem restoration and protection objectives. It is important for the long-term restoration of the ecosystem that these efforts be continued and strengthened. Furthermore, we believe that in order for this effort to be successful, the State of Florida must be a full partner with the Federal government. It is anticipated that the Governor and Legislature will define the role of the State in the implementation process.



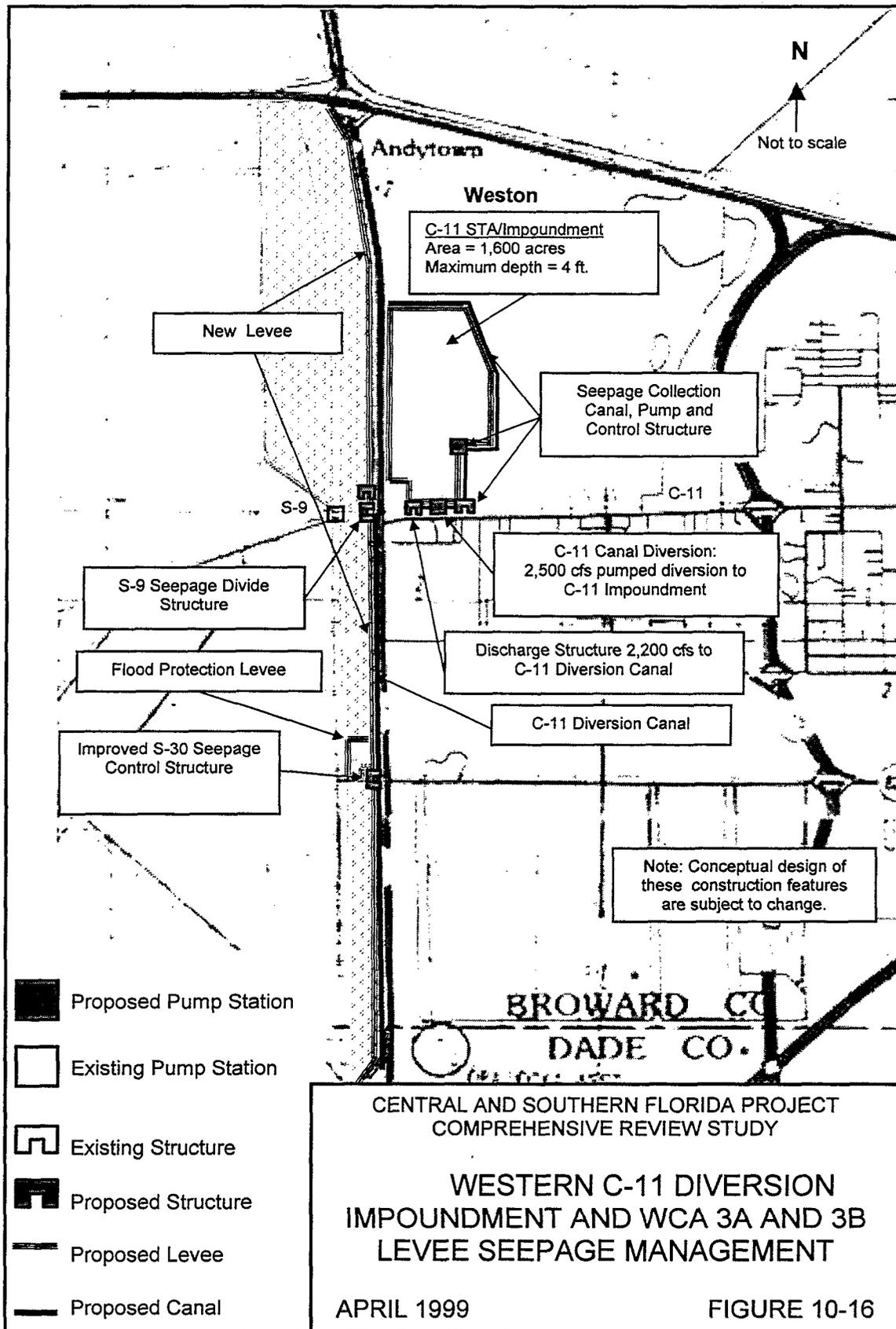
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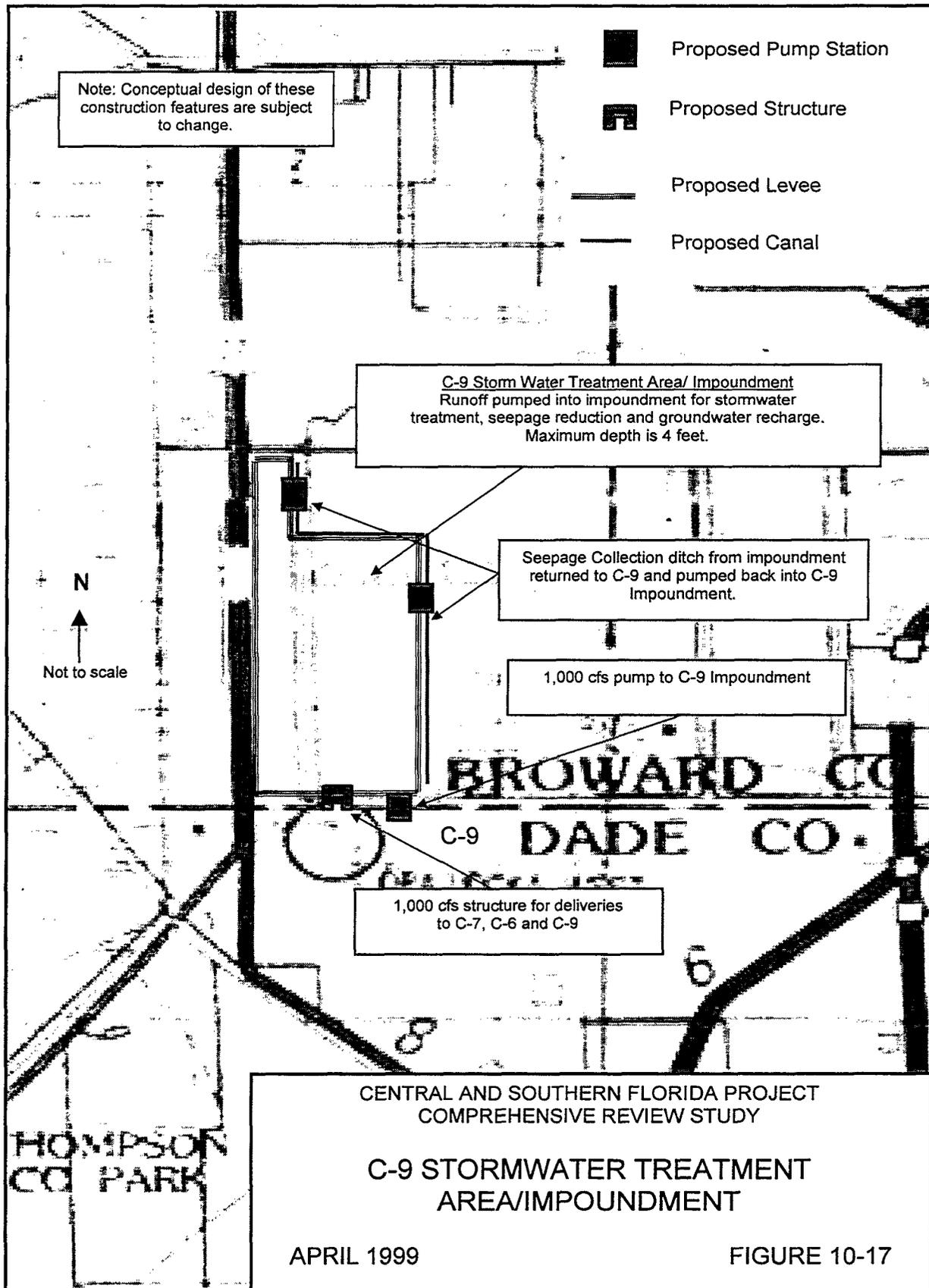


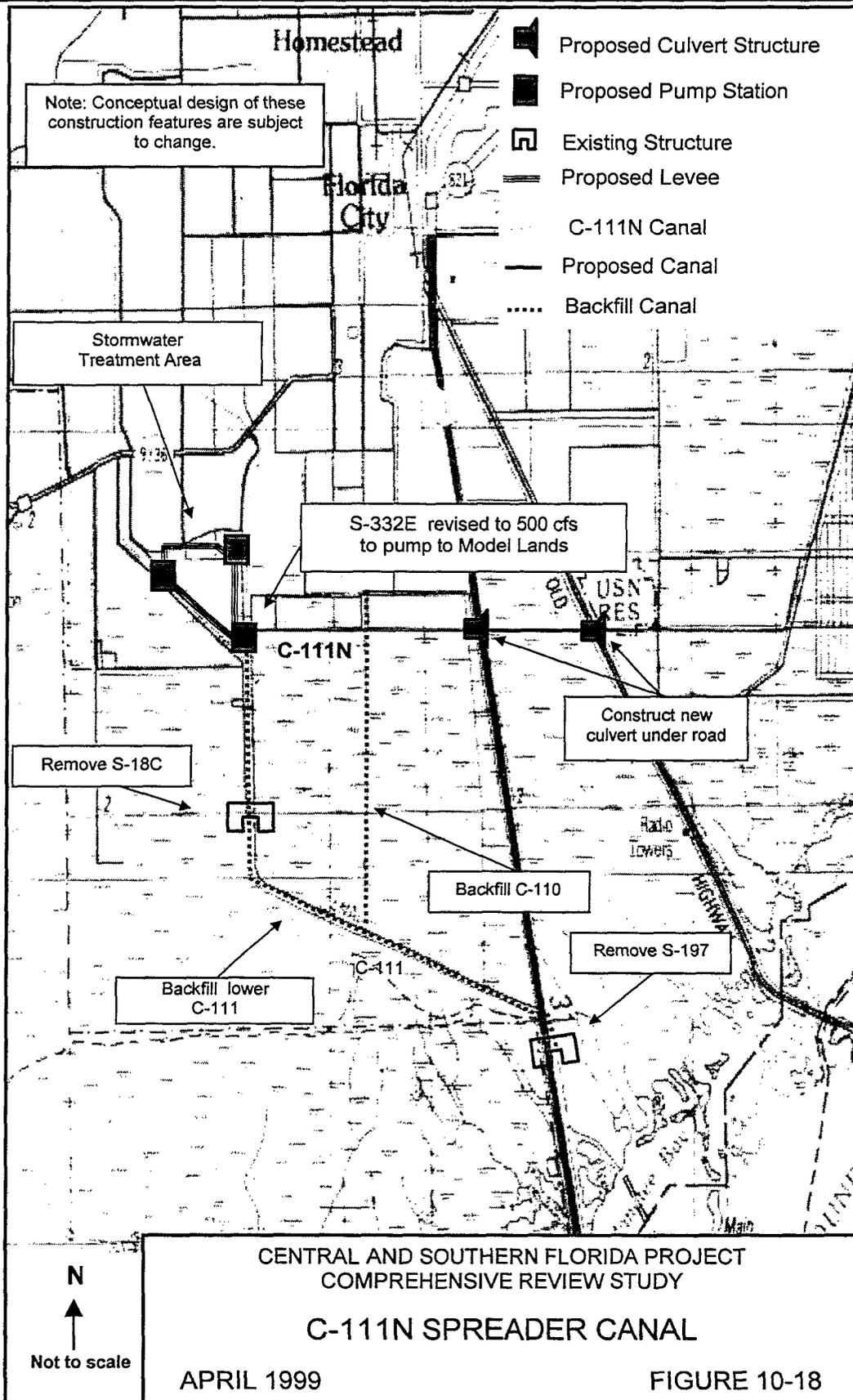
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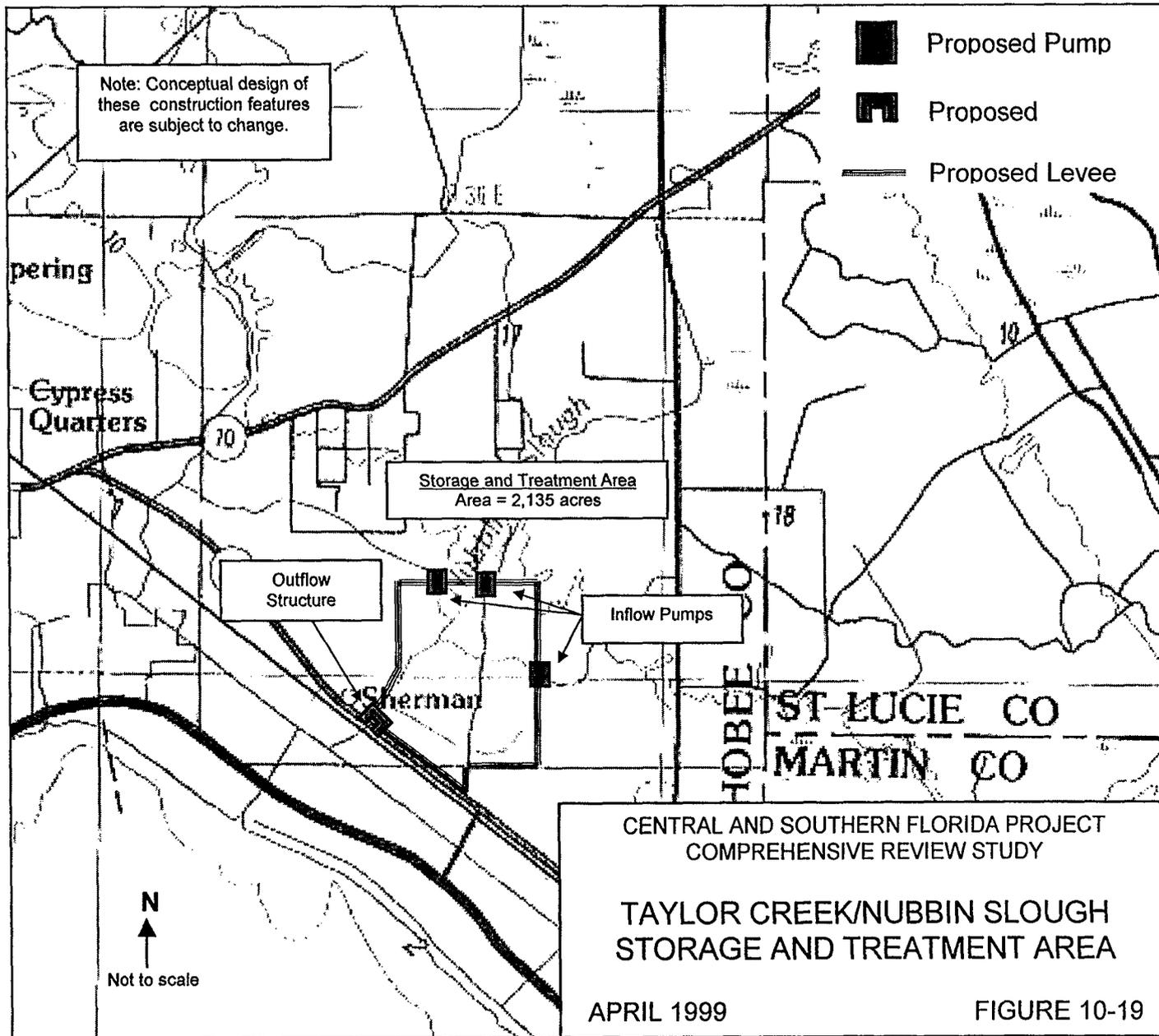


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