

DATA QUALITY ACT CHALLENGE AND REQUEST FOR CORRECTION
TO THE ARMY CORPS OF ENGINEERS

Pursuant to the Data Quality Act of 2000's Section (b)(2)(B), the U.S. Office of Management and Budget (OMB) *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies*, and Section 3.3.4 of Attachment 1 of the Deputy Secretary of Defense's Memorandum dated February 10, 2003, *Ensuring Quality of Information Disseminated to the Public by the Department of Defense*, I, Madeleine Fortin, a private citizen, hereby challenge the information, data, analyses, and conclusions drawn in the document titled *SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT for the CENTRAL AND SOUTHERN FLORIDA PROJECT, MODIFIED WATER DELIVERIES TO EVERGLADES NATIONAL PARK, FLORIDA, 8.5 Square Mile Area, Volumes 1, 2, and 3* published July 2000 by the U.S. Army Corps of Engineers, Jacksonville District.

STANDING

I am a resident of a community labeled in government documents as the 8.5 Square Mile Area (8.5 SMA). As part of a federal effort to restore a more natural hydrologic regime within the boundaries of Everglades National Park the Corps of Engineers was "*authorized and directed*" to construct a flood protection system to protect this community. See PL 101-229, Section 104, Paragraph 2c Based on inaccurate and incomplete data incorporated into the above mentioned *SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT* (SEIS), the Corps had decided that it is not possible to do this without having an adverse hydrologic impact on groundwater inside Everglades National Park. The Corps maintains that it will only be able to offer limited flood mitigation to a portion of the community for five times the cost of protecting the entire 8.5 SMA, and as a result, is condemning and flooding approximately one third of the 8.5 SMA. As a result, my home, and the homes, farms and businesses of my neighbors are being condemned and destroyed.

LEGAL STANDARD

Office of Management and Budget Data Quality Act Guidelines III.2 state, "*As a matter of good and effective agency information resource management, agencies shall develop a process for reviewing the quality (including the objectivity, utility, and integrity) of information before it is disseminated.*" See *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies*; Republication, 67 F.R. 8452 (Feb. 22, 2002).

The U.S. Army Corps of Engineers has yet to publish their guidelines for implementing the Office of Management and Budget's rules enabling the *Data Quality Act* as required by October 1, 2002 in *OMB Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility and Integrity of Information Disseminated by Federal Agencies; Republication*, 67 F.R. 8452, 8452 (February 22, 2002). But, on March 26, 2003, the Deputy Secretary of Defense promulgated a "policy memorandum" entitled *Ensuring Quality of Information Disseminated to the Public by the Department of Defense* to comply with the OMB DQA requirement.

Even more important to the present issue, scientific material not subject to independent peer review is not presumptively objective. See Memorandum at 3.2.3. In addition, the material in question is highly influential and has been used to justify the Corps decisions with the potential of causing further harm to both the Everglades watershed as well as the human environment in South Florida. Therefore, it is imperative that this data be subject to a higher standard of quality review. See Memorandum at 3.2.3.1

FACTS

In 1989 Congress passed the Everglades National Park Protection and Expansion Act. See PL 101-229 (Appendix 1, pg. 20-24). This Act allowed Everglades National Park to purchase thousands of acres of privately owned vacant land in Northeast Shark River Slough (NESRS). It also ordered the Corps to do two things: restore sheet flow to Shark River Slough, inside Everglades National Park; and to protect the communities that would be impacted by this. As Shark River Slough is the major outfall of the entire Everglades watershed all Everglades restoration projects upstream of the park depend on the completion of this critical project. The Corps developed the Modified Water Deliveries Project (MWD Project) to do this. The project contained structures to discharge water into the slough, protection of several Miccosukee Indian camps and a small, secondary drainage canal around the entire 8.5 SMA community. The MWD Project was approved in 1992. Project features are shown on the Map #1.

It has been 15 years since the Corps was ordered to restore a natural flow of water to Shark River Slough and Everglades National Park and still the MWD Project remains uncompleted. In an effort to justify the Corps wish to greatly expand the budget for the MWD Project, the agency published a *Supplemental Environmental Impact Statement* for the 8.5 SMA portion of the MWD Project in July 2000. Based on information presented in this document, the Corps chose

an alternative labeled "6D" as the preferred alternative for resolving the issue of flood protection for the 8.5 SMA. Project features are shown on Map #2. Computer modeling presented in the SEIS was used to justify the Corps decision that it would not be able to provide flood protection for the entire 8.5 SMA community for the original cost of \$18 million, but the agency would be able to offer limited protection, or *mitigation*, to one third of the community for a cost of \$106,541,230 (Appendix 2, pg. 40). In original cost for the entire MWD Project was \$80,084,000. (Appendix 6, pg.67)

In December 2000 Gen. Joseph W. Westphal, Assistant Secretary of the Army for Civil Works, signed a Record Of Decision authorizing the Corps of Engineers to complete alternative 6D, thus making it the preferred alternative for providing flood protection to the 8.5 Square Mile Area. In the ROD, Gen. Westphal states that Alternative 6D, "*...is technically sound, economically justified, in accordance with environmental statutes, and in the public interest.*" (Appendix 1, pg.25) This decision was based entirely on information presented in the Corps SEIS.

As a result of a federal lawsuit filed by area residents (*Garcia v United States, U.S. Army Corps of Engineers, et al* Case No. 01-801-Civ-Lenard) a federal judge ruled that the Corps lacked the authority to condemn land outside the footprint of the Congressionally authorized project. Rather than complying with the law, the Corps, against the stated wishes of its authorizing committees in both the House and the Senate, had an amendment added to the 2004 Department of Interior Appropriations Bill that granted them the authority to complete alternative 6D. (Appendix 1, pg.26 & 27) Section. 157. MODIFIED WATER DELIVERY PROJECT IN THE STATE OF FLORIDA, states that the Corps has the authority to acquire land "*...for the purpose of providing a flood protection system for the 8.5 square mile area*" although the Corps continues to maintain that they do not have to provide flood protection to the remaining 8.5 SMA community.

In the present matter the Corps SEIS violates both the OMB and the Department of the Army guidelines in the following ways:

1. Corps methods of analysis lack transparency:

The Corps uses output from a computer model that it admits "*does have limitations and should be used with caution,*" to justify its selection of alternative 6D as the preferred alternative. The Corps use of this computer model has not been peer reviewed nor has an independent researcher had

the opportunity to attempt to reproduce the Corps results.

2. Data presented is incomplete:

- a. The Corps SEIS does not state what ground water levels, i.e. what level of flood protection, alternative 6D will provide for the remaining 8.5 SMA community.
- b. The SEIS does not adequately evaluate the effects of 6D on surrounding communities or on Florida Bay.
- c. The Corps alleges that the original flood protection component of the MWD Project will result in environmental harm to Everglades National Park without ever stating what that harm is.

1. Corps methods of analysis lack transparency:

The Corps uses a computer model that it admits "does have limitations and should be used with caution," to justify its selection of alternative 6D as the preferred alternative.

The hydrology of South Florida is complex. In the area of the 8.5 SMA community, ground water in the Biscayne Aquifer flows underground towards the east, while surface water moves overland towards the west coast of Florida via Shark River Slough, the main out-fall for the entire Everglades watershed. In addition, the system of canals, levees, gated structures and pump stations influence ground water levels in the aquifer and, subsequently, the rate and direction of ground water flow through the aquifer.

To evaluate the different alternatives discussed in the SEIS, the Corps made extensive use of computer modeling. The computer model used by the Corps to evaluate the different flood protection alternatives for the 8.5 SMA utilized a composite computer code called MODBRANCH. This computer code is based on two other codes; MODFLOW and BRANCH, both of which were developed by the E.J Wexler and Eric Swain for the U. S. Geologic Survey. MODFLOW is a three dimensional computer code that simulates time-dependent flow of ground water. The capability to simulate three-dimensional flow is important because aquifers are typically made of up multiple geologic units with highly variable geometry and aquifer properties. BRANCH is a one dimensional code used to simulate surface water flow and the effect of canal operations. By linking two codes, it is possible to simulate the influence of changes in canal operations on groundwater levels and/or the influence of changes in the groundwater system on surface water flows.

In discussing the use of the MODBRANCH computer code in the SEIS the Corps noted the following:

Model Limitations

All numerical model studies have limitations. Many of these are related to the specific computer code chosen for a particular study. Other limitations are related to the field data that is available or lack thereof. Lastly, model studies are also limited by the schedule dictated by project requirements. All of these limitations impact various sources of error or limit the evaluation to an appropriate level of detail. This model study does have limitations and should be used with caution." (Appendix 3, pg. 46)

The SEIS then discusses the model limitations. It states that the time needed to do the model runs was so short and the data needed for the models so extensive that:

"Due to the large amount of model runs completed and the vast amount of output generated, it was difficult to cull the data down to a usable format. An attempt was made to reduce the data as much as possible....The data were reviewed to the extent practical...In the end, additional evaluation time would have been helpful and may have resulted in an improved report." (Appendix 3, pg.47)

The SEIS states that the spatial and temporal resolution of rainfall data was too coarse:

"The MODBRANCH model would give much better results if finer resolution rainfall information were available. The fine data resolution is especially important for simulating ground water stages. Unfortunately, these data are not presently available." (Appendix 3, pg. 47)

The SEIS states that evapotranspiration, or the amount of surface water that evaporates, can equal or exceed the amount of rainfall so it must also be included as a parameter in the model. The evapotranspiration rates used in the model were monthly totals, while rainfall was a daily amount. The stated reason for this discrepancy was lack of more accurate data. (Appendix 3, pg. 47)

In discussing the flow of ground water the SEIS states,

"South Florida's geology is extremely heterogeneous. Measurements and tests performed at one location can give distinctly different values when done 500 feet away. It is important to keep this in mind when considering the model results." (Appendix 3, pg. 48)

It goes on to state that "caprock," outcroppings of hard, less permeable limestone, are

"not included in the MODBRANCH model because its spatial distribution is unknown. For this reason, the model results should be considered primarily on an

an areal basis, secondarily on a site-specific basis." (Appendix 3, pg. 48)

In a MS-Power Point presentation given to a meeting of the Combined Structure and Operating Plan (CSOP) Advisory Board on June 17, 2004, Bob Evans, a computer modeler for the Corps, stated that the MODBRANCH computer model was ineffective in modeling overland sheet flow:

*"MODBRANCH is still a **GROUND WATER MODEL** with Stream/Canal routing. Users must be careful in areas where the predominant flow is **OVERLAND!** (Bold and underlining as it appears on the power point slide. Appendix 10, pg. 83)*

The areas within Everglades National Park evaluated by the MODBRANCH model experience overland sheet flow for much of the year, yet the Corps has used the MODBRANCH computer model to demonstrate the hydrologic impact of different project alternatives on these areas.

In discussing the importance of accurate topographical data, i.e. land elevations, the SEIS states that the topographical data used is derived from several sources, including the Corps, USGS and Everglades National Park. The Corps notes that even a difference of 0.5 feet can *"significantly affect both the results of the MODBRANCH model and the interpretation of the results."*

(Appendix 3, pg. 49) Elevation maps published by Miami-Dade County show land elevations in the 8.5 SMA as being between one and one and a half feet higher than the Corps elevation data. A copy of this map is included with this Request For Correction along with a map from the SEIS for comparison. Note that the land elevations on the Corps map are lower than the land elevations on the County map. The Corps map notes that the source of the data is the Dade County Department of Environmental Protection (DERM). Attempts to view the original land elevation data at the DERM office have been unsuccessful.

To depict the effect that each evaluated alternative would have in different locations, indicator cells were selected from the model grid. Cells selected were located within the 8.5 SMA community, Everglades National Park, the area south of the 8.5 SMA, as well as some areas east of the major conveyance canal, L31 North. Model output is presented in the form of hydrographs showing the height of the ground water surface over time for each of the evaluated alternatives in the selected cells (Cell locations shown on Appendix 3, pg. 53). Hydrographs were presented to demonstrate the effect each alternative would have on the ground water under two conditions: Base89 and Base95. Base89 uses rainfall data from 1989, a dry year, while Base95 uses rainfall data from 1995, a wet year. Each hydrograph has various colored lines

representing the level of ground water each alternative would provide in each cell under either Base89 or Base 95 conditions.

The Corps maintains that they do not have to provide the 8.5 SMA with flood protection, but only with flood mitigation, or "pre-project conditions." The Corps further defines pre-project conditions as the level of ground water present in the area in 1983 as hypothesized by the MODBRANCH computer model. This is termed 'Base83' and is presented as a dashed, lavender colored line representing the model's prediction of ground water levels in each cell during a wet year and a dry year if 1983 canal operations had been used.

Despite the data limitations discussed above, the Corps has made extensive use of computer model output to justify its selection of alternative 6D as the preferred alternative. In describing the performance measures used to evaluate each alternative the SEIS states, "*Most of the major performance measures depend on model output in order to be quantified.*" (Appendix 3, pg. 52) The Corps is using the output of a computer model it states "*does have limitations and should be used with caution,*" and for which it states it lacked critical data to justify its decision to spend over \$100 million in additional funds.

REMEDY

The Corps use of the MODBRANCH computer model to justify its choice of 6D as the preferred alternative is not within the DQA guidelines. The Corps admits it lacks critical data. The Corps admits that the model did not accurately model over land sheet flow yet it used the model to predict water levels in areas that experienced over land sheet flow. In order for the public to be secure in the knowledge that the Corps use of the MODBRANCH computer model is objective and their results can be reproduced the Corps must allow outside peer review of its use of the MODBRANCH computer model.

2. Data presented is incomplete:

a. The Corps SEIS does not state what ground water levels will be provided for the remaining 8.5 SMA community.

In 1989 when Congress passed the Everglades National Park Protection and Expansion Act it stated the the Corps of Engineers was "*authorized and directed to construct a flood protection system*" to protect the community (Appendix 1, pg. 24). In 2003, when the Corps obtained

Congressional approval to construct alternative 6D, Congress again stated its intention that the community be given flood protection when it stated that the Corps was constructing 6D *"..for the purpose of providing a flood protection system for the 8.5 square mile area.."* (Appendix 1, pg.26) This language is clear and unambiguous. None the less, the Corps maintains that it is under no obligation to do as Congress so clearly "authorized and directed" it to in 1989 and again in 2003.

On page 30 of the Volume 2 of the SEIS, the Corps defines flood protection as follows:

"..for the purposes of this analysis , a plan is considered to provide 10 year flood protection if it reduces the water levels to below ground level along the western, lower boundary of the protected area under a 10 year flood event. In addition, keeping the water levels below ground surface is consistent with he 1 in 10 year protection level defined by Dade County." (Appendix 3, pg. 51)

However, elsewhere in the SEIS the Corps continues to maintain that the remaining 8.5 SMA community will not receive flood protection, it will receive "flood mitigation," "pre-project conditions," or "Base83 condition." The Corps has so far refused to define the range of ground water levels Base83 would provide. On page 27 of the draft SEIS the Corps states, *"There is no specific description of the Base83 project conditions for the 8.5 SMA."* (Appendix 5, pg. 64) This phrase was left out of the final version of the SEIS. Volume 1, page 19 of that document states:

3.2.1 Base 83

Information contained in the 1992 GDM detailed the condition of the environment and resources within the MWD study area prior to the project implementation...As such, it represents the best information available for the background conditions and features of the MWD area for the Base 83 conditions. Therefore, the Base 83 project conditions, as established for the 1992 MWD GDM/EIS, have been used for this reevaluation for comparative purposes.

A summary of the pre-MWD project conditions was presented in the 1992 GDM and is included below as a base for conditions as they existed prior to the MWD project. (Appendix 2, pg. 30)

No information stating the range of ground water levels that existed in the 8.5 SMA community in 1983 were found in the 1992 GDM for the MWD Project. No further explanation is offered in the 2000 SEIS. When asked at a public meeting to further describe what Base83 conditions actually were, Kim Tapalin, one of the senior Corps project managers for the MWD Project, stated that she was "unable to describe it."

The Corps goes so far as to reinterpret clearly stated legislative intent when it writes:

Although the Act states "flood protection", it is clear that such protection is to be limited to that which would be necessary to protect against impacts as a result of implementation of the MWD Project. To alleviate the potential adverse effects on the 8.5 SMA due to implementation of the MWD Project, a number of alternatives were analyzed during the development of the 1992 GDM. Since the intent was to provide protection against impacts caused by the project and not to provide complete flood protection, use of the term "mitigation" versus "protection" was adopted by the USACE in the 1992 GDM.
(Appendix 2, pg.29)

The Corps continues to refuse to adequately define what "impacts" it is protecting the remaining 8.5 SMA against.

The Corps even states that the remaining community will continued to be flooded:

"(e) The periodic flooding of landowners east of the proposed levee, before and after project implementation, will remain unchanged from conditions in existence prior to implementation of the MWD Project. Flood mitigation, not flood protection, should be provided by the design and operation of the Recommended Plan..." (Appendix 2, pg. 42 & 43)

Nowhere in the SEIS does the Corps definitively state what range of ground water levels existed prior to the implementation of the MWD Project or how much the level of ground water can be expected to rise as a result of the MWD Project. Nor does the Corps state what levels of ground water alternative 6D will provide the remaining 8.5 SMA community. The Corps has continued to state publicly and in writing that they only have to provide the 8.5 SMA with "pre-project" conditions without ever defining what levels of ground water constitute "pre-project conditions." A FOIA request filed some years ago requested that the Corps define what levels of ground water the Corps project would provide the community during the dry season and during the rainy season, i.e. "pre-project" conditions. The Corps has never responded to this FOIA request in writing, but I was told by senior Corps staff at the Corps Jacksonville office, that the Corps was not going to define "pre-project conditions" because this "would limit their project flexibility."

Apparently Base83 is not the actual levels of ground water that existed in the 8.5 SMA community in 1983, but the ground water elevations the Corps computer hypothesized existed in the community in 1983. The Corps states that Base83 boundary "us(es) stages and flows that

existed prior to implementation of the South Dade Conveyance System.” (Appendix 3, pg. 45) As the South Dade Conveyance System has been in place since 1978 (Appendix 8, pg. 73 & 74) this is not a helpful definition.

Hydrographs published in the SEIS show that in cell 20925, within the protected portion of the 8.5 SMA community, Base83 conditions will result in water above the surface of the ground from week 22 until week 48, or 26 uninterrupted weeks of water above the surface of the ground, east of the protective canal and within the protected portion of the community during a wet year. This same hydrograph shows water levels provided by alternative 6D as lower than Base83, but the Corps has continued to maintain that they will only be providing the community with Base83 conditions. (Appendix 3, pg. 58)

REMEDY

DQA guidelines state that data presented by federal agencies must be clear and complete. The Corps refusal to clearly and understandably state what effect the project will have on the 8.5 SMA community violates these guidelines. The Corps must clearly define the level of flood protection alternative 6D will provide for the remaining 8.5 SMA community. This can be described as a range of ground water levels or as the amount of rainfall that can be handled by the project in a 24 hour period while keeping the level of ground water below the surface of the ground.

b. The SEIS does not adequately evaluate the effects of 6D on surrounding communities or on Florida Bay.

Computer generated hydrographs published in the SEIS show that during a wet year water will be above the surface of the ground for a significant portion of the year on land east of the L-31 North canal. This land has homes, farms and businesses that will be adversely impacted by these high ground water levels. The SEIS offers no evaluation of the impact these high levels of ground water will have on the homes, farms or businesses of these unsuspecting people.

Hydrographs for cells 19766 and 20036 showing the effects of the different project options on ground water during a wet year (labeled 95ops in the legend of the hydrograph) are presented on pages 55 and 57 of Appendix 3. According to the hydrographs, water levels will be above the surface of the ground for a significant portion of the year for most project alternatives evaluated.

The location of these cells appear from the map to be just west of Krome Avenue and only several miles away from intensively developed land in Miami-Dade County. Ground water levels this high, so close to developed land and close to a major road pose a risk of flooding to private property outside the project area and would be inconsistent with the project authorization for the MWD Project. The effect of this high level of groundwater on land east of L-31 North is never evaluated or discussed in the SEIS.

The SEIS also does not adequately discuss or define the impoundment area that will be constructed south of SW 168 Street, nor does it evaluate the effect this impoundment area will have on land south of the project area. This impoundment area will be constructed to supposedly hold the seepage water pumped south from the 8.5 SMA via a canal that is to be constructed along SW 205 Avenue. Due to the extremely high porosity of the ground in Miami-Dade County it is expected that water from this impoundment area will seep east, into the L-31 North canal, raising canal stages. (Appendix 8, pg. 75 shows the direction of underground seepage in the project area.) This water, seeping into L-31 North canal, can be expected to have two major impacts:

- 1.) Water levels in the canal system directly influence the level of ground water in the surrounding land, thus raising the level of ground water in farm land south of the project area increasing the risk of flooding to agricultural land.

- 2.) High levels of water in L-31 North canal have a direct, negative impact on Florida Bay (Attachment 7, pg. 68-71.)

The SEIS does not evaluate the hydrologic effect that this impoundment area will have on land south of the project area. It does not even accurately describe it.

Volume 1 of the SEIS states that, *"A new proposed pumping system will discharge seepage water through a 96-inch diameter pipe to be released south into a treatment area in the C-111 project area."* (Appendix 2, pg. 33)

Volume 2, states that water removed from the 8.5 SMA, *"..would be pumped from S-357 into a series of pipes/swales and conveyed to the C1-11 project area."* (Appendix 3, pg. 51)

Volume 3 states that alternative 6D will use a pipeline, "*..to convey seepage from the 8.5 SMA to the C1-11 system.*" and goes on to say that the water from this pipeline will "*be released south into a 200-acre treatment area and eventually into the C-111 project area.*" (Appendix 4, pg. 60 & 62)

Nowhere in the SEIS is there even a diagram of this impoundment/treatment area. The following page shows a map of the proposed impoundment area. It was not part of the SEIS. It was distributed at Project Delivery Team meetings held in Miami-Dade County by the Corps. The Corps has performed no analysis of the hydrologic impact this impoundment area would have downstream of the project.

REMEDY

The DQA states that data must be complete. For this objective to be met hydrologic analysis of the project impacts must be evaluated and clearly described.

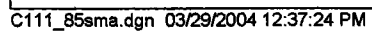
- 1.) Outside peer review must be utilized to adequately evaluate the effect of the alternative 6D impoundment area on L-31 North canal stages and the resulting effect this will have on ground water levels in the agricultural areas south of the 8.5 SMA as well as the effect on Florida Bay.
- 2.) Outside peer review must be utilized to adequately evaluate the effect alternative 6D will have on land east of L-31 North.

c. The Corps alleges that protecting the entire 8.5 SMA will result in environmental harm to Everglades National Park without ever stating what that harm is.

Computer generated hydrographs published in the SEIS show ground water levels from the Corps original project, labeled as "Plan 1," (which protected the entire 8.5 SMA community) as being virtually identical to ground water levels generated by the Corps chosen project 6D in cells 19213 and 19990, in Northeast Shark River Slough (NESRS). (Appendix 3 pg.54 & 56)

Table 8 in Volume 1 of the SEIS notes the amount of additional water supplied to NESRS for 6D and the original project as follows:

	<u>Original Project</u>	<u>6D</u>	<u>Difference</u>
Minimum stage (in feet)	6.61	6.84	0.23 feet
Maximum stage	8.05	8.25	0.20 feet
Acres with increased water depth	59,360	62,068	2,708



This averages out to approximately an additional 2.5 inches of water on an 2,708 more acres of land in North East Shark River Slough, from alternative 6D as compared to the original alternative. (Appendix 2, pg.36) There are approximately 64,000 acres in NESRS so the area with an increased depth of 2.5 inches represents only 4.23% of the land in NESRS.

Table 8 also states that alternative 1 provided 39 continuous weeks of inundation in Northeast Shark River Slough, while alternative 6D provided 45 weeks of continuous inundation. Thus alternative 6D is expected to raise the level of ground water on 4.23% of the land in NESRS an average of 2.5 inches for 6 weeks a year over the alternative that protected the entire community.

Despite this, the Corps states that as a result of implementing alternative 6D, *"Water levels within the ENP are raised significantly and localized impacts of drawdown in the seepage canal are reduced when compared to Alternatives 1, 2, and 9."* (Appendix 4, pg. 61) As each evaluated option appears from the hydrographs to have the same effect on ground water levels, this statement would appear to be incorrect. An additional 2.5 inches of ground water on only 4.23% of land in NESRS for an additional 6 weeks a year can hardly be described as *"significant."*

To confuse the issue further, the SEIS states that alternative 6D will increase the hydroperiod (the length of time water will be above the surface of the ground) on 1272 more acres in NESRS than alternative 1. This represents less than 2% of the land in NESRS. (Appendix 2, pg. 34)

Elsewhere in the SEIS the Corps states that Alternative 6D

"is predicted to result in a net increase of wetland acreage (7,464 acres) within the 8.5 SMA and the surrounding area of potential affect. Short hydroperiod, marl-forming wetland would be reduced by 4,298 acres while long hydroperiod peat-forming wetlands are predicted to increase by 11,762 acres. (Appendix 2, pg. 37)

These are very different figures from the ones published on page 72. How does increasing the water depth approximately 2.5 inches on 2,708 acres of land result in a net increase of wetland acreage of 7,464 acres? Alternative 6D will result in taking 2881 acres of land within the 8.5 SMA. Even if this land is considered as restored wetlands that only adds up to 5,589 acres.

Although the SEIS states that Alternative 6D *"provides an increase of 2,731 acres of snail kite habitat over Alternative 1."* it fails to say how this increase is accomplished as the snail kite does not live or hunt within the project area.. (Appendix 2, pg. 35) Pages 113 and 114 of Volume 1 of

the SEIS state,

"The snail kite is a highly mobile species with no known roosting or nest sites within the project area, nor any Designated Critical Habitat within the project area. There is not particularly important resource for the species in the project area." (Appendix 2, pg. 38 & 39)

The SEIS goes on the state that other endangered species such as the Florida panther, Cape Sable seaside sparrow, and the wood stork are not effected by alternative 6D. If alternative 6D provided some environmental benefit to these endangered species, the SEIS could say what it is.

No explanation is offered as to the effect that this imperceptible difference in ground water levels on such a small portion of the land in NESRS will have on the ecology inside the park yet the supposed environmental harm that will result from protecting the entire 8.5 SMA is used as justification for the destruction of one third of the community, with the forced acquisition of 2,881 acres containing 87 homes and businesses as well as the expenditure of \$106+ million for a project that should have cost \$18 million. (Appendix 4, pg. 62)

REMEDY

The Corps must furnish clear, complete, understandable, peer reviewed data to substantiate its position that environmental harm will result from protecting the entire 8.5 SMA community.

THE RESULT OF THE CORPS ACTIONS

1.) The residents in the 8.5 SMA were promised flood protection by Congress in the 1989 Everglades Protection and Expansion Act and again in 2003 when the Corps was given authorization to construct alternative 6D. Rather than comply with these Congressional directives, the Corps is destroying one third of the community and refuses to provide flood protection for the remaining portion of the 8.5 SMA. They base the necessity for their decisions on data published in the SEIS that does not meet DQA guidelines and standards. As a result hundreds of people are losing their homes, farms and businesses. The SEIS fails to provide convincing proof that this acquisition is necessary.

2.) As a result of the Corps refusal to complete the MWD Project in a reasonable amount of time, water has been impounded north of the park, in the state-owned, central Everglades, or the

Water Conservation Areas (WCA's) for so long that over 50% of the tree islands are dead. See The Everglades Consolidated Report, Chapter 6, pg.33, Figure 3.

3.) Also, as a result of this impounded water coupled with the extremely high porosity of the ground in Miami-Dade County, the canal system in the County is overloaded with water. A Flooding Task Force created by Miami-Dade County found that not completing the MWD Project contributed to the catastrophic flooding experienced by the entire County after Hurricane Irene in October 1999 and urged that the MWD Project be completed "*as quickly as possible*," stating that the MWD Project "*...ha[s] been designed and approved for the express purpose of resolving the conflict between protecting Everglades National Park and Florida Bay and providing residents and businesses with the flood protection that is essential*" and stated further that the MWD Project "*[will] enhance the natural system , especially in Everglades National Park, the Water Conservation Areas, and Florida Bay by increasing flows through the system toward historic levels.*" (Appendix 9, pg. 78 & 79) It appears that choosing alternative 6D to complete the 8.5 SMA portion of the MWD Project has the potential of exasperating flooding south and east of the project area as well as delaying the completion of this critical project for years.

IN CONCLUSION

In the present matter the Corps *Supplemental Environmental Impact Statement* for the 8.5 Square Mile Area portion of the Modified Water Delivery Project violates both the OMB and the Department of Defense information quality guidelines. The Corps published the SEIS for the express purpose of providing legitimization for drastically increasing project costs, thus the SEIS violates the DQA requirement for publishing unbiased data. Much of the data the Corps did present in the document is incomplete, inaccurate, and non-peer reviewed. Several important pieces of data are missing altogether. This Data Quality Act Challenge and Request For Correction seeks to have the Corps of Engineers provide data that is clear, accurate, complete and unbiased. The time period allowed for the Corps to comply with this Request For Correction is 60 days.

Thank you for your help in this matter. Please contact me if I can be of any help to you in processing this Request.

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Appendix A

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PUBLIC LAW 101-229—DEC. 13, 1989

Public Law 101-229
101st Congress

An Act

Dec. 13, 1989
[H.R. 1727]

Everglades
National Park
Protection and
Expansion Act of
1989.
Florida.
16 USC 410r-5
note.

To modify the boundaries of the Everglades National Park and to provide for the protection of lands, waters, and natural resources within the park, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled.

SECTION 1. SHORT TITLE.

This Act may be cited as the "Everglades National Park Protection and Expansion Act of 1989".

**TITLE I—EVERGLADES NATIONAL PARK
EXPANSION**

16 USC 410r-5.

SEC. 101. FINDINGS, PURPOSES AND DEFINITION OF TERMS.

(a) FINDINGS.—The Congress makes the following findings:

(1) The Everglades National Park is a nationally and internationally significant resource and the park has been adversely affected and continues to be adversely affected by external factors which have altered the ecosystem including the natural hydrologic conditions within the park.

(2) The existing boundary of Everglades National Park excludes the contiguous lands and waters of the Northeast Shark River Slough that are vital to long-term protection of the park and restoration of natural hydrologic conditions within the park.

(3) Wildlife resources and their associated habitats have been adversely impacted by the alteration of natural hydrologic conditions within the park, which has contributed to an overall decline in fishery resources and a 90 percent population loss of wading birds.

(4) Incorporation of the Northeast Shark River Slough and the East Everglades within the park will limit further losses suffered by the park due to habitat destruction outside the present park boundaries and will preserve valuable ecological resources for use and enjoyment by future generations.

(5) The State of Florida and certain of its political subdivisions or agencies have indicated a willingness to transfer approximately 35,000 acres of lands under their jurisdiction to the park in order to protect lands and water within the park, and may so transfer additional lands in the future.

(6) The State of Florida has proposed a joint Federal-State effort to protect Everglades National Park through the acquisition of additional lands.

(b) PURPOSE.—The purposes of this Act are to—

(1) increase the level of protection of the outstanding natural values of Everglades National Park and to enhance and restore

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under the Federal Property and Administrative Services Act of 1949 (63 Stat. 377).

(e) OFFERS TO SELL.—In exercising the authority to acquire property under this Act, the Secretary shall give prompt and careful consideration to any offer made by any person owning property within the boundaries of the addition to sell such property, if such owner notifies the Secretary that the continued ownership of such property is causing, or would result in undue hardship.

(f) AUTHORIZATION OF APPROPRIATIONS.—(1) Subject to the provisions of paragraph (2), there are hereby authorized to be appropriated such sums as may be necessary to carry out the provisions of this Act.

(2) With respect to land acquisition within the addition, not more than 80 percent of the cost of such acquisition may be provided by the Federal Government. Not less than 20 percent of such cost shall be provided by the State of Florida.

(g) ASSISTANCE.—Upon the request of the Governor of the State of Florida, the Secretary is authorized to provide technical assistance and personnel to assist in the acquisition of lands and waters within the Kissimmee River/Lake Okeechobee/Everglades Hydrologic Basin, including the Big Cypress Swamp, through the provision of Federal land acquisition personnel, practices, and procedures. The State of Florida shall reimburse the Secretary for such assistance in such amounts and at such time as agreed upon by the Secretary and the State. Notwithstanding any other provision of law, reimbursement received by the Secretary for such assistance shall be retained by the Secretary and shall be available without further appropriation for purposes of carrying out any authorized activity of the Secretary within the boundaries of the park.

16 USC 410r-7.

SEC. 103. ADMINISTRATION.

(a) IN GENERAL.—The Secretary shall administer the areas within the addition in accordance with this Act and other provisions of law applicable to the Everglades National Park, and with the provisions of law generally applicable to units of the national park system, including the Act entitled "An Act to establish a National Park Service, and for other purposes", approved August 25, 1916 (39 Stat. 535; 16 U.S.C. 1-4). In order to further preserve and protect Everglades National Park, the Secretary shall utilize such other statutory authority as may be available to him for the preservation of wildlife and natural resources as he deems necessary to carry out the purposes of this Act.

(b) PROTECTION OF ECOSYSTEM.—The Secretary shall manage the park in order to maintain the natural abundance, diversity, and ecological integrity of native plants and animals, as well as the behavior of native animals, as a part of their ecosystem.

(c) PROTECTION OF FLORA AND FAUNA.—The park shall be closed to the operation of airboats—

- (1) except as provided in subsection (d); and
- (2) except that within a limited capacity and on designated routes within the addition, owners of record of registered airboats in use within the addition as of January 1, 1989, shall be issued nontransferable, nonrenewable permits, for their individual lifetimes, to operate personally-owned airboats for non-commercial use in accordance with rules prescribed by the Secretary to determine ownership and registration, establish

Boating.

Appendix A

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the ecological values, natural hydrologic conditions, and public enjoyment of such area by adding the area commonly known as the Northeast Shark River Slough and the East Everglades to Everglades National Park; and

(2) assure that the park is managed in order to maintain the natural abundance, diversity, and ecological integrity of native plants and animals, as well as the behavior of native animals, as a part of their ecosystem.

(c) DEFINITIONS.—As used in this Act:

(1) The term "Secretary" means the Secretary of the Interior.

(2) The term "addition" means the approximately 107,600 acre area of the East Everglades area authorized to be added to Everglades National Park by this Act.

(3) The term "park" means the area encompassing the existing boundary of Everglades National Park and the addition area described in paragraph (2).

(4) The term "project" means the Central and Southern Florida Project.

SEC. 102. BOUNDARY MODIFICATION.

16 USC 410r-6.

(a) AREA INCLUDED.—The park boundary is hereby modified to include approximately 107,600 acres as generally depicted on the map entitled "Boundary Map, Everglades National Park Addition, Dade County, Florida", numbered 160-20,013B and dated September 1989. The map shall be on file and available for public inspection in the offices of the National Park Service, Department of the Interior.

Public
information.

(b) BOUNDARY ADJUSTMENT.—The Secretary may from time to time make minor revisions in the boundaries of the park in accordance with section 7(c) of the Land and Water Conservation Fund Act of 1965 (16 U.S.C. 4601-4 and following). In exercising the boundary adjustment authority the Secretary shall ensure all actions will enhance resource preservation and shall not result in a net loss of acreage from the park.

(c) ACQUISITION.—(1) Within the boundaries of the addition described in subsection (a), the Secretary may acquire lands and interests in land by donation, purchase with donated or appropriated funds, or exchange. For purposes of acquiring property by exchange, the Secretary may, notwithstanding any other provision of law, exchange the approximately one acre of Federal land known as "Gilberts' Marina" for non-Federal land of equal value located within the boundaries of the addition. Any lands or interests in land which are owned by the State of Florida or any political subdivision thereof, may be acquired only by donation.

(2) It is the express intent of Congress that acquisition within the boundaries of the addition shall be completed not later than 5 years after the date of enactment of this section. The authority provided by this section shall remain in effect until all acquisition is completed.

Termination
date.

(d) ACQUISITION OF TRACTS PARTIALLY OUTSIDE BOUNDARIES.—When any tract of land is only partly within boundaries referred to in subsection (a), the Secretary may acquire all or any portion of the land outside of such boundaries in order to minimize the payment of severance costs. Land so acquired outside of the boundaries may be exchanged by the Secretary for non-Federal lands within the boundaries, and any land so acquired and not utilized for exchange shall be reported to the General Services Administration for disposal

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uses, permit conditions, and penalties, and to protect the biological resources of the area.

(d) **CONCESSION CONTRACTS.**—The Secretary is authorized to negotiate and enter into concession contracts with the owners of commercial airboat and tour facilities in existence on or before January 1, 1989, located within the addition for the provision of such services at their current locations under such rules and conditions as he may deem necessary for the accommodation of visitors and protection of biological resources of the area.

(e) **VISITOR CENTER.**—The Secretary is authorized and directed to expedite the construction of the visitor center facility at Everglades City, Florida, as described in the Development Concept Plan, Gulf Coast, dated February 1989, and upon construction shall designate the visitor center facility as "The Marjory Stoneman Douglas Center" in commemoration of the vision and leadership shown by Mrs. Douglas in the protection of the Everglades and Everglades National Park.

Marjory
Stoneman
Douglas.

SEC. 104. MODIFICATION OF CERTAIN WATER PROJECTS.

16 USC 410r-8.

(a) **IMPROVED WATER DELIVERIES.**—(1) Upon completion of a final report by the Chief of the Army Corps of Engineers, the Secretary of the Army, in consultation with the Secretary, is authorized and directed to construct modifications to the Central and Southern Florida Project to improve water deliveries into the park and shall, to the extent practicable, take steps to restore the natural hydrological conditions within the park.

(2) Such modifications shall be based upon the findings of the Secretary's experimental program authorized in section 1302 of the 1984 Supplemental Appropriations Act (97 Stat. 1292) and generally as set forth in a General Design Memorandum to be prepared by the Jacksonville District entitled "Modified Water Deliveries to Everglades National Park". The Draft of such Memorandum and the Final Memorandum, as prepared by the Jacksonville District, shall be submitted as promptly as practicable to the Committee on Energy and Natural Resources and the Committee on Environment and Public Works of the United States Senate and the Committee on Interior and Insular Affairs and the Committee on Public Works and Transportation of the United States House of Representatives.

(3) Construction of project modifications authorized in this subsection and flood protection systems authorized in subsections (c) and (d) are justified by the environmental benefits to be derived by the Everglades ecosystem in general and by the park in particular and shall not require further economic justification.

(4) Nothing in this section shall be construed to limit the operation of project facilities to achieve their design objectives, as set forth in the Congressional authorization and any modifications thereof.

(b) **DETERMINATION OF ADVERSE EFFECT.**—(1) Upon completion of the Final Memorandum referred to in subsection (a), the Secretary of the Army, in consultation with the South Florida Water Management District, shall make a determination as to whether the residential area within the East Everglades known as the "Eight and One-Half Square Mile Area" or adjacent agricultural areas, all as generally depicted on the map referred to in subsection 102(a), will be adversely affected by project modifications authorized in subsection (a).

Agriculture and
agricultural
commodities.

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(2) In determining whether adjacent agricultural areas will be adversely affected, the Secretary of the Army shall consider the impact of any flood protection system proposed to be implemented pursuant to subsection (c) on such agricultural areas.

★ (c) FLOOD PROTECTION; EIGHT AND ONE-HALF SQUARE MILE AREA.—If the Secretary of the Army makes a determination pursuant to subsection (b) that the "Eight and One-Half Square Mile Area" will be adversely affected, the Secretary of the Army is authorized and directed to construct a flood protection system for that portion of presently developed land within such area.

(d) FLOOD PROTECTION; ADJACENT AGRICULTURAL AREA.—(1) If the Secretary of the Army determines pursuant to subsection (b) that an adjacent agricultural area will be adversely affected, the Secretary of the Army is authorized and directed to construct a flood protection system for such area. Such determination shall be based on a finding by the Secretary of the Army that:

(A) the adverse effect will be attributable solely to a project modification authorized in subsection (a) or to a flood protection system implemented pursuant to subsection (c), or both; and

(B) such modification or flood protection system will result in a substantial reduction in the economic utility of such area based on its present agricultural use.

(2) No project modification authorized in subsection (a) which the Secretary of the Army determines will cause an adverse effect pursuant to subsection (b) shall be made operational until the Secretary of the Army has implemented measures to prevent such adverse effect on the adjacent agricultural area: *Provided*, That the Secretary of the Army or the South Florida Water Management District may operate the modification to the extent that the Secretary of the Army determines that such operation will not adversely affect the adjacent agricultural area: *Provided further*, That any preventive measure shall be implemented in a manner that presents the least prospect of harm to the natural resources of the park.

(3) Any flood protection system implemented by the Secretary of the Army pursuant to this subsection shall be required only to provide for flood protection for present agricultural uses within such adjacent agricultural area.

(4) The acquisition of land authorized in section 102 shall not be considered a project modification.

Agriculture and
agricultural
commodities.

(e) PERIODIC REVIEW.—(1) Not later than 18 months after the completion of the project modifications authorized in subsection (a), and periodically thereafter, the Secretary of the Army shall review the determination of adverse effect for adjacent agricultural areas.

(2) In conducting such review, the Secretary of the Army shall consult with all affected parties, including, but not limited to, the Secretary, the South Florida Water Management District and agricultural users within adjacent agricultural areas.

(3) If, on the basis of such review, the Secretary of the Army determines that an adjacent agricultural area has been, or will be adversely affected, the Secretary of the Army is authorized and directed, in accordance with the provisions of subsection (d), to construct a flood protection system for such area: *Provided*, That the provisions of subsection (d)(2) shall be applicable only to the extent that the Secretary, in consultation with the Secretary of the Army, determines that the park will not be adversely affected.

RECORD OF DECISION

8.5 Square Mile Area
Modified Water Deliveries to Everglades National ParkDECISION

I have reviewed the General Reevaluation Report (GRR) and Final Supplement to the 1992 Final Environmental Impact Statement on the Modified Water Deliveries (MWD) to Everglades National Park (ENP) Project for the 8.5 Square Mile Area (SMA). I have also reviewed all correspondence, including comments on the Draft and Final Supplemental Environmental Impact Statement (SEIS), and all pertinent documents for this project. Based on this review and after review of the views of other agencies, Native American Tribes, non-governmental organizations, and the general public, I find that Alternative 6D is the final recommended plan for providing flood mitigation to the 8.5 SMA. This plan is technically sound, economically justified, in accordance with environmental statutes, and in the public interest. All practicable means to avoid or minimize environmental harm from the recommended alternative have been adopted. Therefore, I recommend that the 8.5 SMA flood mitigation plan, described in the General Reevaluation Report (GRR) and the Final SEIS, be implemented with the added assurances and conditions described below:

- The perimeter levee location and footprint shall maximize the amount of wetlands included in the west and north of the perimeter levee, following the approximate boundary in Alternative 6D;
- Following the approximate boundary in Alternative 6D, the levees and seepage canal system should be optimized to minimize impacts to the residents of the 8.5 SMA and maximize wetland benefits. For example, the levee's location should avoid residences and wetlands where practicable;
- Water quality treatment for the Recommended Plan assumes state regulatory controls are in effect and that current runoff at the time of implementation meets water quality standards. To the extent additional treatment is required solely due to the implementation of the modifications in the Recommended Plan, they shall be implemented to the extent necessary to meet applicable water quality standards;
- The Recommended Plan, including all required lands, shall become a project feature of the MWD Project. Therefore, construction and land acquisition shall be implemented as part of the project. The Federal government will transfer title of the project lands to the non-Federal sponsor, with the exception of those lands for which the non-Federal sponsor already holds title to, retaining such interests as may be necessary for inspections and other appropriate activities in the operation and maintenance phase of the project;

APPROPRIATIONS BILL LANGUAGE PASSED BY HOUSE AND SENATE:

[PAGE-76]

SEC. 157. MODIFIED WATER DELIVERY PROJECT IN THE STATE OF FLORIDA.

(a)

AUTHORITY.-The Corps of Engineers, using funds made available for modifications authorized by section 104 of the Everglades National Park Protection and Expansion Act of 1989 (16 U.S.C. 410r- 8), shall immediately carry out alternative 6D (including paying 100 percent of the cost of acquiring land or an interest in land) for the purpose of providing a flood protection system for the 8.5 square mile area described in the report entitled "Central and South Florida Project, Modified Water Deliveries to Everglades National Park, Florida, 8.5 Square Mile Area, General Reevaluation Report and Final Supplemental Environmental Impact Statement" and dated July 2000. ★

(b) CONDITION.

[PAGE-77]

(1) IN GENERAL.-The Corps of Engineers may only acquire real property used as a residence for the purpose of carrying out the project described in subsection (a) if the Corps of Engineers or the non- Federal sponsor first offers the owner of such real property comparable real property within the part of the 8.5 square mile area that will be provided flood protection under such project. This paragraph does not affect the authority of the Corps of Engineers to acquire property for which this condition has been met or to which this condition does not apply.

(2) AUTHORITY TO ACQUIRE LAND AND PROVIDE ASSISTANCE.-The Corps of Engineers is authorized to acquire such land in the flood protected portion of the 8.5 square mile area from willing sellers, and provide such financial assistance, as may be necessary to carry out this subsection.

(3) FUNDING.-The Corps of Engineers and the non-Federal sponsor may carry out this sub section with funds made available to carry out the project described in subsection (and funds provided by the Department of Interior for land acquisition assistance for Everglades restoration purposes.

February 14, 2003

CONFERENCE REPORT LANGUAGE - [NOTE: THIS IS NOT THE LAW, BUT
HELPS EXPLAIN
THE INTENT OF CONGRESS]:

The managers are aware of the concerns of the residents of the 8.5 Square Mile Area regarding the plan to implement section 104 of the Everglades National Park Protection and Expansion Act of 1989 (16 U.S.C. 410r-8), called "Alternative 61)." This plan requires the acquisition of additional homes. To minimize disruption in the lives of these residents and to make them whole again, if the United States must take their property to proceed with implementation of Alternative 6D, the conference agreement allows the Corps to acquire additional residential property only if these residents are offered the opportunity to relocate to comparable land within the 8.5 Square Mile Area. This means that the residents of the 8.5 Square Mile Area who choose to relocate within that area must be offered land of equal or greater size, suitable under all applicable land use regulations for use that is the same as the actual use of the land on which they currently reside and eligible for all necessary permits required for such use. The managers also expect the financial assistance provided to such residents will allow them to build a replacement home of equal size, including costs of moving and temporary living arrangements during a reasonable period of time for design and construction. The managers understand that Federal finding in the amount of \$6,000,000 has previously been appropriated and provided to the South Florida Water Management District for the purpose of acquiring replacement residential property. The language in the conference agreement also clarifies that this directive is not intended to stop the Alternative 6D project from moving forward.

The language, specifically the text of subsection (b) (1), does not require the Corps of Engineers or the non-Federal sponsor to complete a relocation before completing a land acquisition, once the offer required by subsection (b) (1) is made. Such offers and land acquisitions may be made and completed in accordance with a schedule determined by the Corps of Engineers and the non-Federal sponsor and need not proceed sequentially.

**CENTRAL AND SOUTHERN FLORIDA PROJECT
MODIFIED WATER DELIVERIES TO
EVERGLADES NATIONAL PARK, FLORIDA**

8.5 SQUARE MILE AREA

VOLUME 1

**GENERAL REEVALUATION REPORT
AND
FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT**

**DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA**

JULY 2000



HDR

HDR Engineering, Inc.

SECTION 2.0 AUTHORIZED PROJECT

2.1 PROJECT AUTHORITY

Everglades National Park Protection and Expansion Act, (PL101-229, Section 104, December 1989). The Everglades National Park Protection and Expansion Act, authorized the Secretary of the Army, upon completion of a GDM, to modify the C&SF project to improve water deliveries to ENP and to take steps to restore ENP natural hydrological conditions. These modifications were specified in a GDM completed by the USACE in 1992 entitled *Modified Water Deliveries to Everglades National Park*. In June 1992, the MWD GDM was approved by the Chief of the Engineering Division, Directorate of Civil Works, USACE. This approval fulfilled the requirements of Section 104 of the 1989 Everglades National Park Protection and Expansion Act, which directed the Secretary of the Army to select the plan that accomplished the goals of MWD to the extent practicable.

In regards to flood protection for the 8.5 SMA, the Act states: "If the Secretary of the Army makes a determination pursuant to subsection (b) that the Eight and One-Half Square Mile Area will be adversely affected, the Secretary of the Army is authorized and directed to construct a flood protection system for that portion of presently developed land within such area."

(Although the Act states "flood protection", it is clear that such protection is to be limited to that which would be necessary to protect against impacts as a result of implementation of the MWD Project. To alleviate the potential adverse effects on the 8.5 SMA due to implementation of the MWD Project, a number of alternatives were analyzed during the development of the 1992 GDM.) Since the intent was to provide protection against impacts caused by the project and not to provide complete flood protection, use of the term "mitigation" versus "protection" was adopted by the USACE in the 1992 GDM.

A component of the Authorized Plan in the GDM included the construction of a flood mitigation system for the 8.5 SMA consisting of a levee, berm and seepage collection system surrounding the area to the north and west which ties into L-31N. The seepage collection canal conveys seepage water to a pump station on the northeast corner and discharges to L-31N Borrow canal.

The USACE and the SFWMD executed a Project Cooperation Agreement (PCA), dated September 29, 1994, for implementation of the MWD Project as described in the 1992 GDM.

- ◆ **Base 95 (Existing):** This is the condition of the study area as it exists today, as measured and observed during the conduct of this reevaluation.
- ◆ **Future Without Project:** This is the condition of the study area as it would be expected to exist in the future, after the MWD Project was implemented, including the Authorized Plan for mitigation of the 8.5 SMA. This is the base for which the “future with project” scenario will be compared.

A specific description of each of the project conditions is included in Section 4.5 of this report.

3.2.1 Base 83 ★

Information contained in the 1992 GDM detailed the condition of the environment and resources within the MWD study area prior to the project implementation. It contains a snapshot of this broad area as it appeared to the MWD study team. As such, it represents the best information available for the background, conditions, and features of the MWD area for the Base 83 conditions. Therefore, the Base 83 project conditions, as established for the 1992 MWD GDM/EIS, have been used for this reevaluation for comparative purposes.

A summary of the pre-MWD project conditions was presented in the 1992 GDM, and is included below as a base for conditions as they existed prior to the MWD project.

C&SF Project. The C&SF Project provides essentially all water deliveries, other than direct rainfall, to the NESRS. In total, WCA 1, 2 and 3 include the largest remaining portion of undeveloped Everglades in existence. WCA 3 is the largest and southernmost of these areas, with a total size of about 915 square miles. L-67A and L-67 C divide the WCA into two segments, 3A on the west (760 square miles) and 3B on the east (155 square miles).

The operation of the project to deliver water to ENP has been governed by the requirements of PL 91-282, enacted in June 1970 following droughts in the early 1960's. This law established a minimum schedule of water volume to be delivered to ENP through three delivery points: Shark River Slough and two locations east of the study area. The minimum delivery to Shark River Slough was set at 260,000 acre-ft. annually, distributed in accordance with a monthly schedule of minimum water releases. In times of water shortage, the law allowed deliveries to be cut back to a volume representing 16.5 percent of the total volumes released from the C&SF Project.

Actual water volumes delivered from the C&SF Project through Shark River Slough to ENP are determined based on Federal regulations, the physical capabilities of the system, and management decisions of USACE, ENP, and the

SFVMD. The principal governing factor in deciding the volume of water to discharge is the stage (height) of water in WCA 3A. Operating practice has been to provide monthly deliveries as close to delivery schedule as is possible without a deficit whenever water in WCA 3A is below regulation schedule. This is done to maintain sufficient storage in WCA 3A both to ensure that water is available for subsequent ENP deliveries, and to satisfy other purposes of the project, such as storage for wildlife conservation and aquifer recharge.

When water released from WCA 3A is not sufficient to keep WCA 3A from exceeding its schedule stage, additional "flood" releases are made to lower the stage in WCA 3A. The S-12 structures are the main means of discharging floodwaters. Minor flood releases can also be made, under certain conditions, westward into Big Cypress and eastward, via S-151, into WCA 3B.

Average annual discharge of water into ENP through the S-12 structures for the period of January 1971 through December 1987 was about 392,000 acre-ft., which was 51 percent above the 260,000 annual minimum delivery schedule. The extra water was almost entirely a result of flood releases from WCA 3A that were made in order to keep the stage within the regulation schedule. Most of the excess was delivered during the months of July through October, which is during the normal wet season. The greatest release as a percentage of the delivery schedule occurred during the period March through August.

Water Quality. The quality of water delivered to ENP is frequently influenced by urban and agricultural activities elsewhere in the watershed. Of particular concern are floodwaters released from the Everglades Agricultural Area (EAA) into WCA 3A. The Everglades is a nutrient poor system and the introduction of nutrients, particularly phosphorus, from the agricultural areas is thought to have significantly affected sawgrass and wet prairie habitat in the water conservation areas through which EAA discharges pass en route to ENP. Large acreage in WCA Nos. 1, 2, and 3 has been converted to cattail, an otherwise uncommon plant in the Everglades, as a result of nutrient increases. Lower in the WCA system, particularly in the southern portion of WCA 3A and in the Shark River Slough, there is yet relatively little conversion to cattail. This is thought to be the result of the removal of nutrients upstream. Water that reaches the S-12 release structures in L-29 through sheet flow over WCA 3A showed phosphorus levels of less than 10 parts per billion (ppb) total phosphorus, whereas water delivered through the L-67A canal frequently exceeded 30 ppb total phosphorus. However, total phosphorus concentrations vary seasonally with annual rainfall amounts and were often higher following periods of severe drought. The average seemed to vary between 8 and 15 ppb.

Periphyton. Periphyton is the community of small to microscopic algae that grow attached to the stems and leaves of the dominant prairie and marsh plants. They are believed to be a crucial component of the marl-forming process. Loss of historic inflows has reduced the aquatic productivity of ENP by reducing the

aerial extent of the periphyton community. Reduced flows also appear to have affected periphyton species composition. Studies have shown that the taxonomic composition of periphyton in ENP was significantly correlated with hydroperiod length and soil percent organic matter, which are both largely regulated by water management activities. Shortened hydroperiods and low percentages of soil organic matter favored the development of blue-green periphyton over other groups of algae, such as diatoms and green algae. Other studies have shown that both fish and invertebrate grazers selected against blue-greens, favoring diatoms or green algae as a preferred food source.

Vegetation. Wetland communities occupy most of the East Everglades. The most common community in the East Everglades is sawgrass marsh (about 37% of the area as stated in the 1992 GDM), with the combined mesic grass communities, such as muhly grass and beard grass, ranked second (about 30% of the area). In the NESRS, some ecological modifications to the natural plant communities occurred because of the changed hydroperiod and fire patterns.

Beginning in the 1930's, several exotic plant species became established in parts of ENP and adjacent areas. Aquatic weeds are present, but have yet to pose a major problem in ENP. Three woody exotics pose threats to ENP: Casuarina (Australian Pine), Melaleuca (Cajeput Tree), and Schinus (Brazilian Pepper). While exotics invade a variety of natural plant communities, their spread in wetlands is attributed primarily to the decline in vigor and health of the natural communities, mostly associated with reductions in water depths and hydroperiods. The invasion of Melaleuca has been a problem in NESRS.

Birds. About 300 species of birds have been identified in ENP. Southern Florida's location makes it a migratory crossroads for West Indian and Central and South American birds; numerous North American species are residents. Many of this continent's species of wading birds, shorebirds, and waterfowl are represented here at some time of the year. Many of them are nesting residents, including some which seldom range farther north and others that have disappeared from areas where they once occurred.

Beginning in the early 1960's, the distribution of water deliveries affected wading birds mainly in two ways. First, the concentration of southward water flow in the Everglades into the northern portion of ENP resulted in a longer hydroperiod in the wetlands that received the flow, and in long-delayed and incomplete dry season drawdowns. Often, food was never sufficiently concentrated and available to support major wading bird nesting attempts. Or, as was commonly the case with wood storks, food became available only late in the dry season, and nesting was delayed so that it could not be completed before the beginning of the summer rains. Second, the already reduced foraging area available to wading birds was sharply diminished by eliminating flow to NESRS. This probably resulted in a substantial decline in aquatic productivity and loss of a significant portion of the available early dry season feeding habitat. Loss of these

3.4.7 Alternative 6C – Modified Western Portion of 8.5 SMA as Buffer Plan (Save Our Rivers Boundary)

Alternative 6C was developed based on a request from the SFWMD following the public presentation of this report on April 12, 2000 and is similar in nature and design to Alternative 6B. This alternative, shown in Figure 10, consists of an exterior and interior levee as well as a seepage canal generally constructed as shown. The location of the levee and canal system generally follows the eastern boundary of the area designated by SFWMD as the Phase 1 - Save Our Rivers (SOR) boundary. This area has been the subject of willing seller property acquisition by SFWMD as part of the SOR program.

A seepage collection canal will be located between the levees designed to keep the groundwater levels within the eastern portion of the area at the same levels as existed prior to the implementation of the MWD Project. The interior levee is positioned to prevent surface water from entering the seepage canal. A new proposed pumping structure (S-357) located at the southern terminus of the levee/canal system will discharge seepage through a 96-inch diameter pipe to be released south into a treatment area in the C-111 project area.

3.4.8 Alternative 6D – Modified Western Portion of 8.5 SMA as Buffer Plan

Alternative 6D is similar in nature and design to Alternative 6C. This alternative consists of an exterior and interior levee as well as a seepage canal generally constructed as shown on Figure 11. The location of the exterior levee is generally inside the Phase 1 - SOR boundary line that the outer levee for Alternative 6C follows. The seepage canal system runs along 205th Avenue north from 168th Street to 132nd Street, then east along 132nd Street to the L-31N canal. The seepage collection canal is designed to keep the groundwater levels within the area interior of the outer levee at the same levels as existed prior to the implementation of the MWD Project. Two interior levees, one on either side of the seepage canal, are positioned to prevent surface water from entering the seepage canal. A new proposed pumping structure (S-357) located at the southern terminus of the levee/canal system will discharge seepage water through a 96-inch diameter pipe to be released south into a treatment area in the C-111 project area.

The canal and levee system on the western boundary of this alternative ranges from approximately 0.22 to 1.1 miles west of the boundary of Alternative 6B, depending on the location along the boundary. Similarly, it is located approximately .10 to 1.05 miles east of the westernmost boundary of the 8.5 SMA. This alternative includes approximately 5.5 square miles within its boundaries, which is 2.1 square miles more than Alternative 6B.

impacts and project costs while maximizing the environmental benefits. Alternative 6C would impact 8% of the total residential structures and 2% of agricultural areas as compared to 62% and 44%, respectively, for Alternative 6B. Total project costs were reduced and are estimated at \$62.8 million, approximately 35% of the cost of Alternative 5 and 43% of the cost of Alternative 6B. The environmental benefits associated with Alternative 6C were generally less than the benefits associated with Alternative 6B. The WRAP score, for example, for Alternative 6C is 4,253 functional units less than the maximum score associated with Alternatives 4 and 5 and 3,411 less than Alternative 6B.

After reviewing the results for Alternatives 6B and 6C, and again considering public input, Alternative D was developed as a variation to try to minimize social impacts and project costs while optimizing the environmental benefits. Alternative 6D would impact 17% of the total residential structures and 8% of agricultural areas as compared to 62% and 44%, respectively for Alternative 6B and 8% and 2%, respectively for Alternative 6C. Total project costs for Alternative 6D are estimated as \$88.1 million, approximately 60% of the cost of Alternative 6B, 1.4 times the cost of Alternative 6C and 2.9 times the cost of Alternative 1. The environmental benefits associated with Alternative 6D increased as compared to Alternative 6C and were generally consistent with the level of benefits for Alternatives 6B and 5. The WRAP score, for example, for Alternative 6D is 1,126 functional units less than the maximum score associated with Alternatives 4 and 5 and 3,127 greater than Alternative 6C.

6.3.4 Summary Evaluation

The environmental benefits and impacts for each alternative are quantified by hydropattern effects in NESRS (Objective 1) and effects to ecological functions (Objective 4) as further summarized below for each of the three groups of alternatives:

Objective 1. Evaluate Effects on Hydropatterns in NESRS												
Measure	Units	Structural					Non-Structural		Combination			
		Alt 1	Alt 2B	Alt 3	Alt 7		Alt 4	Alt 6	Alt 6B	Alt 6C	Alt 6D	Alt 6A
a. Hydroperiod Impacts ⁽¹⁾	Increased Hydroperiod (ac)	24,999 (avg)			26,271		26,271		26,271	25,799	26,271	
	Decreased Hydroperiod (ac)	1,271 (avg)			0		0		0	471	0	
b. Water depths ⁽¹⁾	Increased depth (ac)	59,469 (avg)			62,261 (avg)		62,125		62,068	60,643	62,049 (avg)	
	Decreased depth (ac)	2,598 (avg)			0		0		0	1,425	0	95
⁽¹⁾ Value represents the comparison of each alternative versus the Base 95 Condition												

6.4.3 Evaluation of Alternatives

Alternative 1 represents the best structural plan that has the least social impacts. Alternative 5 is the best non-structural plan that maximizes ecosystem restoration. Alternative 6D is the best combination plan with balanced results. The evaluation will continue with these three alternatives as follow:

1. Functional Units (WRAP): Compared to Alternative 1, Alternative 6D is the most cost effective of all the alternatives in terms of increased functional units of wetlands, providing 4,087 functional units more than Alternative 1 at a cost of \$14,069 per unit. Alternative 5 had the highest output of additional functional units, but had a significantly higher cost per functional unit at \$28,467 per unit. Alternative 6D provides nearly 93% of the functional units provided by Alternative 5 at approximately 49% of the cost. Figure 40 shows the incremental cost per WRAP functional unit as compared to Alternative 1.
2. Endangered species benefit: Alternative 5 provides the best optimal mix of suitable wood stork habitat during water level recession. Per USFWS analysis, Alternative 6D provides a similar mix while Alternative 1 has a lesser mix. Alternative 6D provides an increase of 2,731 acres of snail kite habitat over Alternative 1. This amount is 70% of that provided by Alternative 5 at approximately 49% of the cost.
3. Short-Hydroperiod Wetlands: Alternative 6D increased the area of short-hydroperiod wetlands by 365 acres over Alternative 1. Alternative 5 provides an additional 344 acres, but at a significantly higher incremental cost of \$90.9 million.
4. Increased Water Depths: Alternative 6D provides for an additional 2,708 acres inside NESRS with increased water depths above Alternative 1. This is essentially the same acreage as Alternative 5 (2,765 acres) but they are provided at a substantially reduced incremental cost (\$90.9 million dollars less than Alternative 5).
5. Lengthened hydroperiods: When compared to Alternative 1, Alternative 6D increases the area with a lengthened hydroperiod by an estimated 1,115 acres in NESRS. This is equivalent to the increase achieved by Alternative 5, but at a substantially reduced incremental cost (\$90.9 million less than Alternative 5).
6. While displacing an additional 34 households over and above that of Alternative 1, Alternative 6D impacts less than 17% of the total number of households that would need to be relocated with the implementation of Alternative 5. Thus, over 83% of the owner-occupied and non-owner occupied residences would not be affected with the implementation of

Table 8
Results of Alternatives Analysis

This table presents the absolute values for each performance measure.

1. Evaluate Effects on Hydropatterns in NESRS													
Measure	Units	Base 95	Alt 1	Alt 2B	Alt 3	Alt 4	Alt 5	Alt 6B	Alt 6C	Alt 6D	Alt 7	Alt 8A	Alt 9
a. Hydroperiod Impacts ⁽¹⁾	Increased Hydroperiod (ac)	N/A	25,156	24,842	26,271	26,271	26,271	26,271	25,799	26,271	26,271	26,271	24,996
	Decreased Hydroperiod (ac)	N/A	1,114	1,428	0	0	0	0	471	0	0	0	1,271
b. Water depths ⁽¹⁾	Increased depth (ac)	N/A	59,360	59,578	62,396	62,125	62,125	62,068	60,643	62,068	62,125	62,029	59,469
	Decreased depth (ac)	N/A	2,707	2,489	0	0	0	0	1,425	0	0	95	2,598
c. Effects on Seasonal variability	Minimum stage, (ft)	5.59	6.61	6.69	6.95	6.83	6.83	6.86	6.97	6.84	6.83	6.91	6.65
	Maximum stage, (ft)	7.89	8.05	8.07	8.34	8.25	8.25	8.29	8.17	8.25	8.25	8.31	8.08
	Range of stage, (ft)	2.54	2.02	1.95	1.96	1.95	1.95	1.97	1.97	1.96	1.95	1.94	1.98
d. Duration of continuous flooding	Consecutive weeks of inundation	39	39	42	42	42	42	45	43	45	42	45	41
(1) Value represents the comparison of each alternative versus the Base 95 Condition													
2. Evaluate Impacts to the Landowners and Residents of the 8.5 SMA Resulting From Implementation of the Modified Water Deliveries Project													
Measure	Units	Base 95	Alt 1	Alt 2B	Alt 3	Alt 4	Alt 5	Alt 6B	Alt 6C	Alt 6D	Alt 7	Alt 8A	Alt 9
a. Flood mitigation damages	Area of damages, (ac, %)	0	0	0	4693 73%	N/A	N/A	150 2%	0	548 9%	4404 69%	2013 31%	0
b. Flood protection damages	Area of damages, (ac, %)	0	N/A	N/A	5825 91%	N/A	N/A	150 2%	N/A	N/A	N/A	N/A	N/A
c. Impacts to business	No. of businesses impacted	0	0 0%	0 0%	0 0%	4 100%	4 100%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
d. Impacts to Residences	No. of residences impacted	0	1 0.5%	1 0.5%	1 0.5%	17 8%	208 100%	129 62%	17 8%	35 17%	1 0.5%	104 50%	1 0.5%
	Total no. of structures impacted	0	1 0.2%	1 0.2%	1 0.2%	41 8%	514 100%	319 62%	41 8%	87 17%	1 0.2%	258 50%	1 0.2%
e. Impacts to agricultural lands	Lost area (ac)	0	0 0%	0 0%	0 0%	0 0%	2,642 100%	1,175 44%	51 2%	215 8%	0 0%	900 34%	0 0%
	Lost annual income (\$M/yr)	0	0	0	0	0	6.46	2.78	0.125	0.53	0	2.20	0
f. Unwilling sellers	No. of property owners	Time constraints associated with the conduct of this study prevented the development of a statistically reliable survey instrument and sample survey. As a result, a specific estimate of the numbers of unwilling sellers has not been developed.											
3. Analyze Cost Effectiveness													
Measure	Units	Base 95	Alt 1	Alt 2B	Alt 3	Alt 4	Alt 5	Alt 6B	Alt 6C	Alt 6D	Alt 7	Alt 8A	Alt 9
a. Project costs	O&M and Replacement Costs (\$M/yr)	0	.27	.33	0	0	0	.33	.33	.40	.43	.35	.37
	Real Estate Costs (\$M)	0	4.1	4.1	110.2	122.8	184.8	115.0	30.7	55.7	110.5	127.0	4.1
	Capital Costs (\$M)	0	26.5	29.8	125.6	9.2	14.2	32.7	32.1	32.4	24.1	26.8	35.8
	Total Initial Project Costs (\$M)	0	30.6	33.9	235.8	132.0	179.0	147.7	62.8	88.1	134.6	153.7	39.9
b. Local Costs	Capital Cost (\$M)	0	0	0	0	0	0	36	0	0	0	0	0
	Annual O&M Costs (\$M/yr)	0	0	0	0	0	0	0.90	0	0	0	0	0
1) Capital cost includes all design and construction management costs and contingency; it does not include real estate costs. 2) O & M and Replacement costs are presented as annual costs. 3) O & M costs do not include ecological O & M or water quality monitoring. 4) Real estate costs include all fee simple acquisition and flowage easements.													

this alternative can be expected to range between 7 ppb and 12 ppb. The discharge standard for phosphorus is 10 ppb. Thus, a treatment facility will have to be constructed. The treatment facility envisioned consists of an approximately 200-acre area located 2,000 feet south of Richmond Drive in an area already acquired for the planned C-111 buffer area. Discharge from the seepage canal will be pumped to the treatment area. The treatment area will consist of a bermed area approximately 3,000 feet by 3,000 feet. Final design of the facility will establish water surface elevations within the treatment area. However, for planning purposes, it is expected that water surface elevations of no more than 4-feet above ground surface will exist in the treatment area. Water would enter an open water section of the facility. From there it would be directed, using baffles, to a shallower area where biological uptake can occur. It is expected that discharge from this facility can be directed to the C-111 system to the south. The cost of this facility is included in the overall cost of this alternative.

4.11.3 Wetlands

The improved hydrology is predicted to result in a net increase of wetland acreage (7,464 acres) within the 8.5 SMA and the surrounding area of potential affect. Short hydroperiod marl-forming wetland would be reduced by 4,298 acres while long hydroperiod peat-forming wetlands are predicted to increase by 11,762 acres. The reduction in short hydroperiod wetlands appears to be the result of drawdown effects near the canal in addition to shifts towards long hydroperiod wetlands caused by increased hydroperiods. Approximately 130 acres of wetland will be directly impacted as a result of construction of the levee and canal system.

The FCAR provided an assessment of wetland impacts based on the use of the WRAP and hydrologic modeling (USFWS/NPS 2000). It concluded that some hydrologic improvement from construction and operation of this plan would likely be realized along the levee alignment (compared to other alternatives) as the canal is distant and a significant edge effect is not apparent. Functional lift of these lands should be consistent with maximum lift attainable through total acquisition of the area, including conversions of shrubby and exotic-dominated habitats to native landscapes over the project life of 50 years.

According to the FCAR, throughout the life of the project, the FAA tract (Graminoid Wetland >7.0 feet) would experience negative hydrologic impacts resulting from the construction of the seepage canal immediately south of the area (USFWS/NPS 2000). This would result in a 20 per cent functional loss as some vegetative ground cover would be lost, the encroachment of woody and exotic species would increase, and the potential for disruptive fire would increase. Other than the FAA tract, approximately 360 acres is estimated to remain in the projected area. Wetland function of these lands is predicted to be lost to development within the life of the project.

West of the levee and canal, long hydroperiod wetlands, forested wetlands, and forested exotic wetlands in ENP would experience benefits identical to those associated with alternatives 4, 5, and 6B. Alternative 6D would increase wetland function by 1,322 FU (1,290 in ENP and 32 within the 8.5 SMA).

Alternative 6D represents an improvement of 4,087 FU compared to Alternative 1. A total lift of 2,417 FU is realized in ENP and is attributed to unimpeded restoration flows resulting from the implementation of the MWD. Levee alignment will be optimized during the design phases to minimize impacts to wetlands. Figure 23 shows the areal extent of simulated wetland hydroperiods and substrate conditions under Alternative 6D. The water level effect of this alternative relative to full MWD Project implementation is shown in Figure 24.

4.11.4 Fish and Wildlife

For lands east of the proposed levee and canal, the effects of Alternative 6D result in reduced habitat quality due to predicted future expansion of agricultural and residential land uses. For lands west of the proposed levee, the effects of this alternative are expected to result in improved habitat for fish and wildlife resources due to improved water deliveries to ENP.

4.11.5 Listed Species

A Biological Assessment (BA), has been prepared under the provisions of Section 7 of the Endangered Species Act (50 CFR 402.02), for the Recommended Plan (Alternative 6D with conditions) for five listed species that are known to, or might occur in the project area, including the wood stork, snail kite, eastern indigo snake, Florida panther, and Cape Sable seaside sparrow (Attachment A). Based on the information presented in the BA, the USACE has concluded that the project would not be likely to adversely affect any of the five listed species. Coordination with the USFWS has been initiated and concurrence with this determination requested. The following summarizes the conclusions reached for each species.

Wood Stork. The wood stork is a highly mobile species with no known roosting or nest sites within the project area. The nearest such site is along the Tamiami Trail (Tamiami West colony, located about five miles north of the 8.5 SMA). There is no particularly important resource for the species in the project area. It is determined that the project would not be likely to adversely affect the wood stork.

Snail Kite. The snail kite is a highly mobile species with no known roosting or nest sites within the project area, nor any Designated Critical Habitat within the

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project impact area. There is no particularly important resource for the species in the project area. It is determined that the project would not be likely to adversely affect the snail kite.

Eastern Indigo Snake. The indigo snake probably occurs in the upland portion of the project area and therefore could potentially be affected by construction activities associated with implementation of the project. All standard protective measures that have been jointly developed with the USFWS will be implemented (see Attachment A). It is determined that the project would not be likely to adversely affect the indigo snake.

Cape Sable Seaside Sparrow. Potential adverse effects on the sparrow would involve project-induced changes in hydrological conditions in the portion of Designated Critical Habitat for the sparrow, Population F, which lies immediately southwest of the 8.5 SMA. Hydrologic modeling for average year rainfall was completed for the analysis. Hydrologic modeling shows that, on average, the project would not likely result in adverse effects to the Cape Sable seaside sparrow.

Florida Panther. ENP staff have been tracking radio-collared panthers since 1986, and presently have been following an estimated 90% of the individuals in the area. Records for a 15-month old male panther and 4-year old female panther indicate sightings near, but not within the 8.5 SMA. The nearest known denning area is 15 to 20 miles away. The project would not introduce any barrier to panther movements since they are known not to be impeded by levees or canals. Noise and human presence during the two-year project construction period could divert panther movements from the immediate area, but would produce no long-term effects on utilization of adjacent habitat. Therefore, it is determined that the project would not be likely to adversely affect the Florida panther.

4.11.6 Socio-Economics

With Alternative 6D, 2,881 acres (45 percent) of the 6,413 acres located in the 8.5 SMA will be required to implement this alternative. Approximately 2,335 acres of land will need to be acquired in fee simple and 546 acres will need to have flowage easements. Of the total 2,881 acres required for Alternative 6D, 1,132 acres have been acquired and are in public ownership. About 215 acres of the land needing to be acquired is agricultural land. Utilizing the average annual agricultural income per acre in Miami-Dade County (\$2,445), the value of annual agricultural income potentially lost is estimated at about \$526,000. Assuming the existing estimated mix of residents versus non-residents (40.5% vs. 59.5%) remains constant, the estimated amount of annual agricultural income potentially lost to residents is about \$221,000 and the loss to non-residents is about \$305,000.

Description of Recommended Plan

The Recommended Plan consists of perimeter and interior levees as well as a seepage canal that would be constructed as shown on Figure ES-1. The location of the perimeter levee would be generally east of the Phase 1 – Save Our Rivers (SOR) boundary line. The perimeter levee on the western boundary of the Recommended Plan ranges from approximately 500 to 5,500 feet east of the westernmost boundary of the 8.5 SMA, depending on the location along the boundary. To implement this plan, a total of 2,335 acres would be purchased fee simple, and flowage easements would be required for 546 acres.

The seepage canal system and interior levees would run along 205th Avenue north from 168th Street to 132nd Street, then east along 132nd Street to the L-31N canal. The seepage collection canal is designed to maintain the groundwater levels within the area interior of the outer levee at the same levels as existed prior to the implementation of the MWD Project. Two interior levees, one on either side of the seepage canal, would be positioned to prevent surface water from directly entering the seepage canal. A new proposed pumping structure (S-357), located at the southern terminus of the seepage canal, would discharge seepage water south into a treatment area in the C-111 Project area.

Several design and construction issues have been identified that could potentially impact both cost and schedule for this project. These issues include site access for surveying and geotechnical exploration, equipment specifications for the pumping station, construction phasing, maintenance of traffic, noise and vibration abatement, dust control and truck haul routes. These issues should be addressed early in the detailed design of the Recommended Plan to minimize the potential for impacts to the project budget and schedule.

The total estimated cost for the Recommended Plan is \$106,541,230.

Environmental Consequences of Recommended Plan

The Recommended Plan results in an increase in WRAP functional units (1,322 FU), due in large part to the minimization of drawdown effects within ENP and preservation of wetlands west of the proposed perimeter levee. Wetlands within the 8.5 SMA and the area of potential effect are predicted to increase by 7,464 acres compared to the existing conditions. Due to these environmental improvements, compensatory mitigation for wetlands and fish and wildlife resources will not be necessary.

A Biological Assessment (BA) has been prepared under the provision of Section 7 of the Endangered Species Act. The BA evaluated likely project effects on five listed species that are known to or might occur in the area affected by the project, including the wood stork, snail kite, eastern indigo snake, Florida panther, and

Cape Sable seaside sparrow. This BA concluded that the project is not likely to adversely affect any of the listed species. Coordination with the U.S. Fish and Wildlife Service (USFWS) has been initiated and their concurrence with this determination requested.

Water discharged from the seepage canal will be conveyed through a treatment area in the C-111 Project area, located just south of the 8.5 SMA. This treatment area will facilitate removal of nutrients prior to eventual down gradient discharge. Approximately 35 owner residences (17%) and 20 tenants will require relocation. However, it is anticipated that many residents can relocate onto available properties within the 8.5 SMA.

Public Involvement

As part of the preparation of this GRR/SEIS, public involvement has been encouraged and facilitated since the onset of this reevaluation. Affected stakeholders have been afforded several opportunities for public input. Public involvement included numerous public forums to allow for residents, cooperating agencies, and affected stakeholders to present their issues and concerns.

Meetings held to specifically discuss this project included agency and stakeholder scoping meetings, technical team meetings, and formal public meetings. Numerous verbal and written comments were received from residents and non-residents, business owners, elected officials, special interest groups, tribal representatives and the environmental community. During formal public meetings, all input was documented on tape by a stenographer and comment cards filled out by attendees were assembled. At the technical meetings, input was received from agency and tribal representatives, special interest groups, and other various stakeholders. Cooperative efforts were pursued to gain an understanding of issues and include input in the most effective manner possible.

All public meetings were announced (noticed) at least two weeks in advance while technical meetings were open to all interested parties who were notified via a network of electronic mail and telephone correspondence. In an effort to gather as much information and insight as possible, several visits were made to the 8.5 SMA, hosted by residents, business owners, and government agency and tribal representatives.

Plan Implementation

The costs for lands, easements, and rights-of-way needed for construction as well as lands acquired west and north of the perimeter levee would be 100% Federal responsibility. The Federal government will retain title to the project lands and grant to the non-Federal sponsor a 50-year outgrant for the lands to implement operation and maintenance responsibilities, including sufficient rights

for project operation, maintenance, management, repair and rehabilitation. The USACE would pay 75% of the cost for operation and maintenance. The SFWMD, as the local sponsor, would pay 25% of the cost for operations and maintenance for the Recommended Plan, and 100% of the cost of the post-construction management of land outside of the perimeter levee. In accordance with the terms of local cooperation, title to the lands currently owned by the SFWMD will be transferred to the Federal government and SFWMD would be paid its reasonable land costs and reasonable and documented administrative costs.

An implementation schedule has been developed for the Recommended Plan and shows that the project can be constructed by December 2003.

Recommendations

The project for the 8.5 SMA is an integral part of the MWD Project for ENP. Portions of the MWD Project have been implemented, but the benefits from the project cannot be fully utilized until the part for the 8.5 SMA is completed. The Recommended Plan will consist of perimeter and interior levees as well as a seepage canal and pump station with the following conditions:

- (a) The perimeter levee location and footprint shall maximize the amount of wetlands included west and north of the perimeter levee, following the approximate boundary in Alternative 6D.
- (b) Following the approximate boundary in Alternative 6D, the levees and seepage canal system should be optimized to minimize impacts to the residents of 8.5 SMA. For example, the levee's location should avoid residences and wetlands where practicable.
- (c) Water quality treatment shall be provided for the existing runoff at the time of implementation to meet applicable state water quality standards and applicable permitting requirements and not cause degradation of ambient conditions. The water quality treatment for the Recommended Plan assumes regulatory control and enforcement actions.
- (d) The Recommended Plan, including all required lands, shall become a project feature of the MWD Project. Therefore, construction and land acquisition shall be implemented as part of the project. The Federal government will retain title to the project lands and grant the non-Federal sponsor an outgrant for the lands to implement operation and maintenance responsibilities including sufficient rights for project operation, maintenance, management, repair and rehabilitation.
- (e) The periodic flooding of landowners east of the proposed levee, before and after project implementation, will remain unchanged from conditions in

existence prior to implementation of the MWD Project. Flood mitigation, not flood protection, should be provided by the design and operation of the Recommended Plan. No deviations are intended from the operations specified in the Manual (i.e., increased pumping in the seepage canal or the inclusion of additional pumps) due to anticipated public demand for increased flood relief inside the perimeter levee of the 8.5 SMA Project.

- (f) Implementation of the Recommended Plan shall not adversely harm the restoration levels of ENP's hydrology greater than that simulated through modeling of Alternative 6D. A monitoring, evaluation, and reporting program shall be implemented to ensure operations are consistent with these levels.
- (g) Operations of the 8.5 SMA Project shall be detailed in an Operations and Maintenance Manual. As appropriate, this Manual shall be agreed to by ENP, USFWS, USACE, and SFWMD, and include provisions for monitoring, emergency operations as well as mechanisms for dispute resolution to assure compliance in a manner satisfactory to all agencies.
- (h) Seepage canal design will incorporate, insofar as practicable, enhancements that will increase the potential for improved water quality through biological treatment, and increase habitat for fish and wildlife. Additionally, all lands north and west of the perimeter levee and within the 8.5 SMA will be restored and managed to maximize the ecological quality of the area to the extent practicable.
- (i) A Biological Assessment (BA) has been prepared under the provision of Section 7 of the Endangered Species Act. The BA evaluated likely project effects on five listed species that are known to, or might occur in the area affected by the project, including the wood stork, snail kite, eastern indigo snake, Florida panther, and Cape Sable seaside sparrow. This BA concluded that the project is not likely to adversely affect any of the listed species. Coordination with the USFWS has been initiated and their concurrence with this determination requested.
- (j) Appropriate and reasonable noise abatement features such as walls surrounding the facility or interior building soundproofing will be constructed as needed in the vicinity of the proposed pumping facility.

It is recommended that the Recommended Plan be constructed at 100 percent Federal expense with the non-Federal sponsor being responsible for operation, maintenance, repair, replacement and rehabilitation of the Recommended Plan with a 75 percent Federal contribution for operations and maintenance and that the following items of local cooperation, in addition to the items of local cooperation contained in the General Design Memorandum for the Modified Water Deliveries to Everglades National Park, dated June 1992, shall be required of the non-Federal Sponsor:

**CENTRAL AND SOUTHERN FLORIDA PROJECT
MODIFIED WATER DELIVERIES TO
EVERGLADES NATIONAL PARK, FLORIDA**

8.5 SQUARE MILE AREA

**VOLUME 2
APPENDIX A
HYDRAULIC AND HYDROGEOLOGIC
MODEL REPORT**

**DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA**

JULY 2000



HDR

HDR Engineering, Inc.

Water Sources and Sinks

Important aspects of any model are the various boundary conditions. The boundaries represent sources or sinks for groundwater and surface water. Various types of boundary conditions can be simulated utilizing MODBRACH. For the purposes of this study variable head boundaries were utilized along the northern and western edge of the model boundary, while the eastern and southern boundary utilized a variable head boundary representing the daily mean tide elevation. The data utilized to assign the boundaries on the western and northern model edges were imported from the SFVMM 2X2 model and interpolated to the model grid. The variable tidal heads assigned along the eastern ocean side of the model were determined by daily mean tide data. Additional boundary inputs include the flow and stage in various canals (discussed below) and the location of municipal water wells. A simplistic map of the various boundaries is shown as Figure 14. Further information of the development of various boundaries for the model is available in the MODBRACH model Calibration report (Evans, 2000).

Three main boundary condition sets were utilized for the study. They included a "restored" boundary using D13R stages and flows; a Base83 boundary using stages and flows that existed prior to implementation of the South Dade Conveyance System; and a Base95 boundary which approximates current conditions.

The main boundary condition set used for alternative design purposes was that of a "restored" boundary along the C-4 canal. The restored boundary approximates stages and flows in the MODBRACH model that will occur once the MWD has been constructed and is operated. Since the exact configuration and operation of these improvements had not been fully evaluated at the time of this study, an appropriate restored boundary had to be selected. During technical team meetings involving interested stake holders, agencies and the Corps of Engineers, it was decided that a reasonable restored boundary could be represented by the D13R scenario developed during the Restudy. The Base83 and Base95 boundaries were utilized for a few simulations to allow alternative comparisons to these base years.

In order to keep track of the various model runs, a file naming convention was developed. The naming convention includes boundary type (D13Rbc, Base95bc, Base83bc), alternative name (existing, plan1, plan2, etc.), precipitation year (1995 or 1989), and structure operational scheme (1983 or 1995 operations). An example is provided for information purposes.

MODBRACH model is both a numerical and incremental process. The "numerically" computed flow through a structure depends on the structure type, stage differentials, and structure "coefficients" as described above.

The process is "incremental" in that, once the specific criteria are met to open or close a structure, the structure opens in a certain number of time steps. The gradual opening or closing of structures maintains numerical stability. Many of the structures are opened or closed in incremental time steps (minimum duration of 1 hour), whereas, in the real world these structure operations occur in a fraction of the model time steps. Additionally, the opening (or closing) of a structure may change the trigger status such that in the next time step the structure will be closed (or opened). This frequently results in rapid oscillations of "flow/no-flow" through the structure. Rapidly opening and closing the structures does not occur in the real world, but it does in the model world. This is especially true of manually operated structures.

Flow rates measured through structures are frequently in error. Measured flow rates are normally a function of head differential (i.e., headwater versus tail water) and a structure rating curve. Therefore, the accuracy of the flow rates measured in the field depends primarily on the accuracy of the rating curves.

Model Limitations

(All numerical model studies have limitations. Many of these are related to the specific computer code chosen for a particular study. Other limitations are related to the field data that is available or lack thereof. Lastly, model studies are also limited by the schedule dictated by project requirements. All of these limitations impart various sources of error or limit the evaluation to an appropriate level of detail. This model study does have limitations and should be used with caution.) This study was not intended to be an exhaustive analysis of future operational schemes nor was it intended to be utilized for final design of any project alternative. Once an alternative has been selected as a Locally Preferred Alternative (LPA) or once a new Federally Preferred Plan has been selected, it is recommended that further modeling be completed in order to optimize the recommended plan. This modeling should be completed during final design and prior to construction.

A brief discussion of the limitations of this model study is included in the following paragraphs.

Project Schedule

The project schedule for this report was extremely short requiring numerous model runs and evaluations to be completed within approximately 4 months time. The MODBRACH model is a very detailed model that reproduces real world

results in a fairly accurate fashion. However, the detail and accuracy comes at a cost of long computational times. Each model run requires approximately 35 to 45 hours to complete on a Compaq DS20 workstation with dual alpha EV6 processors operating at 500 MHz clock speed each. For this model study, approximately 100 separate model runs were completed utilizing various boundary conditions, structure operations, precipitation and alternatives. Those model runs required over 180 CPU days of computer time. Due to the large amount of model runs completed and the vast amount of output generated, it was difficult to cull the data down to a usable format. An attempt was made to reduce the data as much as possible and utilize spreadsheets to organize various model runs. The data were reviewed to the extent practical and processed for use in various environmental restoration performance measures discussed below. In the end, additional evaluation time would have been helpful and may have resulted in an improved report.)

Rainfall Boundary Conditions

Rainfall is an important parameter, especially in the region of south Florida. The amount and timing of rainfall greatly affects the increase or decrease in stage (ground water and canal) and flows within the system. The rainfall boundary conditions used for this study were the same that are used as inputs for the SFVMM 2x2, as mentioned above. The spatial resolution of the data is 2 miles x 2 miles and the temporal resolution is 1 day. (The MODBRACH model would give much better results if finer resolution rainfall information were available. The fine data resolution is especially important for simulating ground water stages. Unfortunately, these data are not presently available.) Future studies could include rainfall derived from NEXRAD or other methods, which would give rainfall at fine resolutions in both temporal and spatial terms.

Evapotranspiration boundary conditions

The total yearly evapotranspiration can equal or exceed the total rainfall for average and dry years, which means that evapotranspiration is an equally important boundary condition. The evapotranspiration boundary conditions used were produced by the SFVMM 2x2. However, the monthly total evapotranspiration output by SFVMM 2x2 was used, as opposed to the rainfall, which was daily. Again, there was no better source for these data. The only way to get better evapotranspiration is to establish more data collections sites throughout the area.

Variable Head Boundary Conditions

The variable head boundaries, as mentioned above, were generated as a hybrid of SFWMM 2x2 output and tide data. Future model accuracy could be improved by using more observation wells and eliminating the inherent error found in using model output and harmonic tide data as boundary conditions.

Geologic parameters

(South Florida's geology is extremely heterogeneous. Measurements and tests performed at one location can give distinctly different values when done 500 feet away. It is important to keep this in mind when considering the model results.) The model considers the hydrogeologic parameters to be homogenous within each grid cell. While hydraulic conductivity and transmissivity vary from cell to cell, each is isotropic within the cell. Additionally, the parameters do not vary significantly between adjacent cells, increasing the degree of homogeneity of the model. The real world is not homogenous. There are indications that there are preferential flow paths within the surficial aquifer including voids, fractures and cavities. These preferential flow paths are not represented by the model inputs. In addition, in some portions of the study area hard "caprock" limestone is present in various thickness. The caprock is typically much less permeable than the deeper portions of the Biscayne Aquifer. The caprock is not included in the MODBRACH model because its spatial distribution is unknown. For this reason, the model results should be considered primarily on an areal basis, secondarily on a site-specific basis.)

Canal Leakance And Hydraulic Parameters

The canal leakance and other hydraulic parameters, which affect canal stage and flow, include Manning's n (roughness) and momentum coefficient. Nominal values of each were used throughout the study.

Structure Operations and Implementation

The affect of how the structures are operated and how they are numerically implemented is discussed above. Future refinement of structure operation routines, especially in opening and closing could result in better replication of field stages and flows.

Topography

The topography used was obtained from the Corps of Engineers and USGS data sources. The accuracy of

these data (on the order of 0.5 feet) can significantly affect both the results of the MODBRACH model and the interpretation of the results. The model results can be affected by slight variations in elevations, since this would change the local land slope. A small change in topography could cause a significant change in flow direction due to the small water gradients found in the area.

Description of Alternatives to be Evaluated

Nine project alternatives and two variations of one alternative were evaluated as part of this model study. They are discussed in more detail elsewhere in this report, but a short summary of each alternative is included here for informational purposes.

Alternative 1

This plan is a re-evaluation of the original mitigation plan presented in the GDM. It is formulated to serve as a flood mitigation alternative where residents within the 8.5 SMA would be protected against higher water stages that could result from implementation of the MVD. The plan consists of a perimeter levee surrounding the entire 8.5 SMA, a seepage canal parallel to the levee, and a small interior levee to separate storm-water run off. The seepage canal would be connected to a proposed pump station (S-357) to be located at the intersection of the seepage canal and the L-31North canal. The S-357 pump station would pump 8.5 SMA flood waters north to the L-29 canal where another pump station (S-356) would "recycle" the flood waters into Northeast Shark River Slough. Figure 15 depicts the main features of this plan superimposed on top of an aerial photo of the study area.

Alternative 2

This plan is a modification of Alternative 1, where flood waters would be pumped south to the C-111 project instead of being pumped to the north. This plan is more consistent with the proposed Comprehensive Environmental Restoration Plan for the Everglades (USACE, 1999), because it routes flood waters to the south as nature had intended. The plan consists of a perimeter levee surrounding the entire 8.5 SMA, a seepage canal parallel to the levee, and a small interior levee to separate storm-water run off. The seepage canal would be connected to a proposed pump station (S-357) to be located at the intersection of the seepage canal and Richmond Drive. Flood-waters would be pumped from S-357 into a series of pipes/swales and conveyed to the C-111 project area. Figure 16 depicts the main features of this plan superimposed on top of an aerial photo of the study area.

Pump Station S-357 would convey the flood waters into a spreader canal system located in the C-111 buffer area. Figure 22 depicts the main features of this plan superimposed on top of an aerial photo of the study area.

Alternative 9

This plan was formulated to function as a flood mitigation plan. It is a combination of Alternative 1 and Alternative 2. It would be phased in so that Alternative 1 would be constructed first and operated with S-357A pumping flood waters to the north. At some point, once S-357B is operating, floodwaters would be conveyed to the south as presented in Alternative 2. This alternative allows for a quicker implementation period, given that Alternative 1 is already authorized for construction. Figure 23 depicts the main features of this plan superimposed on top of an aerial photo of the study area.

Alternative 6C – Variation of Alternative 6B

This plan was formulated to function as a flood mitigation plan with some areas getting incidental 1 in 10 year flood protection. For the 8.5 SMA, the 1 in 10 year flood protection level is complicated by the interaction of surface and ground water as well as the varied land use within the area. Houses, roads, and other structures are more directly affected by surface water, while septic tanks, and other subsurface facilities, as well as agriculture, are affected by ground water levels. Due to the relatively low elevations within the 8.5 SMA, interactions of surface water and ground water, effects of pumping and canal stages on ground water, and the varied nature of land use, for purposes of this analysis, a plan is considered to provide 10 year flood protection if it reduces the water levels to below ground level along the western, lower boundary of the protected area under a 10 year flood event. In addition, keeping the water levels below ground surface is consistent with the 1 in 10 year protection level defined by Dade County.

The plan consists of a perimeter levee surrounding a portion of the 8.5 SMA, a seepage canal parallel to the levee, and a small interior levee to separate storm-water run off. The seepage canal would be connected to a proposed pump station (S-357) to be located at the intersection of the seepage canal and the Richmond Drive. Flood-waters would be pumped from S-357 into a series of pipes/swales and conveyed to the C-111 project area. This plan is more consistent with the proposed Comprehensive Environmental Restoration Plan for the Everglades (USACE, 1999), because it routes flood-waters to the south as nature had intended. Figure 23b depicts the main features of this plan superimposed on top of an aerial photo of the study area.

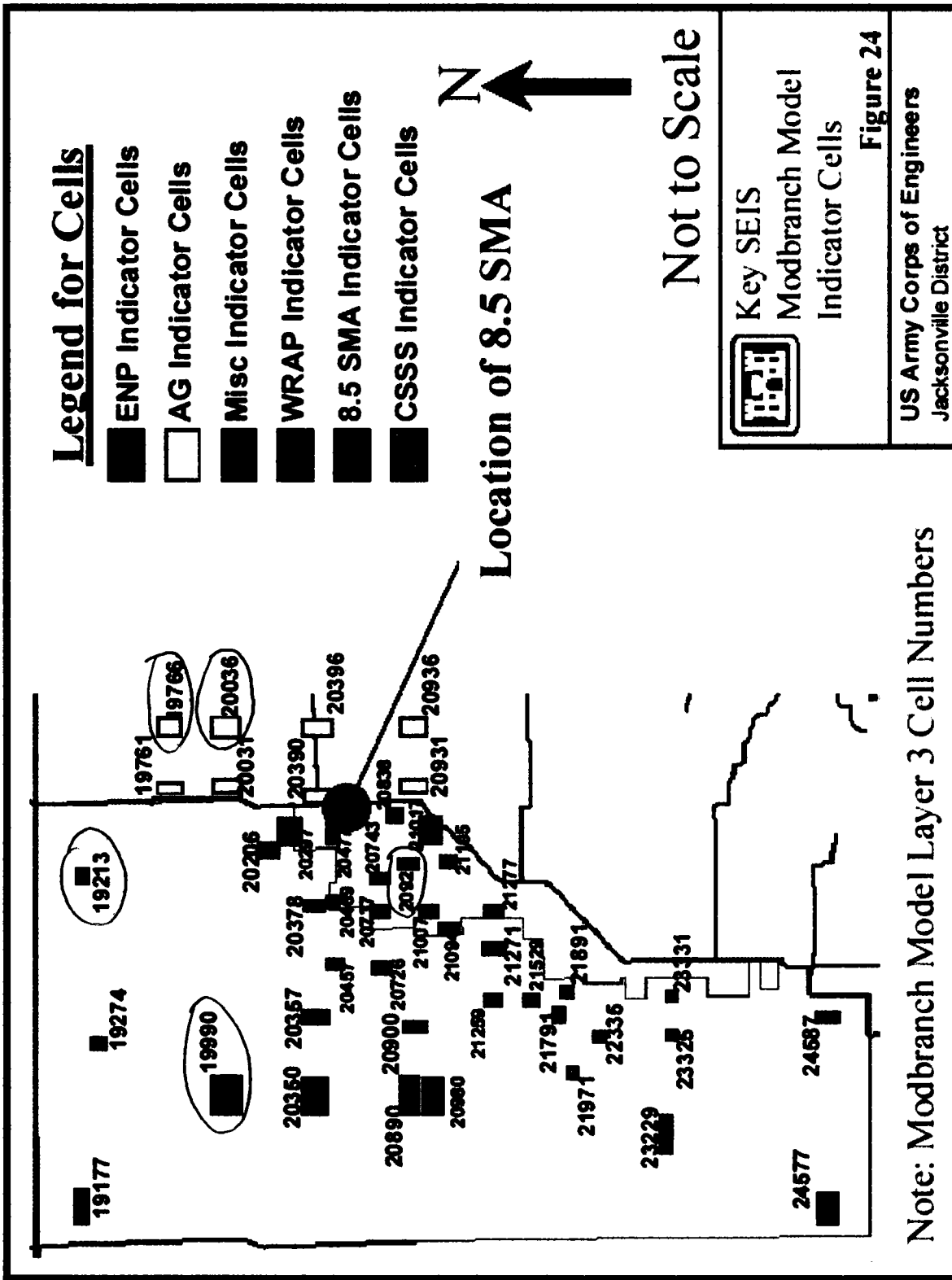
Alternative 6D – Variation of Alternative 6B

This plan was formulated to function as a flood mitigation plan with the goal of providing 10 year flood protection for the 8.5 SMA, the 1 in 10 year flood protection level is complicated by the interaction of surface and ground water as well as the varied land use within the area. Houses, roads, and other structures are more directly affected by surface water, while septic tanks, and other subsurface facilities, as well as agriculture, are affected by ground water levels. [REDACTED] low elevations within the [REDACTED], interactions of surface water and ground water, [REDACTED] and canal stages on ground water, and the varied nature of land use, (for purposes of this analysis, a plan is considered to provide 10 year flood protection if it reduces the water levels to below ground level along the western, lower boundary of the protected area under a 10 year flood event." In addition, keeping the water levels below ground surface is consistent with the 1 in 10 year protection level defined by Dade County.) ☆

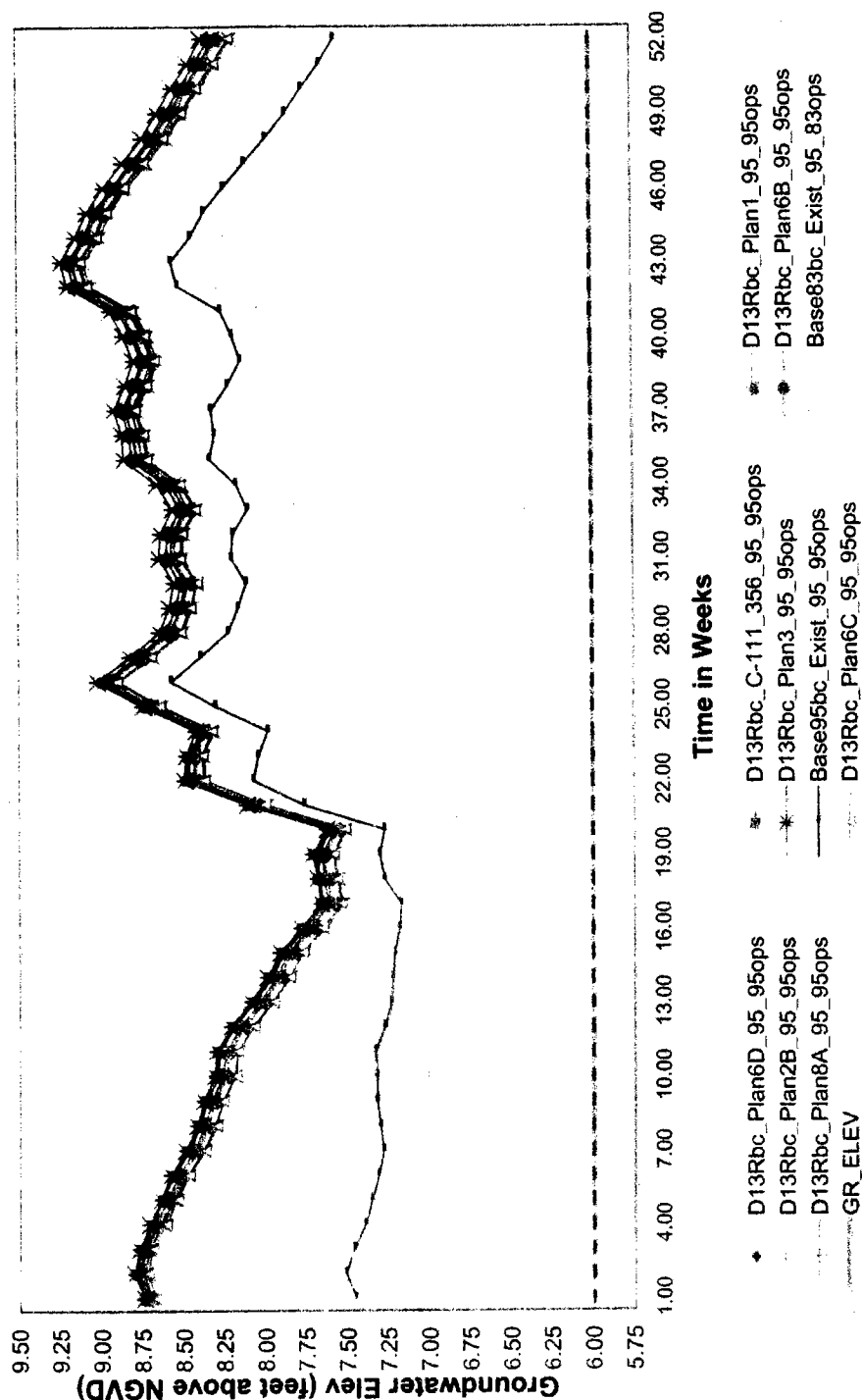
The plan consists of a perimeter levee surrounding a portion of the 8.5 SMA, a seepage canal stepped back from the levee, and a small interior levee to separate storm-water run off. The seepage canal would be connected to a proposed pump station (S-357) to be located at the intersection of the seepage canal and Richmond Drive. [REDACTED] [REDACTED] into Everglades National Park. Flood waters would be pumped from S-357 into a series of pipes/swales and conveyed to the C-111 project area. This plan is more consistent with the proposed Comprehensive Environmental Restoration Plan for the Everglades (COE, 1999), because it routes flood-waters to the south as nature had intended. Figure 23c depicts the main features of this plan superimposed on top of an aerial photo of the study area.

Description of Base Conditions and the No-Action Alternative

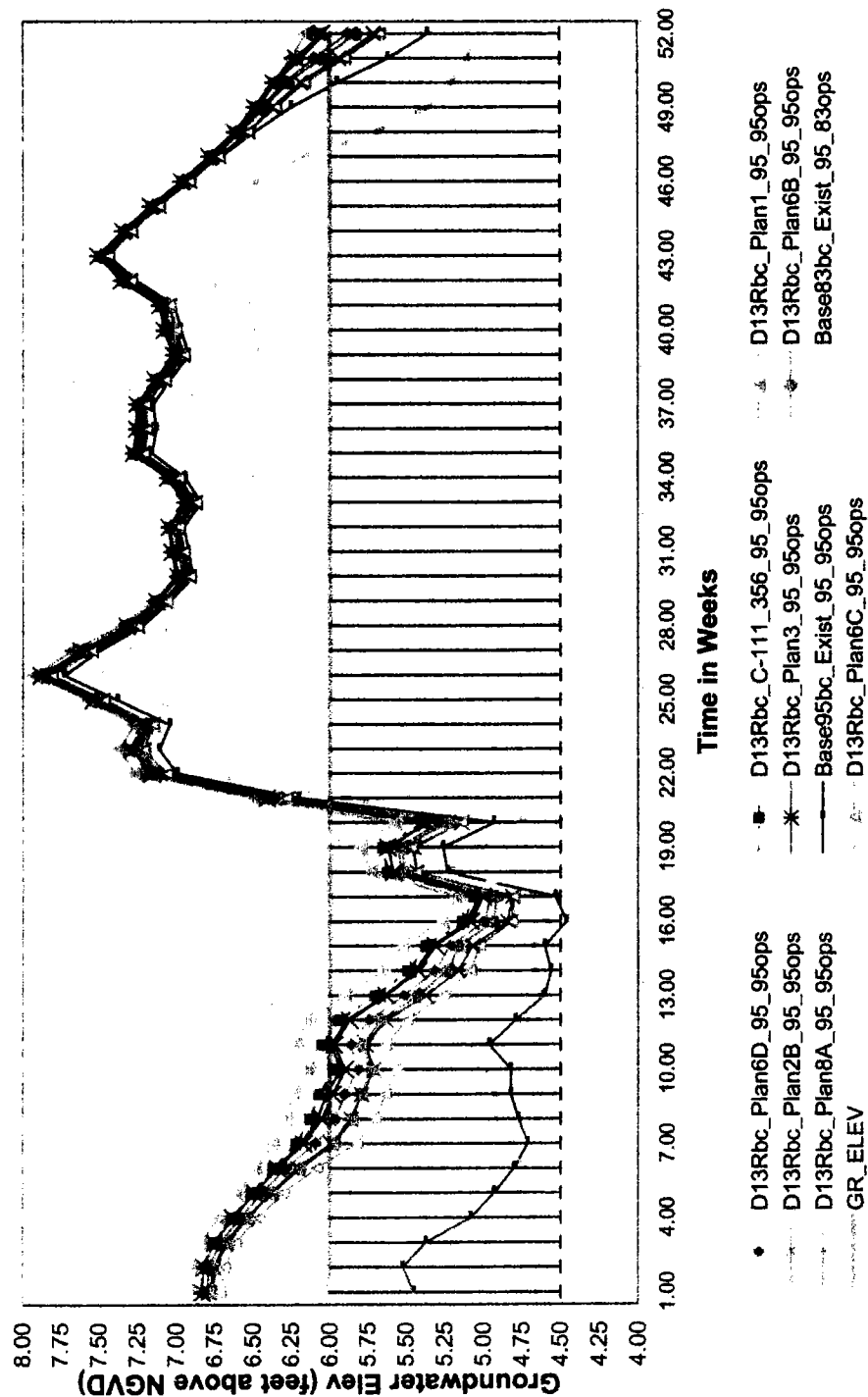
For the purposes of this study, base conditions and a no-action alternative had to be assigned. The base conditions and no-action alternative provide a frame of reference for comparing the performance of each alternative. As was stated earlier in this report, simulations were completed utilizing a range of boundaries, precipitation and structure operational criteria. Two base conditions have been recognized as important for any model study in this study area. These are the [REDACTED] These two conditions have been discussed at length in many other reports and it has been concluded that they provide a good comparison base. For this study, Alternative 1 has been assigned as the "no-action" alternative because it has been authorized for implementation. All other Alternatives (2 through 9 including 6C and 6D) are potential locally preferred alternatives (LPAs), which may be constructed instead of Alternative 1. In



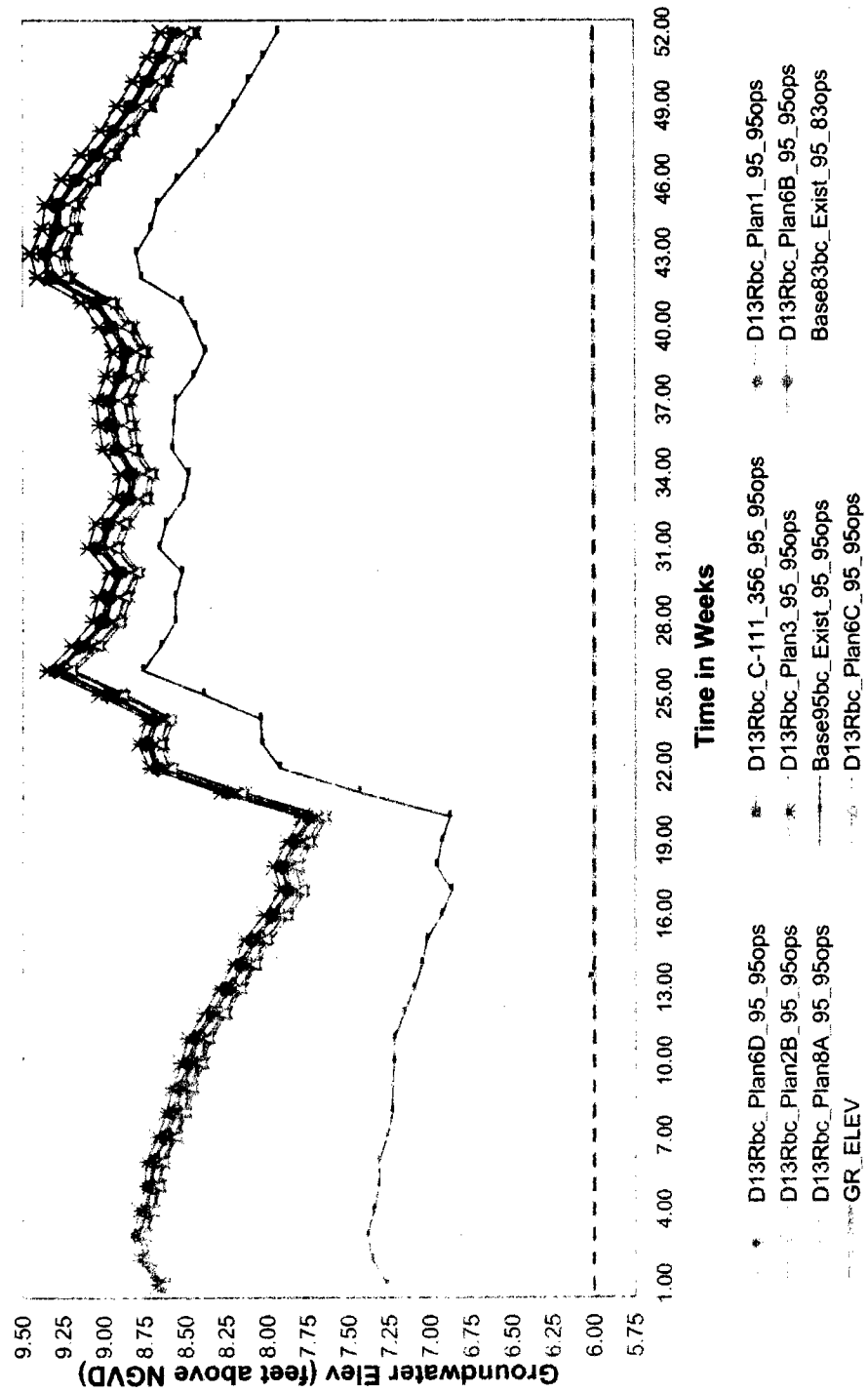
Model Hydrographs from Weekly Average Groundwater Stage at Cell
19213 FIGURE 63



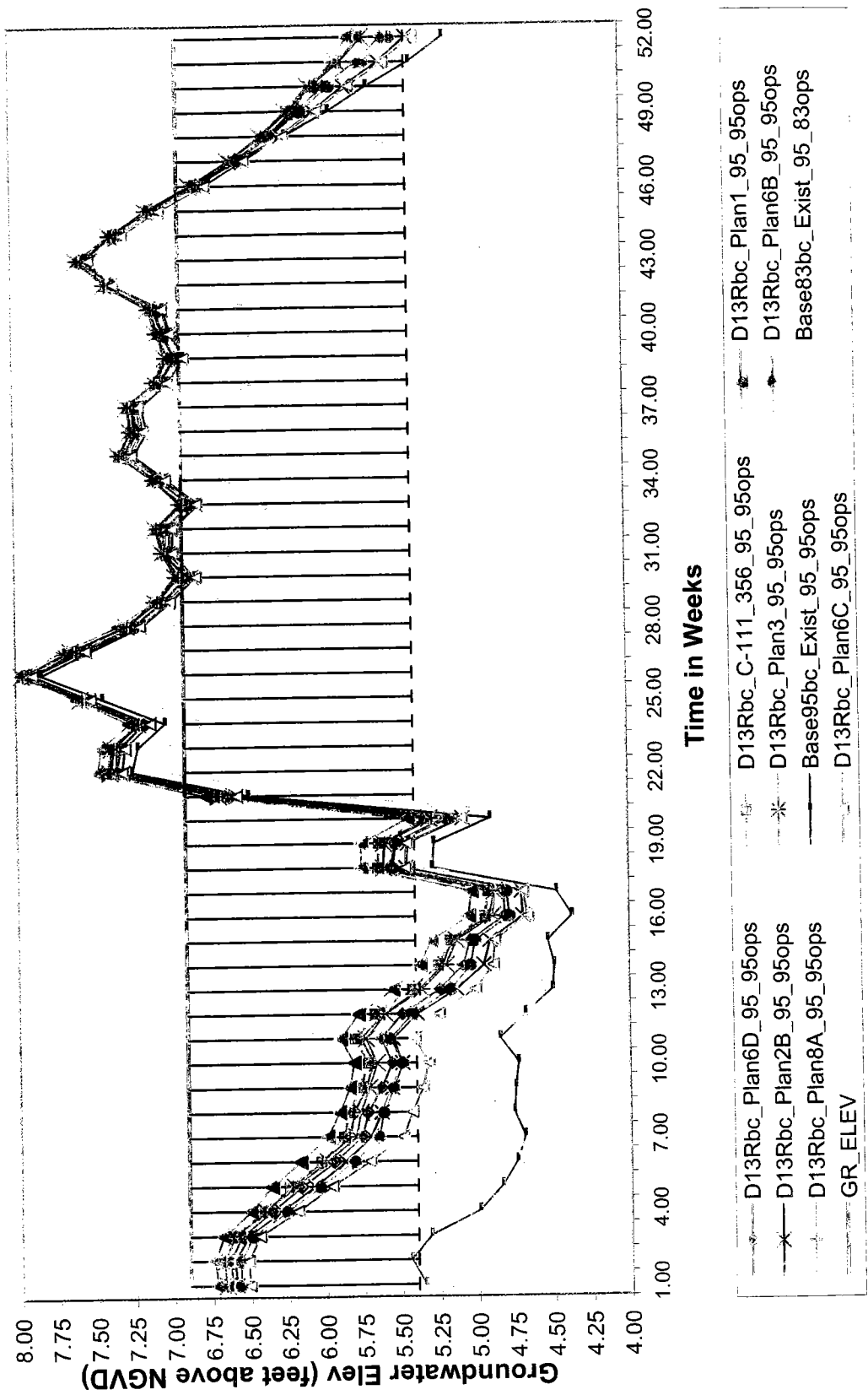
Model Hydrographs from Weekly Average Groundwater Stage at Cell
19766 FIGURE 48



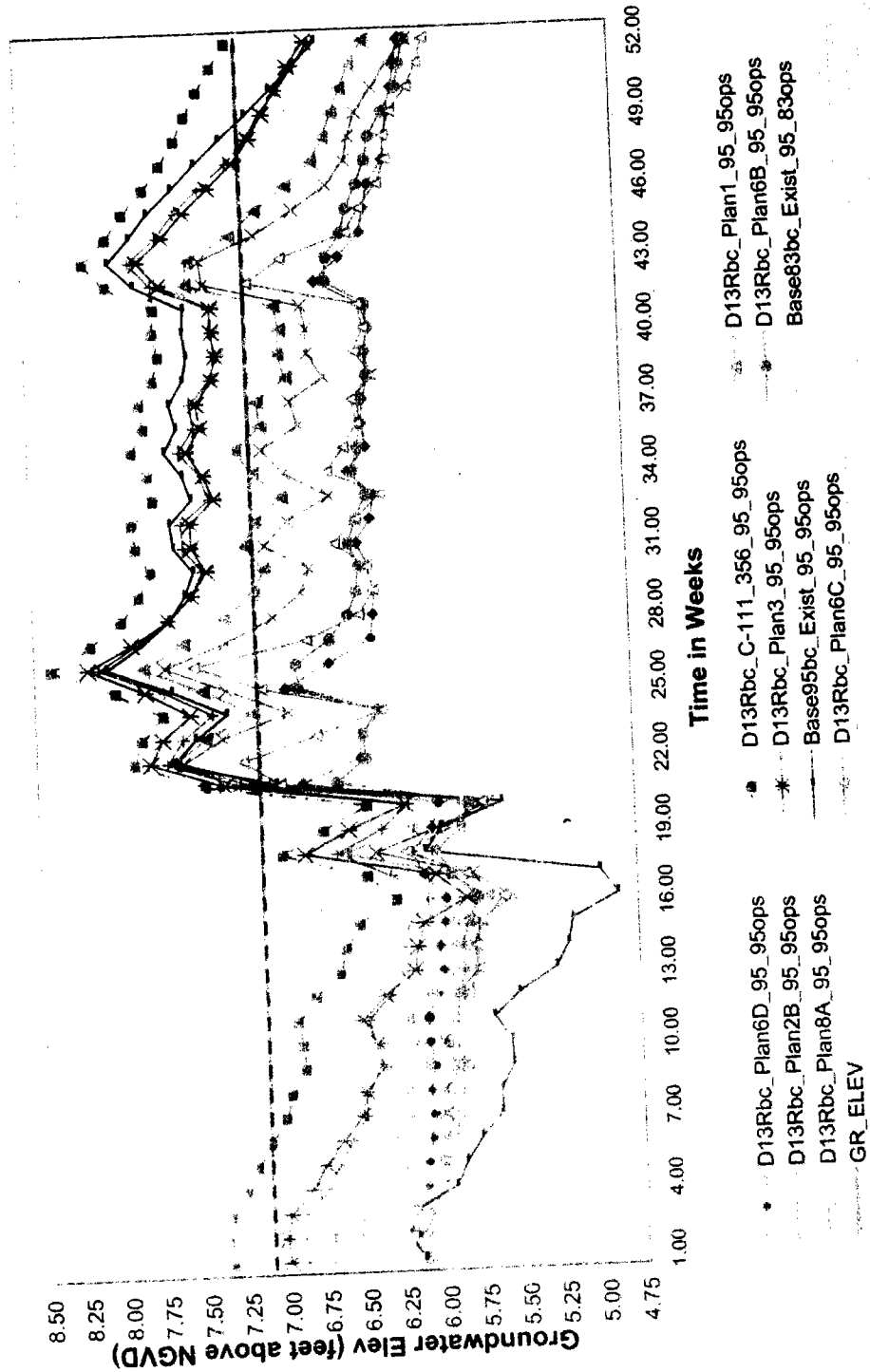
Model Hydrographs from Weekly Average Groundwater Stage at Cell
19990 FIGURE 58



Model Hydrographs from Weekly Average Groundwater Stage at Cell
20036 FIGURE 50



Model Hydrographs from Weekly Average Groundwater Stage at Cell
20925 FIGURE 42



**CENTRAL AND SOUTHERN FLORIDA PROJECT
MODIFIED WATER DELIVERIES TO
EVERGLADES NATIONAL PARK, FLORIDA**

8.5 SQUARE MILE AREA

VOLUME 3

**APPENDIX B - PERTINENT CORRESPONDENCE
APPENDIX C - PRELIMINARY ENGINEERING AND COSTS
APPENDIX D - REAL ESTATE**

**DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA**

JULY 2000



HDR

HDR Engineering, Inc.

alignment discussed herein. The original Alternative 6B consisted of a perimeter levee, seepage canal and internal levee which generally bisected the 8.5 SMA at approximately the location of SW 202nd Street and the topographic elevation of 7.0-feet NGVD.

Alternative 6D is similar in nature and design to Alternative 6B. This alternative consists of a perimeter levee as well as a seepage canal with interior levees on both sides of the canal generally constructed as shown on Figure C-12. The location of the perimeter levee generally bisects the area between Alternatives 6B and 6C. In contrast to Alternatives 6B or 6C, the seepage canal and interior levee are not located adjacent to the perimeter levee. Rather, the seepage canal and interior levees follow the same east-west alignment as in 6C; which is adjacent to the southern boundary of the FAA site. However, the seepage canal continues west to a location west of the FPL easement. Then it travels south to its terminus at Richmond Drive. To reduce the potential for water quality impacts due to runoff to the seepage canal, an interior levee will be constructed on both sides of the seepage canal. As was the case with Alternative 6C, Alternative 6D has also been developed as a flood mitigation alternative. That is, the goal for this alternative is not flood protection of the area to the east of the levee but flood mitigation.

★ (A seepage canal is projected to keep the groundwater levels within this eastern portion of the area at the same levels as were found prior to the implementation of the MWD project.) The purpose of this configuration is to allow water levels within ENP to be raised as specified in MWD or NSM levels. The seepage canal collects water which infiltrates through the levee to prevent deleterious changes on the water surface elevation within the 8.5 SMA. The interior levee is positioned to prevent surface water from entering the seepage canal. Based on previous work effort, surface water from the residential area was expected to have the potential for inferior quality water when compared to that seeping from ENP Expansion Area.

★ (A pipeline is projected to convey seepage water from the 8.5 SMA to the C-111 system.) Specifically, the water will be directed to the western storage areas proposed between the seepage canal and the ENP. These storage areas may provide treatment for the conveyed water. If in the event that treatment cannot occur in the facilities, a treatment area can be constructed south of the 8.5 SMA in areas already purchased. The costs of this treatment area are included in the cost estimate.

B. Levees and Canal. The perimeter levee has an estimated length of 34,500 feet, a top width of 20 feet and an elevation of 10.2 feet as shown on Figure C-2. The seepage canal shown on Figure C-3 varies in width and depth depending on the location relative to the proposed pump station S-357, located at the southern terminus of the seepage canal and SW 168th Street. For this alternative, the width varies from 25 feet at the northeastern end to 30 feet at the

Annual costs for ecological maintenance assume that the area to be converted to wetlands is regraded to appropriate contours for natural wetland recruitment. The cost of this regrading is considered a Capital Cost. Ecological operations and maintenance considers the effort necessary for the removal of nuisance species during the period (5-years) when natural recruitment is occurring. After 5-years, it is believed that the wetlands will be established and will not require the same level of effort as initially expended. Thus, the annual costs include initial intensive treatment, periodic burning, and the periodic removal of nuisance species. The total annualized cost is estimated to be \$67,454. The annual costs for water quality monitoring are estimated to be approximately \$147,033. The costs for this alternative are summarized on Tables C-3 and C-4.

N. Alternative Performance. Alternative 6D is designed to provide flood mitigation for the area east of the levee. Simulation results show that this alternative fully provides this mitigation (Appendix A) (Water levels within the ENP are raised significantly and localized impacts of drawdown in the seepage canal are reduced when compared to Alternatives 1, 2, and 9.)

10.0 ALTERNATIVE 7 - RAISE ALL ROADS PLAN

A. Plan Description. Alternative 7 was developed in response to residents comments during the Scoping Process. The residents stated that their primary need was for the raising of roads to permit them access to their property during times of high water. This alternative assumes that most of the structures within the area are already above flood levels. Raising the roads for the area consists of construction of in-kind roadways above the 1 in 10 year flood elevation. This configuration is depicted on Figure C-13. A cross section of both the dirt and paved roads is shown on Figure C-14. In-kind replacement means that if a road is currently constructed of asphalt it will be replaced with similar construction materials. If an existing roadway is dirt, it will be reconstructed in a similar manner. Internal drainage and seepage would be managed using flowage easements, culverts and other conveyance structures. Internal drainage would be routed to L-31N to reduce the potential for conveyance of surface water carrying potential pollutants to the ENP. Internal drainage features required to facilitate surface flow are discussed in the Local Cost Analysis Appendix.

Alternative 7 is considered to be a flood mitigation alternative. By USACE definition, a flood mitigation alternative limits damages to the residents within the 8.5 SMA from flood stages no greater than currently exist without project implementation. Thus, the alternative does not change the existing storm water management level of service to the 8.5 SMA.

B. Levee and Canals. This item is not required for this alternative.

east along 132nd Street to the L-31N canal. The seepage canal is designed to keep the groundwater levels within the area interior of the outer levee at the same levels as existed prior to the implementation of the MWD project. Two interior levees, one on either side of the seepage canal, are positioned to prevent surface water from entering the seepage canal. (A new proposed pumping structure (S-357) located at the southern terminus of the levee/canal system will discharge seepage through a 96-inch diameter pipe to be released south into a 200-acre treatment area and eventually to the C-111 project area.) There will be no major changes to operations of existing structures in the C&SF system resulting from implementation of this alternative.

The canal and levee system on the western boundary of this alternative ranges from approximately 0.22 to 1.1 miles west of the boundary of Alternative 6B, depending on the location along the boundary. Similarly, it is located approximately .10 to 1.05 miles east of the westernmost boundary of the 8.5 SMA. This alternative includes approximately 5.5 square miles within its boundaries, which is 2.1 square miles more than Alternative 6B.

Of the approximate 6,413 acres located in the 8.5 SMA, approximately 2,881 acres are required to implement this alternative. The Authorized Plan includes the acquisition of fee title less the Severable Use Rights to approximately 663 acres within 259 parcels. The USACE has acquired this land or is in the process of finalizing the acquisition of this land. This land would be required for this alternative. SFWMD has acquired the fee title to 469 acres within 160 parcels.

Of the remaining approximately 1,749 acres required for this alternative, 1,203 acres would be acquired in fee and a flowage easement would be acquired on 546 acres. It is estimated that 87 residential units will be displaced with the implementation of this alternative. Of this number, it is estimated that 35 are owner occupied residential units and 20 are tenant occupied units that will require relocation. In addition, about 215 acres of agricultural lands and 602 owners or parcels will be acquired.

8.9 Alternative 7 – Raise All Roads Plan

Public comments indicated the desire to allow use of the land within the 8.5 SMA after the implementation of MWD project, even without flood mitigation or protection measures. An alternative was developed that would improve roadway features within the area. This would be accomplished by raising all public access roads and restoring them in-kind. The roads will be raised so that they will not be flooded as a result of the MWD Project. All areas within the roads will remain unimproved. Roads will be improved only to the condition in which they currently exist (paved will be paved, dirt will be dirt). Internal drainage could be handled by placing culverts and obtaining flowage easements. Due to the

**Central and Southern Florida
MODIFIED WATER DELIVERIES TO
EVERGLADES NATIONAL PARK, FLORIDA**

8.5 SQUARE MILE AREA

**GENERAL REEVALUATION REPORT
WITH SUPPLEMENTAL ENVIRONMENTAL
IMPACT STATEMENT**

95% REVIEW DRAFT

**DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA**

MARCH 20, 2000



HDR
HDR Engineering, Inc.

- ◆ **Base 95 (Existing):** This is the condition of the study area as it exists today, as measured and observed during the conduct of this reevaluation.
- ◆ **Future Without Project:** This is the condition of the study area as it would be expected to exist in the future if the authorized project was implemented. This is the base for which the "future with project" scenario will be compared.

A specific description of each of the project conditions is included in Section IV of this report.

1. **Base 83.**

★ (There is no specific description of the Base 83 project conditions for the 8.5 SMA.) However, information contained in the 1992 GDM detailed the condition of the environment and resources within the modified water deliveries study area prior to the project. It contains a snapshot of this broad area as it appeared to the MWD study team. As such, it represents the best information available for the background, conditions, and features of the MWD area for the Base 83 conditions. Therefore, the Base 83 project conditions for the 1992 MWD GDM/EIS have been used for comparative purposes to give background for Base 83 for the 8.5 SMA.

A summary of the pre-MWD project conditions has been summarized from the 1992 GDM, and is included below as a base for conditions as they existed prior to the MWD project.

C&SF Project. The C&SF project provides essentially all water deliveries, other than direct rainfall, to the NESRS. In total, the

JUNE 1992

**CENTRAL AND SOUTHERN
FLORIDA PROJECT**

**FOR FLOOD CONTROL
AND OTHER PURPOSES**

**PART I, AGRICULTURAL AND CONSERVATION AREAS
SUPPLEMENT 54
GENERAL DESIGN MEMORANDUM AND
ENVIRONMENTAL IMPACT STATEMENT**

**MODIFIED WATER DELIVERIES TO
EVERGLADES NATIONAL PARK**



**US Army Corps
of Engineers
Jacksonville District**

d. Not Applicable -- N/A statute, E.O., or other policy and related regulations have been met.
e. Incomplete -- Preliminary plans, analysis not needed.

FEBRUARY 1991 PRICE LEVEL

TO EVERGLADES NATIONAL PARK

ACCOUNT CODE	ITEM	ESTIMATED COST	CONTINGENCY	TOTAL COST	SUBTOTAL COST
STRUCTURE 355A					
09.....	CHANNELS AND CANALS	306,000	77,000	383,000	1,984,000
15.....	FLOODWAY CONTROL AND DIVERSION STRUCT.	1,068,000	267,000	1,335,000	
30.....	PLANNING, ENGINEERING AND DESIGN	117,000	29,000	146,000	
31.....	CONSTRUCTION MANAGEMENT	96,000	24,000	120,000	
STRUCTURE 355B					
09.....	CHANNELS AND CANALS	306,000	77,000	383,000	1,984,000
15.....	FLOODWAY CONTROL AND DIVERSION STRUCT.	1,068,000	267,000	1,335,000	
30.....	PLANNING, ENGINEERING AND DESIGN	117,000	29,000	146,000	
31.....	CONSTRUCTION MANAGEMENT	96,000	24,000	120,000	
NEW SPILLWAY STRUCTURE S-334					
11.....	LEVEES AND FLOODWALLS	303,000	74,000	377,000	2,028,000
15.....	FLOODWAY CONTROL AND DIVERSION STRUCT.	1,106,000	273,000	1,379,000	
30.....	PLANNING, ENGINEERING AND DESIGN	120,000	29,000	149,000	
31.....	CONSTRUCTION MANAGEMENT	99,000	24,000	123,000	
U.S. 41 RAISING AND RAMPING					
08.....	ROADS, RAILROADS AND BRIDGES	2,014,000	478,000	2,492,000	2,878,000
09.2.....	ROADS	171,000	41,000	212,000	
30.....	PLANNING, ENGINEERING AND DESIGN	141,000	33,000	174,000	
31.....	CONSTRUCTION MANAGEMENT				
PUMPING STATION S-356					
09.....	CHANNELS AND CANALS	745,000	186,000	931,000	18,376,000
11.....	LEVEES AND FLOODWALLS	412,000	103,000	515,000	
13.....	PUMPING PLANT	9,320,000	5,144,000	14,464,000	
30.....	PLANNING, ENGINEERING AND DESIGN	891,000	462,000	1,353,000	
31.....	CONSTRUCTION MANAGEMENT	733,000	380,000	1,113,000	
DEGRADING OF LEVEE L-67 EXTENSION					
11.....	LEVEES AND FLOODWALLS	2,585,000	525,000	3,110,000	3,593,000
30.....	PLANNING, ENGINEERING AND DESIGN	220,000	45,000	265,000	
31.....	CONSTRUCTION MANAGEMENT	181,000	37,000	218,000	

ACCOUNT CODE ITEM ESTIMATED COST CONTINGENCY TOTAL COST

FLOOD PROTECTION TO RESIDENTIAL AREA
 02. RELOCATIONS 1,715,000 429,000 2,144,000
 08. ROADS, RAILROADS AND BRIDGES 700,000 143,000 843,000
 08.2. ROADS 6,972,000 1,743,000 8,715,000
 09. CHANNELS AND CANALS 3,676,000 919,000 4,595,000
 11. LEVEES AND FLOODWALLS 1,110,000 275,000 1,385,000
 30. PLANNING, ENGINEERING AND DESIGN 914,000 226,000 1,140,000
 31. CONSTRUCTION MANAGEMENT

MICCOSUKEE INDIAN - TIGER TAIL CAMP MITIGATION
 19. BUILDINGS, GROUNDS AND UTILITIES 301,000 67,000 368,000
 30. PLANNING, ENGINEERING AND DESIGN 35,000 8,000 43,000
 31. CONSTRUCTION MANAGEMENT 14,000 3,000 17,000

MICCOSUKEE INDIAN - OSCEOLA CAMP MITIGATION
 19. BUILDINGS, GROUNDS AND UTILITIES 201,000 49,000 250,000
 30. PLANNING, ENGINEERING AND DESIGN 34,000 8,000 42,000
 31. CONSTRUCTION MANAGEMENT 14,000 3,000 17,000

PUMPING STATION S-357
 13. PUMPING PLANT 4,107,000 874,000 4,981,000
 30. PLANNING, ENGINEERING AND DESIGN 349,000 74,000 423,000
 31. CONSTRUCTION MANAGEMENT 287,000 61,000 348,000

SUBTOTAL PROJECT COST 55,739,000 16,681,000 72,420,000

REAL ESTATE COSTS
 01. LANDS AND DAMAGES (FOR RESIDENTIAL AREA) 5,751,000 1,438,000 7,189,000
 30.D. ENVIRONMENTAL & REGULATORY ACTIVITIES
 Endangered Species Monitoring 400,000 0 400,000
 (Snail Kite)
 Agriculture Area Monitoring Wells 40,000 10,000 50,000
 Hydrological Monitoring 20,000 5,000 25,000

TOTAL PROJECT COST \$61,950,000 \$18,134,000 \$80,084,000

\$80,084,000

**THE EFFECTS OF INTERIM OPERATIONAL PLAN ON THE MAINLAND
MANGROVE WETLANDS OF FLORIDA BAY: HYDROLOGY,
HYDROGRAPHY, FISH COMMUNITY DYNAMICS AND ROSEATE
SPOONBILL NESTING PATTERNS**

**Test 7, ISOP, and IOP Monitoring Results
June 1996 – May 2003**

**Final Report to
The South Florida Ecosystems Office
Everglades National Park
Homestead Florida**

**Jerome J Lorenz, David P.J. Green, and Peter E. Frezza
Audubon's Tavernier Science Center
Tavernier Florida**

December 26, 2003

(Johnson and Fennema 1989, Van Lent et al. 1993, Light and Dineen 1994, Ley et al. 1995). With the completion of S-331 in June of 1983, the regional water supply (represented by inflows to L-31N at S-334 and S-335) could be forced into the lower basin of the L-31/C-111 complex (Johnson and Fennema 1989, Van Lent et al. 1993). The operational design of the SDCS called for the upstream components to shunt the regional supply southward to S-331 (Ley et al. 1995). From S-331, the water was to flow southward on the L-31N to the confluence of the L-31W and C-111. The existing S-174 and S-176 gated spillways (Figure A2.8) were to be operated so that the appropriate amount of water was delivered to the Taylor Slough and C-111 basins according to the MSWD mandate (Van Lent et al. 1993). A second smaller (165 cubic feet per second) pump was located at S-332 (constructed in 1980) on the L-31W and pumped water from S-174 into the Taylor Slough headwaters basin (Van Lent et al. 1993). Ideally, S-18C was designed to pass water from S-176 into the lower reach of the C-111. S-197 was designed to remain closed, thereby forcing water to exit the canal, re-hydrating wetlands north of the canal and sending sheet flow toward the Northeastern Basin of Florida Bay via the gaps in the southern levee (Van Lent et al. 1993, Ley et al. 1995). Aside from water entering NESS from S-333, virtually all water reaching Taylor Slough and northeastern Florida Bay was controlled by state and federal agencies following the completion of the SDCS. The Rocky Glades and the Taylor Slough headwaters basin had been effectively bypassed.

The effects of water management on salinity at the spoonbill foraging grounds

The preponderance of scientific evidence clearly indicates that NEFB has become more saline as a result of water management practices of recent decades (McIvor et al. 1994, Ross et al. 1996, Meeder et al. 1996, Van Lent et al. 1999). It has been postulated that drainage of the Everglades has resulted in decreased flows through Taylor Slough thereby raising the overall salinity in Florida Bay (Van Lent et al. 1993, McIvor et al. 1994, Lorenz 2000). This increased salinity has been implicated in many of the adverse ecological changes that occurred to the ecosystem in the 1980's and early 1990's (Forquaran and Roblee 1999, Lorenz 1999, Mazzotti 1999). Recently, however, the concept that less fresh water is reaching NEFB has been called into question (Brand

2002). More specifically, flow simulations used in the Central Everglades Restoration Plan suggest that there may be more water being delivered to Florida Bay now than there was historically (Restudy Model Runs). The merits of this argument can be easily demonstrated by comparing Figure A2.7 to Figure A2.9. This comparison indicates that in recent years the C-111 canal is delivering more water to NEFB than Taylor Slough did historically. The higher model estimates of 119,000 Acre-Ft (Sklar et al. 2002) and 162,500 Acre-Ft (Van Lent et al. 1993) per year suggest that current C-111 discharges (Figure A2.9) fall within the range of interannual variation of historic flows.

There is little doubt that salinity in NEFB has increased over the last few decades (McIvor et al. 1994, Ross et al. 1996, Meeder et al. 1996, Van Lent et al. 1999). Researchers indicate that this increase in salinity is significantly larger than can be explained by sea level rise (Meeder et al 1996) and that the increase is clearly related to changes in water management practices (Ross et al. 2002). So if the quantity of fresh water reaching NEFB is about the same as the pre-drainage quantity than some parameter other than quantity of flow must have an impact on salinity. The most conspicuous difference is that the distribution of flow has switched radically from Taylor Slough to the C-111/Panhandle region (Figures A2.7, A2.9, and A2.10).

Van Lent et al. (1993) indicated that discharge from the C-111 arrives at Florida Bay primarily to the eastern extreme near US Highway 1 and passes southward as a narrow plume along the Florida Keys. The amount of this flow that mixes with the greater portion of the northeastern basin (as depicted in Figure A2.6) is minimal (Van Lent et al). Therefore, C-111 flow does little to lower the salinity in NEFB. In contrast flow through Taylor Slough reaches Florida Bay further west (through Little Madeira and Joe bays) thereby mixing thoroughly with NEFB and lowering salinity in the basin (Figure A2.6).

I propose that NEFB acts as a salinity buffer for the coastal wetlands. During low freshwater flow periods of the dry season, water from NEFB is blown into the coastal wetlands thereby increasing overall salinity. The degree to which the salinity increases is dependant upon the ambient salinity in NEFB. If the salinity is relatively low in NEFB at the beginning of the dry season, than salinity in the coastal wetlands

will remain relatively low throughout the dry season. Based on this concept, freshwater discharge from the C-111 will do little to buffer the salinity of the coastal wetlands.

A comparison of salinity in NEFB to freshwater flow through both Taylor Slough and C-111 can be used to assess the relative impact of each flow way on NEFB salinity. Since 1993, ENP has continuously collected salinity data at two locations in NEFB: Butternut Key and Duck Key (Figure A2.11). Typically, salinity begins to increase in January (see Figure A2.11 in IOP report) so the low salinity in January at each site would indicate the buffering capacity of NEFB. Regression analysis was used to compare antecedent wet season flows from Taylor Slough and C-111 to the January low salinity at Duck and Butternut Keys for each year from 1994 to 2001 (Figure A2.12). These results clearly suggest that flow from Taylor Slough during the wet season has a determinant effect on the salinity within NEFB, while antecedent discharge from the C-111 appears to have no bearing on January salinity. This is particularly striking given that Duck Key is immediately downstream from C-111 but far to the east of Taylor Slough outflows (Figure A2.11).

Similar regressions were made to examine the buffering effect of NEFB on the coastal wetlands. Salinity data from the TR, JB and HC sites within the coastal wetland (Figure A2.11--see main report and Appendix 2 for details) were used to compare maximum dry season salinity within the coastal wetlands to the January minimum at Duck and Butternut keys from 1994 to 2001. The results clearly suggest that the antecedent conditions in NEFB have a determinant effect on how salty the coastal wetlands will get in the dry season (Figure A2.13). Duck Key is in closer proximity to the coastal wetlands and, not surprisingly, had a stronger relationship with the coastal wetlands salinity. However, it is noteworthy that Butternut Key, almost 10 miles south of the mouth of Trout Creek also has a significant relationship with peak salinity in the coastal wetlands (Figure A2.13). This is probably the most clear indication that NEFB acts as a salinity buffer for the Coastal wetlands.

The above discussion leads to the following conclusions. The salinity characteristics of NEFB are determined by flow quantity through Taylor Slough but not from C-111 discharge. During the dry season, NEFB acts as a salinity buffer for the coastal wetlands that serve as the primary foraging grounds for spoonbills. The

App 8

Simulation of the Water-Table Altitude in the Biscayne Aquifer, Southern Dade County, Florida, Water Years 1945-89

By Michael L. Merritt

Prepared in cooperation with the
Metro-Dade Department of Environmental Resources Management

U.S. GEOLOGICAL SURVEY WATER-SUPPLY PAPER 2458

Table 3. Major drainage canals and levees in southern Dade County and selected secondary canals important to the flow model

[Construction information compiled from U.S. Geological Survey (USGS) literature and U.S. Army Corps of Engineers, Dade County, and South Florida Water Management District (SFWMD) records.

Non-USGS sources do not guarantee accuracy of completion dates. —, not applicable or dates unknown]

SFWMD designation	Local name	Construction date	SFWMD ¹ acceptance date	All plugs ² removed	Purpose and remarks
C-107	Model Land Canals	Probably 1920's	—	—	Drain marshes for housing
C-4	Tamiami Canal: a. Miami to Pinecrest area b. Forty-Mile Bend to Naples	1916-17 ?/27-04/28	—	—	Borrow canal for road construction. In 1962, structure S-12E in L-29 separated east and west sections of canal. East section deepened and widened with construction of L-29 in 1962 and again for South Dade Conveyance System in 1978. West section used for distributing flows to Everglades National Park.
C-3	Coral Gables Canal Dade-Broward Levee (and borrow canals)	1925-42 1927	—	—	Drainage Flood protection
L-67A L-67C L-31E	Levee and borrow canal Levee and borrow canal Levee and adjacent canal: a. North of Goulds Canal b. South of Goulds Canal	1962-63 1962-63 06/63-? 1965-05/67	— — 01/64 —	— — — 08/67	Stage reduction levee Stage reduction levee Provide protection from storm tides. Constructed in stages from north to south (south of Goulds Canal). Section between Black Creek Canal and Goulds Canal (87th Avenue Canal) existed earlier.
C-100	Cutler Drain Canal	06/64-02/65	10/65	12/65	Drain urban areas and prevent saltwater intrusion
C-102N	Princeton Canal: a. Below S-195 b. Above S-195	08/65-12/65 ?-10/70	— —	— —	Drain urban areas and prevent saltwater intrusion

Table 3. Major drainage canals and levees in southern Dade County and selected secondary canals important to the flow model —Continued

[Construction information compiled from U.S. Geological Survey (USGS) literature and U.S. Army Corps of Engineers, Dade County, and South Florida Water Management District (SFWMD) records. Non-USGS sources do not guarantee accuracy of completion dates. —, not applicable or dates unknown]

SFWMD designation	Local name	Construction date	SFWMD ¹ acceptance date	All plugs ² removed	Purpose and remarks
C-103	Mowry Canal	01/66-09/66	08/67	10/67	Drain urban and agricultural areas and prevent saltwater intrusion. Construction began 2 miles from coast in 1966; coastal section probably completed in late 1930's.
C-103S	Mowry Canal	04/66-06/66	08/67	10/67	Same as above
C-103N	Mowry Canal	05/66-03/67	08/67	10/67	Same as above
C-110	Levee and canal	?-02/72	—	—	Never used. Still plugged. Construction of C-109 and C-110 was partly completed when saltwater intrusion into lower reaches caused plans for use for drainage to be changed (Meyer, 1974).
C-109	Levee and canal	?-02/72	—	—	Same as above
L-67 Extension	Levee and canal	06/66-11/67	—	—	Canal expedited delivery of Tamiami Canal water to Shark River Slough; levee confined surface flows to slough area. Canal culverts have been closed since June 1984.
L-29	Eastern section of L-29 borrow canal (Tamiami Canal) widening and deepening, L-67A to L-30	Completed 1977?	—	—	Water deliveries to southern Dade County

¹When canals are constructed by non-SFWMD agencies, such as the U.S. Army Corps of Engineers for management by SFWMD, SFWMD formally "accepts" the canal after inspection to determine that construction specifications have been met.

²Canals are often constructed as a series of reaches separated by earthen plugs. When the canal is to be used by SFWMD for routing water, the plugs are removed.

³An asterisk (*) denotes gaps in south levee allow canal water to flow into the "panhandle" of Everglades National Park, and culverts in north levee allow surface flows into canal. A double asterisk (**) denotes postponed until S-197 constructed to prevent saltwater intrusion.

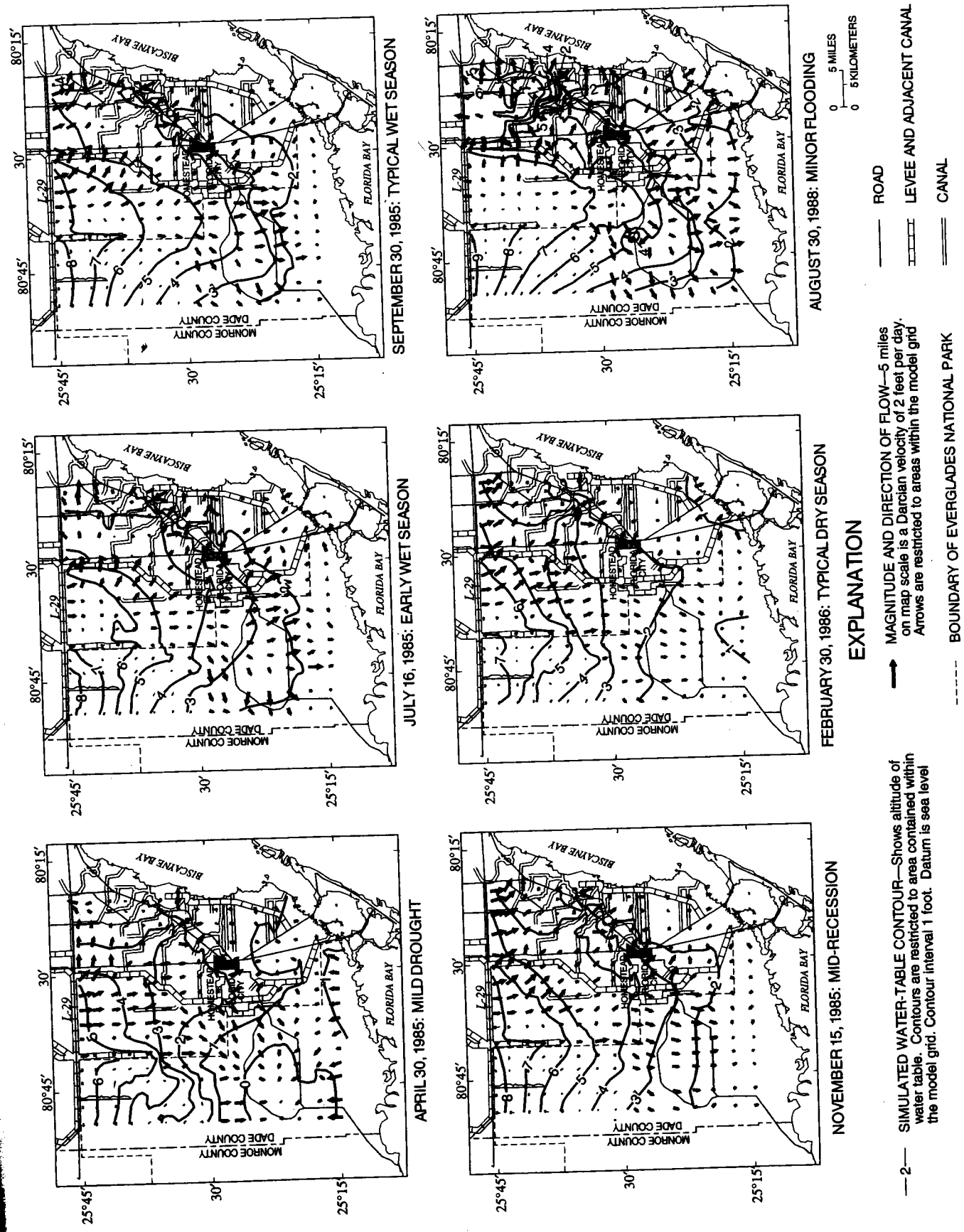


Figure 46. The magnitude and direction of flow in the Biscayne aquifer in the study area at selected times, as depicted by the calibrated model for water years 1983-89.

MIAMI-DADE COUNTY FLOOD

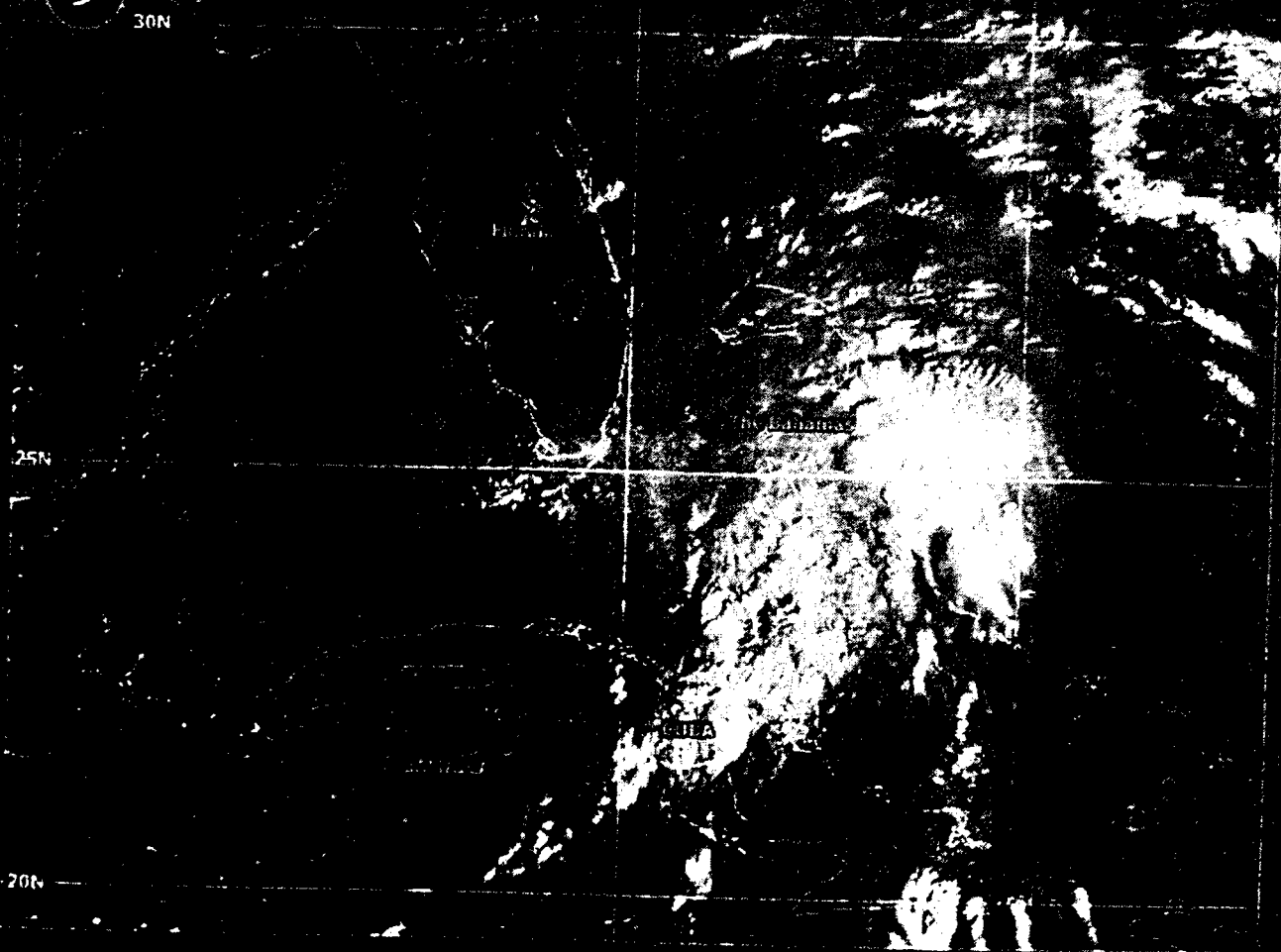
MANAGEMENT TASK FORCE

HURRICANE IRENE REPORT

Volume 1



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MIAMI-DADE COUNTY

- Retrofitting of undersized culverts for improved water flow. Basin C-7 showed the most impacts due to flooding of the other basins. Specifically, the Red Road Canal areas were impacted, due to the inefficient capacities of all the culverts south of the Little River Canal that serves the C-7 Basin.
- The Twin Lakes, part of the C-7 Basin, are to be interconnected to improve the overall storage needs of the area during excessive storm events. Bidding is ongoing.
- It was found that of the four basins initially modeled that the C-8 Basin showed the least significant flooding problems.
- Canal capacity should be improved by dredging accumulated silt. The Miami-Dade Public Works Department (PWD) has provided a list of known areas where dredging is recommended and the Department of Environmental Resources Management is programming the surveying of these locations to determine the extent of the work needed.

As additional Basin's SMMP are completed, similar control measures will be identified and recommended for Commission action. The Task Force recommends that:

- a. The county should complete its SMMP by 2002 with five-year review and updates.
- b. The county should expedite its ongoing development and identification of control measures for implementation as determined by the SMMP in the remaining basins.
- c. The SMMP's modeling efforts should be expedited in the central and north central areas of the county to identify appropriate control measures much like those mentioned above for the northern areas, to ensure that the flood protection needs for those areas of the county are addressed.
- d. The county should produce an official map of the primary and secondary canal systems for the entire county, including private and publicly-owned canals.

6. Experimental Water Deliveries to Everglades National Park. For 17 years, water management operations in the southwest Miami-Dade County region have been governed by criteria developed as part of the federally authorized program of "Experimental Water Deliveries to Everglades National Park (ENP)." Many believe that water levels and structure

operations for the last five years under the program have exceeded the safe limit with respect to flood protection in the urban/agricultural areas of southwest Miami-Dade County. As a result of an emergency declared to protect the Cape Sable Seaside Sparrow the Experimental Water Delivery Program has been discontinued and it is unlikely it will be reactivated in its previous form. The most recent four years under the experimental program have not been documented even though the program required that the agencies complete annual evaluations. These evaluations could produce valuable information to guide future operations in the area so unintended flooding could be avoided. The Miami-Dade County Flood Management Task Force recommends:

- a. The District and the Corps should prepare a final comprehensive report, covering the period from November 1, 1995 to December 31, 1999. This report would make definitive hydrologic conclusions about the impact of the canal operations and provide guidance for future actions.
- b. The evidence presented indicates that the water levels associated with the Experimental Water Deliveries to the ENP contributed to the flooding during Hurricane Irene in southwest Miami-Dade County. Therefore, the county should recommend to the Corps that the water level conditions which existed during the wet season of 1999 be avoided and that in addition to environmental objectives, flood protection to areas east of ENP be accommodated during future operations.

7. **Modified Water Deliveries and C-111 Projects.** The Modified Water Delivery (MWD) and Canal C-111 Projects have been designed and approved for the express purpose of resolving the conflict between protecting Everglades National Park and Florida Bay and providing residents and businesses with the flood protection that is essential. The County should actively participate in ongoing National Environmental Protection Act (NEPA) processes to define structural and operational changes that will both alleviate some flooding issues, as well as protect water supply and the natural environment. These modifications will reduce the inherent conflicts between the natural system and the developed areas. The MWD and C-111 projects enhance the natural system, especially in Everglades National Park, the Water Conservation Areas, and Florida Bay by increasing flows through the system toward historical levels. The projects also

★ help the urban and agricultural area in two ways; 1) they permit the lowering of water levels prior to a hurricane and provide significantly greater conveyance during a hurricane, thus decreasing the probability of flooding; and 2) they provide a structural interface between the natural and developed systems, thus permitting water levels to be managed separately for the benefit of both. The Task Force recommends:

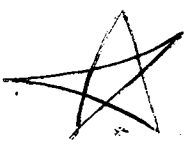
- a. The County Commission should request that the Corps and District complete the Modified Water Deliveries and C-111 Projects as quickly as possible.

8. Sparrow Emergency Operations. The U. S. Fish and Wildlife Service has declared an emergency for the Cape Sable Sparrow (the Sparrow), requiring the Corps to change the way the water management system is operated. These changes have the potential to raise water levels in western Miami-Dade County to levels that would put the area in much greater risk of damaging floods. The Corps has implemented an "Interim Structural and Operational Plan" for the Year 2000 (ISOP). This significantly modified the operations in southern Miami-Dade County. To further comply with the emergency in the years 2001 and 2002, the Corps is preparing a plan to implement the "Interim Operational Plan" (IOP) until the Modified Water Deliveries Project is constructed. Like the ISOP, the IOP will further modify water management operations in southwest Miami-Dade. The Task Force recommends:

- a. The County Commission should recommend to the Corps that any operations related to protecting the Sparrow and its habitat that would result in L31-N canal water levels similar to those maintained during the wet season of 1999 should be avoided and that in addition to environmental objectives, flood protection to areas east of the ENP must be an integral part of any interim operating plan.
- b. The County should play an active role in the formulation of the IOP to ensure that the plan being formulated to protect the Sparrow and its habitat prior to the completion of the Modified Water Deliveries Project, does not unnecessarily affect the residents of Miami-Dade County.
- c. The county should work with the Corps and the District to ensure that more flexible flood control operational criteria are incorporated in the ISOP and IOP. The criteria should stipulate the involvement of the Corps Jacksonville District Engineer and the District

Executive Director along with their respective operations managers, when a serious flooding threat to the region requires decisions which also have the potential to cause serious environmental impacts.

9. **Increase Flood Protection in the CERP.** Within the context of its other project purposes the Corps' Comprehensive Everglades Restoration Plan (CERP) has the potential to maintain or enhance flood protection. The Chief of Engineers, in his June 22, 1999 Report to Congress, stated that flood protection would be maintained to "the extent practicable". Until the Chief of Engineers issued his report flood protection was to be improved throughout the system where possible, but in no case reduced below existing levels. The Chief's report said that, "Such assurance will not, to the extent practicable, impact other existing legal users and flood protection." Miami-Dade County will pay for a significant portion of Everglades restoration and should expect along with ecological and water supply benefits better flood protection where possible. The Task Force recommends:

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- a. The Miami-Dade County Commission should request that Congress include language in the bill that approves the CERP, a firm commitment to seek to improve local flood control within the context of the ecosystem restoration and water supply enhancements of the CERP.

10. **8½ Square Mile Area.** The residents of the 8½ Square Mile Area (SMA) have endured flooding because of the eleven (11) year delay in implementing the Modified Water Deliveries project. There are several ongoing National Environmental Protection Act (NEPA) processes which determine the final disposition of the 8½ SMA. The Task Force Recommends:

- a. Once the final disposition of the 8½ SMA is determined, the county should, if necessary, begin the planning to ensure roads and drainage systems compatible with the chosen project.
- b. Work with the residents of the area to establish a special taxing district within the 8½ SMA to defray costs of internal drainage and other services.
- c. Immediately take steps to ensure access and egress for residents during hurricane conditions.

d. As an interim measure, the county should seek permission from the District to connect the roadside ditch along S.W. 168th Street, south of the 8½ SMA into the L31-N. The permitting process will include addressing environmental concerns with the runoff.

e. The Task Force heard conflicting testimony regarding allegations of discrimination during the post-storm emergency with respect to government assistance in obtaining flood relief for the 8½ SMA. The Task Force recommends that the County Commission should refer the issue of alleged discrimination against the 8½ SMA residents to an appropriate review body.

11. Municipal Improvement Initiatives. The Task Force recommends that the municipalities should continue to seek assistance from appropriate agencies for the construction of capital drainage improvements, which may include the installation of pumping systems. The municipalities should work within the framework of the regional system, and their solutions must be considered in the context of the regional system by the permitting agencies. The success of local solutions is often dependent on establishing improved conditions in the primary canal system. In order for this to work, all communities must coordinate their drainage activities with the county and the District to ensure that the regional system functions efficiently. Water quality must be an integral component of this planning.

12. Cut and Fill Criteria. The Task Force recommends that Miami-Dade County should evaluate the need for extending the fill restrictions (Miami-Dade County Fill Encroachment and Water Management Criteria, [Cut and Fill Criteria], refer to Appendix F), to other areas in southwest Miami-Dade County, beyond the present limits of the original boundaries of Area B.

Study and implement, if necessary, new cut and fill criteria for new development. This may include higher house pad and road elevations and greater on-site stormwater retention. Miami-Dade County should review and upgrade the criteria for development in areas of the county that are known to be flood prone. This evaluation should be done in all flood prone areas of the county regardless of how they are currently mapped or zoned.