

VII REGIONAL OPERATING MANUAL

7-01 General Project Purposes, Goals, Objectives, and Benefits

Regulation of the ECC provides flood control, regional groundwater control, salinity control, enhancement of fish and wildlife, and water supply for agricultural irrigation, municipalities and industry. During a period of transition some water control plans remain in the “O&M Manual for the C&SF Project for Flood Control and Other Purposes.” Systematically, these plans will be removed from the O&M Manuals and included in the Regional Operating Manuals. Water control information and regulations contained in the Regional Operating Manuals supersede any other source.

7-02 Project Relationships and Interactions

This initial version of the East Coast Canal Regional Operating Manual depicts the current approved operational plan for the region. The plan is as it was in 1995 and does not include those projects completed or those operational changes approved since that date. Future versions will describe relationships and interactions of projects and operational changes approved since 1995 along with those changes resulting from the Comprehensive Everglades Restoration Plan.

7-03 Major Constraints

a. Salinity Intrusion

The Biscayne Aquifer is a surficial, highly permeable, wedge shaped aquifer that is about 200 feet thick at the coast but thins to a few feet near its western boundary 35 to 40 miles inland. This aquifer provides water for municipal and industrial (M&I) water supply and agricultural irrigation along the southeast coast. Water supply releases can be made from the WCAs, or transferred from Lake Okeechobee, to the coastal areas to prevent saltwater intrusion and recharge the surficial aquifer. The coastal spillways prevent a saltwater wedge from moving up the canals, and maintain sufficient freshwater head to prevent saltwater intrusion in the aquifer. Salt water encroachment in the ground water table is highly objectionable in its effect on agricultural and municipal ground water withdrawals. Optimum and design water levels in the project canals are established on the basis of groundwater levels, intake and/or discharge structure elevations, and removal rates for flood control. Along the east coast salinity control is included as a requirement of canal-level design criteria.

b. Underdesign of Cross-Sections

There are two major constraints associated with C-8 and S-28 which may impact operations. Canal performance was determined for runoff conditions that could be expected from the occurrence of the SPF. C-8 is an improvement to the previously existing, highly developed, Biscayne Canal. There are some areas in which it was either impractical or too costly to enlarge the cross section of the existing canal to accommodate the SPF. Where these areas existed, canal expansion within the existing canal limits would be accomplished to the maximum extent practicable, even if the canal improvement did not meet the discharge requirements for SPF. The

proposed plan of improvement for Biscayne Canal will remove the SPF with a water surface profile slightly higher than designed (see Part V, Supplement 12).

c. Manatees

The manatee, one of the most endangered species in Florida, is a species of high visibility, and its mortality is highly impacted by the activities of man. Although boating activities are the main reason for manatee mortality caused by man, a significant number are killed by the gates of water control structures and navigation locks in Florida. An estimated six to eight manatees are killed annually (about 70 from 1974 to 1984) at these structures in southern Florida. When feeding upstream of gated structures, these very large and relatively slow-moving herbivores can be caught in the water passing through open gate structures and drawn into the opening. If the opening is less than the girth of the manatee, death by drowning and/or trauma will occur. Therefore coastal spillway gates are first opened a minimum of two and a half feet allowing a nearby manatee upstream to be flushed through the opening. This gate-operating procedure substantially reduces manatee mortality. (See Section 7-08 and Chapter 8, Section 8-05 for further details.)

d. Unusual High Tides and Storm Surge

During project design (assuming a mean sea level of 0.3 ft., NGVD) it was estimated that, during normal operation, a minimum headwater stage of 1.7 to 1.8 ft., NGVD, was necessary at the coastal spillways to maintain adequate groundwater stages to prevent saltwater intrusion (Corps of Engineers, 1954). In many locations in Dade and Broward Counties, optimum canal stages at the coastal spillways range from 1.7 to 3.5 ft., NGVD. Storm tides generated during tropical and extra-tropical cyclones can produce reverse heads across coastal spillways and no flood releases can be made during those periods. Large storm surges can overtop the spillway gates and the structure. In addition, the local interests (SFWMD, cities, counties, drainage districts, etc.) are responsible for the necessary secondary drainage and control systems that tie into the Federal Project. Many of the secondary drainage systems along the southeast coast discharge by gravity into the C&SF Project canals. The coastal areas are generally low lying and vulnerable to flooding. High tides reduce the head and slow gravity drainage, and storm surges can completely stop natural drainage (Titus et al., 1987).

e. Urbanization of the Project Area

The three categories of land use in the area are urban, agricultural, and undeveloped. Agricultural development consists of land used for the production of vegetable crops, improved pasture, citrus and other subtropical fruits and plant nurseries. The subtropical climate is especially favorable for the production of vegetables during the winter months, thus allowing the producers to take advantage of a more desirable market. However urban expansion has been the major contributing factor in land use changes since project design. Large urban areas along the southeast coast of Florida require additional water supply. Although many of these areas get water from groundwater wells, greater surface water deliveries are required to meet the increasing demands and also to control salt water intrusion.

f. Gap at S-334 in the east coast protection levee

When S-334 was constructed a breastwall was not provided. The top of the gate in the closed position is only at elevation 7.7 ft., NGVD. In addition, the US 41 crossing through L-31(N) is only at elevation 10.6 feet, NGVD. In 1995 the breast wall was modified to elevation 17.4 ft., NGVD and is no longer considered a major constraint.

7-04 Standing Instructions to Project Operators

The ECC is an integrated system of storage capabilities and structure outlet capacities. The spillway structures are operated to maintain optimum stages in the canals. Optimum and design water levels in the project canals are established on the basis of groundwater levels, intake and/or discharge structure elevations, and removal rates for flood control. Along the east coast salinity control is included as a requirement of canal-level design criteria. During normal conditions the project structures shall be operated in accordance with the approved Water Control Plan and in accordance with the structure design criteria as described in Appendix A. Optimum elevations in the manual shall be followed. Deviation from the normal operation of the East Coast Canal system shall be made per guidance in section 7-10 of this document, *Deviation From Normal Operating Criteria*.

7-05 Operational Strategy to Meet Regional Objectives

The general purpose of the flood control works is to protect the adjacent coastal areas of the east coast of Florida against floods, store water in conservation areas west of the general alignment of the levees, control water elevations in adjacent areas and provide water for conservation and utilization purposes.

7-05.1 Achieving Natural System Goals, Objectives and Benefits-East Coast Canal:

The goals and objectives for the system include providing more natural freshwater flow regimes and promoting ecological health, beneficial habitat characteristics and functional quality of estuaries. The natural system is enhanced by decreasing extreme high discharges and maintaining minimum flows to the east coast estuaries thereby maintaining desired salinity envelopes and improving water quality. Balancing seasonal estuarine discharges and improving water quality will enlarge and enhance critical estuarine habitat for indicator species such as seagrasses, other submerged aquatic vegetation, oysters, and fishes. In addition to effects on salinity and water quality, maintaining minimum flows (both ground-water and surface-water) will help restore historical coastal freshwater marshes. This will promote the CERP goals of increasing spatial extent of natural areas as well as increasing native species composition and diversity.

7-05.2 Flood Damage Reduction

a. Hurricane or Tropical Storm Regulations

The following information is from the SFWMD's Major Storm Procedures, September 2004. The field offices and stations mentioned belong to the SFWMD. CESAJ 500-1-1 should be consulted for emergency preparation and actions.

(1) West Palm Beach Field Office

The West Palm Beach Field Office will operate these control structures in accordance with established guidelines: S-40, S-41, S-44, S-46, S-155, G-124, and the C-18 box culverts. S-40, S-41, S-44, and S-155 will be placed on remote and operated by the Communications and Control System (C&CS) or as instructed by the Director of Operations. S-46 will be operated as instructed by the Director of Operations. The gates at G-124 will be open full except the culvert next to the highway. The C-18 box culverts in the east leg at S.R. 710 will be closed.

(2) Miami Field Station

The Miami Field Station will man and operate these structures in accordance with established guidelines: S-21, S-22, S-25, S-25B, S-26, S-27, S-28, S-29, G-58, G-72, S-118, S-119, S-123, S-148, and S-149. The following structures will be closed: S-25A, S-30, S-31, S-121, S-122, S-336, G-72, and G-119. S-120, S-338, and G-97 (in Canal 3) will be open full. S-21, S-22, S-25, S-25B, S-26, S-27, S-28, S-29, and S-123 will be placed on remote and operated by the C&CS or as instructed by the Director of Operations. S-148 and G-58 will be operated as instructed by the Director of Operations. S-118, S-119, and S-148 will be opened as directed by the Director of Operations. They are also responsible for C-1, C-1N, C-2, C-4, C-5, C-6, C-7, C-8, C-9, C-100, C-100A, C-100B, C-100C and G-73 (Arch Creek).

(3) Homestead Field Station

The Homestead Field Station will man and operate these structures in accordance with established guidelines: S-20F, S-20G, S-21A, S-165, S-166, S-167, S-179, S-194, and S-196. S-20F, S-20G, and S-21A will be placed on remote and operated by C&CS or as instructed by the Director of Operations. S-165 and S-179 will be operated as directed by the Director of Operations. S-166, S-167, and S-195 will be open full. The gates at S-20A, S-194, and S-196 will be closed.

(4) Ft. Lauderdale Field Station

The Ft. Lauderdale Field Station is responsible for Hillsboro Canal, C-10, C-11, C-12, C-13, C-14, and North New River Canal. They will man and operate the following structures in accordance with established guidelines: S-13, S-33, S-36, S-37A, S-37B, G-57, and G-140. They will operate G-56 as instructed by the Director of Operations. The gates of S-124 and S-125 will be open full. The gates of S-13A will be closed.

(5) Okeechobee Field Station

The Okeechobee Field Station will man and operate these control structures in accordance with the established guidelines: S-49, S-97, and S-99 (to be operated in accordance with design).

(6) Pump Stations

S-13 will be operated as follows: the spillway gates will be closed and a HW stage of 0.0 ft. will be maintained by pumping. S-9 will be pumped to maintain a HW stage of 0.0 ft.

b. Flood Control

The project works maintain optimum stages for the purposes of flood control, water supply, groundwater recharge, and prevention of salt water intrusion. The coastal canals and control structures between St. Lucie and Dade counties are designed to permit rapid removal of floodwaters from their immediately adjacent drainage area. The degree of flood protection provided by outlet capacity is dependent on whether the protected area is urban or agricultural. Rates of removal vary from 40-percent to 100-percent SPF. Many of these coastal area structures have gates which open and close automatically to maintain optimum water levels upstream with the exception of hurricane or tropical storm regulation. The canals and structures will be regulated automatically or manually, as designed, in accordance with the optimum water control and design elevations shown in Table 7-1, on pages T7-1 through T7-3.

c. Hurricane Protection Measures

An economic analyses was done for alternative plans of protection for the Levee 31 East area - a hurricane-levee plan and a salinity-barrier plan. Both plans were found to be economically justified. However, a levee of the height required to provide effective protection against critical hurricanes would inhibit the development expected to take place in the coastal area. The alternative salinity-barrier plan provides a considerable degree of protection against hurricane tides and against salt-water encroachment, which is of paramount concern in the area, yet would not deter growth in the area. Therefore the lower salinity-barrier plan was chosen. Once a year at the beginning of the hurricane season, residents will be notified that L-31E was not designed as protection against hurricane storm surge.

7-05.3 Water Quality

Although the primary purpose of the C&SF Project is to provide flood protection, the maintenance and enhancement of water quality is a project objective. The discharge of storm waters from agricultural lands has resulted in the periodic degradation of the natural water quality. Storm water containing nutrients from fertilizers tend to increase bio-chemical activity in receiving waters causing major declines in the DO. Low DO levels can cause severe stress on fish populations and may result in fish kills. However, low DO concentrations are normal conditions during droughts and occur naturally when detrital materials from vegetated areas are carried into water

bodies with storm water. In addition, the pumped discharges from agricultural lands include chemicals and could boost total organic carbon. Aquatic weed control programs contribute to the high concentration of dissolved solids and algal blooms that are potentially serious problems. Urban problems of pollution and dilution of waste, as well as effluent from sewage treatment facilities, are also prevalent in the area. Regulations governing water quality are a state responsibility. However, SFWMD petitions the Corps on the state's behalf to change regulations where benefits to water quality may be derived without significant loss of authorized project benefits.

Fresh water inflows into coastal estuaries occurs from rainfall, groundwater seepage, upland runoff, and canal discharges. Releases of water from coastal canals occasionally create local problems due to transfer of freshwater into these estuaries. The result of the project works in south Florida has been to change the spatial and temporal distribution of runoff into these areas. Many negative impacts of freshwater inflows result from pulsed, large volume discharges, that shock the system and are not readily mixed into receiving waters.

7-05.4 Water Supply Operations

The network of canals and control structures provides for water and salinity control in the area. Wellfields, which are the source of municipal water supplies, are significantly recharged by conservation area water. Water stored in the WCAs can be used to maintain groundwater levels in the coastal area for public water supply, to irrigate the vast agricultural areas interspersed within the project area, and to maintain a freshwater head along the lower east for salinity control.

7-05.5 Recreation

Recreation is an authorized purpose for the C&SF Project. There are an abundance of recreational facilities within the project area, both private and public; however, no specific water control operations are required for this purpose.

7-05.6 Fish and Wildlife

Along the lower east coast the canals are relatively deep and narrow and sustain intermittent high water flows during the rainy season. These canals provide a habitat for various species of fish, birds, reptiles, amphibians, small mammals, benthic organisms, and aquatic and terrestrial plant species. The manatee is also occasionally observed. The manatee is one of the most endangered species in Florida. These animals are a species of high visibility, and its mortality is highly impacted by the activities of man. Although boating activities are the main reason for the manatee mortality caused by man, a significant number are killed by the gates at water control structures and navigation locks in Florida. It is estimated that about 6 to 8 manatees are killed annually (about 70 since 1974) at these structures in southern Florida. As very large and relatively slow moving herbivores, manatees feeding on the upstream side of gated structures can be caught in the flow of water passing through open gate structures and drawn into the opening. If the opening is less than the manatee's girth,

death by drowning and/or trauma will occur. When spillway gates are opened a minimum of 2.5 feet, any nearby manatee upstream would be flushed through the opening. This gate-operating procedure substantially reduces manatee mortality. For this reason, the SFWMD, USFWS, Florida DEP, et al., favor operations that provide a minimum 2.5-foot gate opening for gated spillways. However, this operating procedure cannot be used as general criteria since significantly smaller gate openings are necessary for water management purposes most of the time. Also, prevailing headwater/tailwater relationships may not allow gates to be opened as much as 2.5 feet without exceeding maximum allowable gate opening (MAGO) curves and causing erosive damage downstream. For single-gated structures, opening the gate at least 2.5 feet (MAGO curves permitting) for shorter periods of time to accomplish water management objectives is acceptable. At multiple-gated spillways one gate should be opened 2.5 feet when the headwater/tailwater differential is 3.5 feet or less.

7-05.7 Navigation

Some of the canals are used for recreational boating. However, operation of the canals and control structures is not done for this purpose.

7-06 Consistency with the Identification of Water and Reservations or Allocations of The Natural System

This version of the East Coast Canal Regional Operating Manual contains no CERP projects or operations subject to the WRDA 2000 consistency requirements for the identification and reservation of water for the natural system.

7-07 Consistency with the Savings Clause and State Assurance Procedures

This version of the East Coast Canal Regional Operating Manual contains no CERP projects or operations subject to the WRDA 2000 requirement for new projects within the region to be consistent with the Savings Clause and State Assurance procedures found in F.S. 373.1501(5)(d).

7-08 Drought Contingency Plan

Regional Drought Contingency Plans (DCP) are written to provide a platform from which to make decisions to implement water conservation measures during droughts, review the operational flexibility of the regional system in a drought, and address the potential problems associated with an extreme drought. The DCP for this manual is located in Appendix C. Rules from the SFWMD's Water Shortage Plan are located within the DCP.

7-09 Flood Emergency Action Plan

Flood Emergency Action Plans outline operating criteria for projects that require flood damage reduction operations. The plans include an explanation of existing and proposed operating criteria, release scheduling procedures during a flood, use of storage, downstream notification procedures, and special safety concerns. There are no current Flood Emergency Action Plans in the region.

7-10. Deviation From Normal Operating Criteria.

The Corps District Commander is occasionally requested by the non-Federal sponsor to approve deviations from normal operating criteria. Prior approval for a deviation is required from USACE-South Atlantic Division (SAD) except as noted in subparagraph “a” below. Deviation requests usually fall into the following categories:

a. Emergencies.

Examples of emergencies that may result in a need to deviate from normal operating criteria include: drowning and other accidents; failure of the operation facilities; chemical spills; treatment plant failures; and other temporary pollution problems. Water control actions necessary to abate the problem should be implemented immediately unless such action would create equal or worse conditions. SAD must be informed of the problem and the emergency operating changes as soon as practicable. In addition, the non-Federal sponsor, the State of Florida (DEP and SFWMD), and the Department of the Interior should be informed.

b. Unplanned Minor Deviations.

There are unplanned instances that create a temporary need for minor deviations from the normal operating criteria, although they are not considered emergencies. Construction accounts for the major portion of these incidents requiring minor deviations. Examples of activities that may require short-term deviations include construction of utility stream/canal crossings and bridge work. Deviations are also sometimes necessary to carry out maintenance and inspection of facilities. Requests for changes in release rates generally involve time periods ranging from a few hours to a few days. Each request should be analyzed on its own merits. In evaluating the proposed deviation, consideration must be given to upstream watershed conditions, potential flood threat, the existing condition of the reservoir/storage area, and alternative measures that can be taken. In the interest of maintaining good public relations, requests for minor deviations are generally granted, providing that these deviations will not have adverse effects on the ability of the project (or projects) to achieve its authorized purposes. Approval for these minor deviations normally will be obtained from SAD by telephone. Written confirmation explaining the deviation and its cause will be furnished to the SAD water control manager. In addition, the non-Federal sponsor, the State of Florida (DEP and SFWMD), and the Department of the Interior should be informed.

c. Planned Deviations.

Each circumstance should be analyzed on its own merits. Sufficient data on flood potential, lake and watershed conditions, possible alternative measures, benefits to be expected, and probable effects on other authorized and useful purposes, together with the CESAJ recommendation, will be presented by memorandum, facsimile, or electronic mail to the SAD for review and approval. In addition, the non-Federal sponsor, the State of Florida (DEP and SFWMD), and the Department of the Interior should be consulted as part of the process of receiving approval from SAD for the deviation.

d. Effects of Storm Surge and High Tides on Coastal Structures

During unusually high tide conditions discharges are limited from many of the coastal structures due to high tailwaters. There is also the possibility that some coastal structures may be inundated by hurricane storm surge. For instance, in Canal 2, the original hydraulic profile is no longer accurate for several reasons: (1) at the time of construction, C-2 upstream of S-22 to Sunset Drive was over-excavated, (2) the canal has been enlarged in order to provide fill for the Turnpike, and (3) increased urban development has increased the impervious surface in the basin. The enlargement of the canal has reduced the stage that will occur in the canal for a given discharge. The decrease in the stage in the canal for a given discharge increases the amount of runoff that can occur from the basin. The increase in the impervious area due to urban development also increases the runoff from the basin. It is possible that a storm less severe than the SPF will create actual flows in C-2 greater than those calculated to occur for the SPF in the original analysis. An indication of this is given by the discharge that occurred at S-22 for Tropical Storm Dennis (approximately a 1-in-100 year event). The discharge was 200 cfs greater than the predicted discharge for the structure for a 1-in-200 year storm. Correspondingly, at the time Canal 7 was designed and constructed, much of the basin (west of Red Road) was in agricultural production. Subsequent development of the area to residential and commercial properties may have significantly increased the runoff and decreased the flood protection provided by the canal (designed to pass runoff from a 1-in-100 year storm). The feasibility of back-pumping runoff from these problem areas is under study.

7-11 Consistency with Adaptive management and Periodic CERP Updates

Adaptive management has been recognized as a critical element of CERP since promulgation of the enabling legislation (WRDA 2000). Congress authorized the use of an adaptive management approach for CERP, to allow the Plan to proceed in the face of existing uncertainties and incomplete scientific data. Adaptive Management for the Plan is defined as the

“continuous process of seeking a better understanding of the natural system and human environment in the South Florida ecosystem, and seeking continuous refinement in and improvements to the Plan to respond to new information, new or updated modeling; information developed through the assessment principles contained in the plan; and future authorized changes to the Plan in order to ensure that the goals and purposes of the Plan are fulfilled.”

The adaptive management strategy for CERP is intended to guide the implementation of the Comprehensive Plan. It will be used to assess the responses of the South Florida ecosystem, and to determine whether these responses match expectations, including anticipated performance levels. An essential element of adaptive management is the development and conduct of a scientifically rigorous assessment program to analyze and understand responses of the system to implementation of the Comprehensive Plan which includes monitoring component to address biological, hydrological, and water quality parameters. In accordance with the programmatic regulations, Restoration Coordination and Verification (RECOVER) is required to prepare a technical report, at least once every

five years, that presents an assessment of whether the goals and purposes of the Comprehensive Plan are being achieved, including whether the interim goals and interim targets are being achieved or are likely to be achieved. Based upon results of the monitoring and assessment efforts, operational changes may be recommended to improve individual project performance and/or Comprehensive Plan performance.

Periodic updates of the CERP are mandated by the programmatic regulations to ensure that the goals and purposes of the Comprehensive Plan are achieved. These updates are scheduled to occur not less often than every five years and will include an evaluation of the Comprehensive Plan using new or updated modeling that addresses the latest scientific, technical and planning information. The primary focus of these periodic updates is to ensure the proper distribution of water. As appropriate, changes to the System-Wide Operating Manual may be incorporated based upon results of the CERP updates and revised operating criteria approved by the Corps and SFWMD.