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**APPENDIX G**  
**MANATEE PROTECTION PLAN**

7 CESAJ SOP No. 1130-2-3  
8

9 Construction Operations Division  
10 MANATEE PROTECTION PLAN FOR WATER CONTROL STRUCTURES  
11

12 1. Authority and Applicability.  
13

14 The Project Operations Manatee Protection Plan for the Jacksonville District is  
15 prepared in accordance with ER 1130-2-540, Environmental Stewardship Operations and  
16 Maintenance Policies, 15 November 1996; EP 1130-2-540, Environmental Stewardship  
17 Operations and Maintenance Guidance and Procedures, revised 30 November 2001; the  
18 Marine Mammal Protection Act of 1972; and the Endangered Species Act of 1973, as  
19 amended; and the approved water control plans and manuals for the Central and Southern  
20 Florida (C&SF) Project; and is applicable to all Jacksonville District field projects,  
21 having Civil Works water control structure responsibilities.  
22

23 2. Purpose and Objectives.  
24

25 Water control structure-related manatee deaths (navigation locks, flood spillway  
26 gates, culverts and other structures) are second only to boat and barge collisions as an  
27 identified source of human-caused mortality. This plan provides policies, guidelines, and  
28 operating procedures for the effective long-range management and operation of water  
29 control structures to reduce manatee risk.  
30

31 The objective of this Standard Operating Procedure (SOP) is to prevent U.S. Army Corps  
32 of Engineers (Corps) water control structure-related manatee mortality by taking the  
33 following actions:  
34

- 35 a. Identify problem structures through site-specific structure-related mortality  
36 investigations.
- 37
- 38 b. Implement alternative operational methods, schedules, and/or partial or complete  
39 structural modifications.  
40
- 41 c. Ensure manatees receive safety consideration when in the vicinity of Corps water  
42 control structures by following proper operational protocol and procedures.  
43
- 44 d. Ensure the Corps coordinates with the Jacksonville and Vero Beach U.S. Fish and  
45 Wildlife Service (FWS) Offices and with the Florida Fish and Wildlife Conservation  
46

2  
3 Commission (FWC) the addition of any new water control structure operated by the  
4 Jacksonville District.

5  
6 3. Background.  
7

8 The Corps missions must be integrated with natural resource laws, values, and  
9 sound environmental practices. They are meant to give "corporate coherence" to the  
10 Corps work, so that people everywhere recognize the Corps roles in, and responsibilities  
11 for, sustainable use, stewardship, and restoration of Our Nation's natural resources. The  
12 Corps is enjoined under Section 2 of the Endangered Species Act of 1973, as amended  
13 (the Act) to conserve endangered and threatened species. The Corps partnered with the  
14 FWS and other Federal, State and local agencies to provide for an environment whereby  
15 the Florida subspecies of the West Indian Manatee is assured consideration regarding  
16 safety and recovery in our Nation's waterways.

17  
18 The Jacksonville District, working directly with these agencies, responded by  
19 implementing and incorporating recommended actions to protect the Florida Manatee.  
20 These actions include:

- 21  
22 1) Screens placed on lock gates to prevent manatee access to sector gate recesses,  
23 2) Reduced lock gate closure speeds, 3) Establishment of spillway gate  
24 operational protocols, 4) Installation of grates on lock chamber floors, barriers on  
25 spillway gates, acoustic array systems on lock gates, 5) A manatee watch program  
26 and a public outreach program in cooperation with the FWC, and 6) Reviewing  
27 the use of piezo-electric strips and determining if remaining vertical lift gates are  
28 to be added in the future.

29  
30 These types of actions result in less risk to the manatee and a balance and synergy among  
31 human development activities and natural systems. As a partner in the Florida Manatee  
32 Recovery Plan, the Jacksonville District is committed to meeting its charge under Section  
33 7 of the Endangered Species Act by reducing manatee risk caused by Corps water control  
34 structures.

35  
36 4. Policies and Procedures.  
37

38 It is the policy of the Jacksonville District to investigate specific cases of reported  
39 structure-related mortality by conducting site-specific investigations to identify the  
40 precise problem(s) at structures; to comply with established procedures as set forth in this  
41 plan for navigation locks, spillways, culverts and other structures; and to comply with  
42 District reporting requirements.

2  
3 a. Investigate specific cases of reported structure-related mortality by conducting site-  
4 specific investigations to identify the cause(s) at water control structures.

5  
6 (1) Upon official notification by the FWC and/or FWS, the Corps with the  
7 assistance of both FWC and FWS, conduct investigations of reported structure-  
8 related mortality to identify the cause at Corps structures.

9  
10 (2) Operations Technical Support Branch, Multi Project Section provides  
11 Planning Division, Environmental Branch, South Florida Studies Section  
12 (Planning) (the District point of contact for endangered species and a District  
13 representative on the Manatee Protection Task Force), and the affected field  
14 projects, a copy of the official FWC notification. Upon receipt of a manatee  
15 necropsy report attributing a manatee death to a Jacksonville District water  
16 control structure, Planning provides a copy of said report to the Multi Project  
17 Section. (See Appendix E, Manatee Protection Plan Point of Contact List)

18  
19 (3) The field project conducts a preliminary onsite investigation of the incident.

20  
21 (4) Upon completion of the preliminary onsite investigation a written report,  
22 including an analysis of the incident and recommendations for corrective actions,  
23 is completed by the field projects and forwarded to the Multi Project Section for  
24 coordination with both Engineering and Planning Divisions prior to submittal to  
25 FWC and FWS.

26  
27 (5) When a structure is identified as a responsible agent in manatee mortality, the  
28 affected field projects implements corrective actions as soon as it is reasonably  
29 possible.

30  
31 (6) When determined the corrective action is beneficial to the safety of the  
32 manatee, does not adversely affect the structural integrity of the structure, and  
33 does not alter the water management function of the structure, modifications are  
34 made permanent as soon as possible within the scope of authorities and funding.  
35 All similar structures posing an immediate risk are similarly modified within a  
36 period of twelve months, if reasonably possible.

37  
38 b. Operational protocol for locks, flood control spillway gates, culverts and other  
39 structures.

40  
41 c. Corps personnel responsible for implementing the SOP receive annual training  
42 from a Corps Biologist.

1 CESAJ SOP 1130-2-3

2  
3 Safety consideration is given to all manatees that approach Corps navigation locks,  
4 spillways, culverts and other water control structures. Each lock, spillway or culvert may  
5 differ due to operational design. The following procedures are designed to decrease the  
6 risk manatees experience when in the vicinity of water control structures.

7  
8 5. Summary.

9  
10 The Manatee Protection Plan provides policy and procedure for the effective  
11 long-range management and operation of water control structures to minimize manatee  
12 risks. This plan accurately addresses structure-related problem areas, and presents  
13 workable standard operating procedures to assist in the recovery of the Florida Manatee.  
14 In order to meet the objective of this plan, everyone involved must continually monitor  
15 and recommend necessary revisions for updates to minimize conflicts between the  
16 manatee and the intended purpose of Corps structures.

17  
18 FOR THE COMMANDER:

19  
20  
21  
22 RANDY L. TURNER  
23 LTC, Corps of Engineers  
24 Deputy Commander

25  
26  
27 7 APPENDICES

28 APP A - Lock Operations

29 APP B - Flood Control/Spillway Gate Operations

30 APP C - Culvert Operations

31 APP D - District and Interagency Reporting Requirements

32 APP E - Manatee Protection Plan Point of Contact List

33 APP F - Sample Jacksonville District Manatee Mortality

34 Investigation Report

35 APP G -USACE Structures with Manatee Protection Systems

36  
37 FIGURE 1

38  
39 Distribution:

40 A

1 APPENDIX A

2  
3 Lock Operations

4  
5 The following safety SOP is in effect for locking manatees at Canaveral Lock, St. Lucie  
6 Lock, Port Mayaca Lock, Moore Haven Lock, Ortona Lock and W.P. Franklin Lock:

7  
8 (a) Lock operators are attentive as to the location and number of manatees in the lock  
9 chamber and approaches and aware that manatees may be present even if not visible.

10  
11 (b) Manatee sightings are recorded on a FWC Manatee Sighting Form. These forms  
12 are to be submitted monthly to the FWC, Bureau of Protected Species Management,  
13 620 Meridian St., Tallahassee, Florida 32399-1600, with the field project retaining a  
14 file copy for record.

15  
16 (c) Make every effort to avoid hindering the passage of manatees through the locks  
17 and to assure their safety around vessels. Provide special lockages for manatees that  
18 demonstrate a desire to pass in one particular direction. According to the judgment of  
19 the lock operator on duty, vessels may be locked with manatees or delayed until the  
20 next lockage.

21  
22 (d) Lock operators advise approaching vessels of manatee presence and their location.  
23 Vessel operators are urged to use extra caution. Lock operators insist that vessels be  
24 at idle, speed upon entering the approach channels and communicate manatee  
25 movements to vessel operators.

26  
27 (e) Lock Operators make every effort not to crowd manatees in the lock chamber and  
28 maintain sufficient distance between vessels.

29  
30 (f) Take precautions to assure manatee safety around sector gates. Avoid leaving one  
31 gate closed for any reason other than an emergency or malfunction.

32  
33 (g) Delay vessels or lockage temporarily if imminent danger to a manatee exists.  
34 When locking manatees and vessels together, delay vessels after lockage to assure  
35 manatees have enough time to clear the area and gain access to safe water. Vessel  
36 operators should then be warned to proceed with caution at idle speed.

37  
38 (h) The field project performs inspections of manatee exclusion-screening devices on  
39 lock gates when damage is suspected and corrects deficiencies as soon as possible.

40  
41 (i) The design of the Manatee Protection System (MPS) detects submerged obstacles  
42 in the crush zone of closing sector gates at navigation locks. The technical manual  
43 for the Piezoelectric Copolymer (PECOP) Acoustic MPS for Navigation Locks is  
44 adhered to at locks that have MPS installed (See Appendix B, MPS Locations).

1 APPENDIX B

2  
3 Flood Control/Spillway Gate Operations  
4

5 The Spillway Operation Decision Flowchart for Manatee Protection (Figure 1), in  
6 conjunction with the operating criteria contained in the approved water control plans and  
7 manuals for the C&SF Project, are designed to reduce manatee risk during spillway  
8 operations at the following structures: S-77, S-78, S-79, S-354, S-351, S-352, S-308, S-  
9 80, S-10A, S-10C, S-10D, S-11A, S-11B, S-11C, S-12A, S-12B, S-12C, S-12D, S-355A,  
10 and S-355B.

11  
12 In addition to the Decision Flowchart, spillway gates should be operated in  
13 accordance with the operating criteria set forth in the water control plans and manuals.  
14 When a structure is identified by the Corps, FWS, and FWC to be a high risk for potential  
15 manatee mortality, injury and/or entrapment, the affected project implements physical  
16 barriers to preclude manatee movement as soon as possible. Only qualified operators  
17 perform Spillway operations.

18  
19 At structures where the head difference is less than or equal to three feet, one or  
20 more gates may be opened to two and one-half feet, subject to the following constraints:  
21 The operator should open the more central gates of the structure first, proceeding outward  
22 to those gates further from the center. The operator should also open gates on alternating  
23 sides of the structure. Thus, if there are four gates numbered 1 through 4 from left to  
24 right, a correct sequence for opening them would be Gates 2, 3, 1, and 4. An equally  
25 correct sequence would be Gates 3, 2, 4, and 1. Gates should be closed in reverse order.

26  
27 Gate openings greater than two and one-half feet should not be made until all  
28 gates have been opened to two and one-half feet, at which time additional gate openings  
29 may be made following MAGO curves. The operator may increase each gate opening in  
30 equal increments, in accordance with the MAGO curves until the predetermined opening  
31 is attained. At the end of the gate opening sequence, all the gates must be set at  
32 approximately equal gate openings, in accordance with the MAGO curves. As a practical  
33 consideration the spillway gates should not be adjusted such that gate openings differ by  
34 more than one foot.

35  
36 Operate Spillways to achieve the smallest possible opening across all gates. The  
37 minimum gate opening when more than one gate is open, will be one-half foot. This  
38 allows debris to be flushed through the gate without being caught. When only one gate is  
39 in operation, the maximum gate opening is 0.9 feet.

40  
41 If a physical barrier is present and functional and the desired gate opening is  
42 greater than two and one-half feet, then the physical gate barrier is removed before the  
43 initial gate opening.

44

1 If the desired gate opening is less than or equal to two and one-half feet (replace  
2 the physical barrier if previously removed), then follow procedures listed below for that  
3 structure.

4  
5 (A) S-78, Ortona; and S-80, St. Lucie.  
6

7 The following procedures are designed to reduce manatee risk during spillway  
8 operations and based on the water surface profile (difference between the upper and  
9 lower pools under normal operating conditions) of the S-78 spillway (eight to nine feet)  
10 and S-80 spillway (11 feet to 14.5 feet).

11  
12 (1) On initial gate openings stop gate for a 30 second period upon the first sign of  
13 water movement. (Approximately 0.1 to 0.3 feet) The operator continuously  
14 observes for obstructions in the gate opening during this procedure.

15  
16 (2) If voids appear (interruptions of even water flow across the full gate width),  
17 the operator determines to the best of his/her ability the source of the voids and  
18 makes the following decision:

19  
20 (a) If it appears to be trash or debris that is caught in the gate (aquatic plants,  
21 trees or other such debris), the operator continues to open the gate in  
22 increments not to exceed 0.3 feet during 30 second periods until the debris has  
23 passed through the gate. The gate shall then be lowered until the desired gate  
24 setting is obtained.

25  
26 (b) If it appears that a manatee is entrapped on the grating the gate should be  
27 operated as follows: If the current gate opening is less than or equal to one-  
28 half feet, the gate is to be lowered so the manatee is able to free itself. Once  
29 the manatee leaves the area, the gate may then be raised to the desired  
30 opening, during which time operator continues to observe for obstructions.

31  
32 (c) If manatee barriers are present and functional and/or not present or  
33 determined nonfunctional and the gate opening is greater than one-half foot  
34 then the gate should be immediately opened to allow the manatee to pass  
35 through (up to a maximum of two and one-half feet) and then adjusted to the  
36 desired opening.

37  
38 (B) SINGLE OR MULTIPLE GATES at S-77, Moore Haven; S-79, W.P. Franklin;  
39 S-308, Port Mayaca; S-351; S-352; and S-354, when the difference between  
40 headwater and tail water elevations, is less than or equal to three feet.

41  
42 (1) To allow manatees to pass under the gates, the minimum opening for any gate  
43 under the "less than or equal to three feet of head" condition is two and one-half  
44 feet.  
45

1 (2) If during the adjustment process, the head across the structure should exceed  
2 three feet, the gates should be closed in reverse order to openings permitted by the  
3 MAGO curves and the operating procedures applicable to head greater than three  
4 feet should then be used.

5

6 (C) SINGLE GATE AT S-77, S-79, S-308, S-351, S-352, and S-354, when the  
7 difference between headwater and tailwater elevations, is greater than three feet.

8

9 (1) If the desired gate opening is  $\leq$  two and one-half feet, then the gate may be  
10 initially opened to a maximum of two and one-half feet and held at that opening  
11 for up to one (1) minute. The forces of the water should precipitate the passage of  
12 any manatee that may be resting against the gate or in the immediate vicinity  
13 while the gate is at the two and one-half feet opening.

14

15 (2) If the predetermined opening is not permitted by the MAGO curves, the  
16 operator must lower the gate to a permitted opening and wait until the discharge  
17 raises the tailwater elevation so the opening can be adjusted to the predetermined  
18 opening. After holding the gate open, the gate should be adjusted to the  
19 predetermined opening in accordance with the MAGO curves.

20

21 (D) Multiple gates at S-77, S-79, S-308, S-351, S-352, and S-354, when the  
22 difference between headwater and tailwater elevations, (head) is greater than 3.0 feet.

23

24 (1) If the desired gate opening is  $\leq$  two and one-half feet, one gate may be opened  
25 to a maximum of two and one-half feet and held at that opening for one (1)  
26 minute to precipitate the passage of any manatee that may be resting against the  
27 gate or in the immediate vicinity. After one minute, the gate may be adjusted to  
28 the desired setting.

29

30 (2) If the desired opening(s) is not permitted by the MAGO curves, the operator  
31 must close the gate to a permitted opening and wait until the discharge raises the  
32 tailwater elevation so the opening can be adjusted to the desired opening. As the  
33 tailwater rises, the operator may adjust each gate opening in equal increments  
34 until the desired opening is attained. As a practical consideration the spillway  
35 gates should not be adjusted such that gate openings differ by more than one foot.

36

37 (3) If it is predetermined that an opening greater than two and one-half feet would  
38 be needed for the gates, then the operator will follow the gate opening sequence  
39 described above in 2c. (1) (2) and (3). At the end of the gate opening sequence,  
40 all of the gates must be set at approximately equal gate openings, all in  
41 accordance with the MAGO curves.

42

43 (4) Operate spillways to achieve the smallest possible opening across all gates.  
44 The minimum gate opening when more than one gate is open, will be one-half  
45 foot. This allows debris to be flushed through the gate without being caught.  
46 When only one gate is in operation, the maximum gate opening is 0.9 feet.

1 APPENDIX C

2  
3 Culvert Operations

4  
5 The following SOP is in effect to reduce manatee risk at Herbert Hoover Dike culverts;  
6 C-1, C-1A, C-2, C-3, C-4A, C-5, C-5A, C-6, C-8, C-10, C-10A, C-11, C-12, C-12A, C-13,  
7 C-14, C-16, and the following culverts on extension levees feeding into Lake  
8 Okeechobee; HP-1, HP-2, HP-3, HP-5, HP-6, HP-7 (Harney Pond Canal); IP-1, IP-2, IP-3  
9 (Indian Prairie Canal); KI-1, KI-2, (Kissimmee River) and FC-1 (Fisheating Creek).

10  
11 (a) When the vertical lift gates are opened from the closed position, raise to an initial  
12 opening of two and one-half feet and then close to the desired setting. This allows  
13 resting manatee to pass through the culvert rather than being pinned and drowned at  
14 the point of the gate opening.

15  
16 (b) When opening flap gate culverts by winch or crane, the shape of the flap gate and  
17 the slow operation alerts the manatee to move before a strong current could trap it at  
18 the point of the gate opening. If a manatee(s) remain near the culvert during the  
19 initial opening of the culvert, the culvert operation will be suspended until the  
20 manatee(s) leave on their own accord.

21  
22 (c) Manatees observed during culvert operations will result in culvert operations  
23 being suspended until the Manatee leaves.  
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APPENDIX D

District and Interagency Reporting Requirements

(a) Sightings of dead, injured, sick or newly calved manatees, as well as sightings of manatees in smaller, shallower canal systems associated with Corps water control structures but outside Lake Okeechobee and the Okeechobee Waterway, are immediately reported to the Manatee Hotline at 888-404-FWCC (3922). It is the responsibility of the field project to promptly notify Multi Project Section.

(b) Prior to FWC manatee rescue operations or investigations requiring diving by any agency at Corps structures, coordination of dive plans are submitted by the requesting agency through the field project to the Multi Project Section.

(c) The Corps' field project and/or Multi Project Section notifies FWC and FWS as far in advance as reasonably possible of any major maintenance or construction that would possibly impact manatee safety.

APPENDIX E

Manatee Protection Plan Point of Contact List

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Florida Fish and Wildlife Conservation Commission  
Bureau of Protected Species Management  
620 Meridian Street  
Tallahassee, FL 32399-1600  
Mr. Ron Mezich (850) 922-4330

U.S. Fish and Wildlife Service  
1339 20th Street  
Vero Beach, FL 32960-3559  
Mr. Dave Ferrell (772) 562-3909

6620 Southpoint Drive, South  
Suite 310  
Jacksonville, FL 32216-0958  
Ms. Nicole Adimey (904) 232-2580 ext. 123

South Florida Water Management District  
Post Office Box 24680  
West Palm Beach, FL 33416-43680  
Mr. Tom Kosier (561) 687-6631

U.S. Army Corps of Engineers  
P.O. Box 4970  
Jacksonville, FL 32232-0019

Planning Division, Environmental Studies Section,  
(CESAJ-PD-ES)  
Ms. Janet Cushing (904) 232-2259

Engineering Division, Water Management and Meteorology  
Section (CESAJ-EN-HW)  
Ms. Stephanie Jenkins (904) 232-2781

Engineering Division, Mechanical and Electrical Section,  
(CESAJ- EN-DM)  
Ms. Shashi Makker (904) 232-1112  
Mr. Gerald Deloach (904) 232-1050

Construction-Operations Division, Operations Technical Support Branch, Multi Project  
Section, (CESAJ-CO-OP)  
Mr. Kevin Salvilla (904) 232-3187  
Mr. Larry Taylor (904) 232-1911

1 Construction-Operations Division, South Florida Operations Office (CESAJ-CO-S)  
2 525 Ridgelawn Road  
3 Clewiston, FL 33440-5399  
4 Ms. Karen Estock (863) 983-8101  
5



1 **US Army Corps**  
2 **of Engineers**

3  
4 APPENDIX F  
5 STANDARD OPERATING PROCEDURES FOR REPORTING DEAD, INJURED,  
6 SICK OR NEWLY CALVED MANATEES  
7

8 1. Call the MANATEE HOTLINE to report incident: (888) 404-3922  
9

10 Please advise dispatcher the county the manatee is located and current condition of the  
11 manatee.  
12

13 2. Notify the Clewiston Office (863) 983-8101 ext. 243, Richard Bailey (or cellular 863-  
14 287-2671) or Ryan Peck (cellular 863-412-0530), if neither are available, Karen Estock  
15 863-983-2304 (or cellular 863-227-0224).  
16

17 3. If the animal is deceased, fill out an initial fatality report; take photos of the carcass  
18 and location where it was first observed, and sketch a picture of the carcass with any  
19 unusual markings if necessary.  
20

21 4. If possible secure the manatee until assistance arrives.  
22

23 5. Fax report to Clewiston Office (863) 983-8579.  
24

1 APPENDIX G  
2 U. S ARMY CORPS OF ENGINEERS STRUCTURES WITH MANATEE  
3 PROTECTION SYSTEMS  
4

5 W.P Franklin Lock

6 Manatee screens on the lock sector gates  
7

8 Ortona Lock

9 Manatee screens on the lock sector gates  
10 Floor grating on the lock chamber floor  
11

12 Ortona Spillway (S-78)

13 Physical barriers in front of the spillway gates  
14

15 Moore Haven Lock

16 Manatee screens on the lock sector gates  
17

18 Port Mayaca Lock

19 Manatee screens on the lock sector gates  
20

21 St. Lucie Lock

22 Manatee screens on the lock sector gates  
23 Acoustic Array Manatee Protection System on lock sector gates  
24 Floor grating on the lock chamber floor  
25

26 St. Lucie Spillway (S-80)

27 Physical barriers in front of the spillway gates  
28

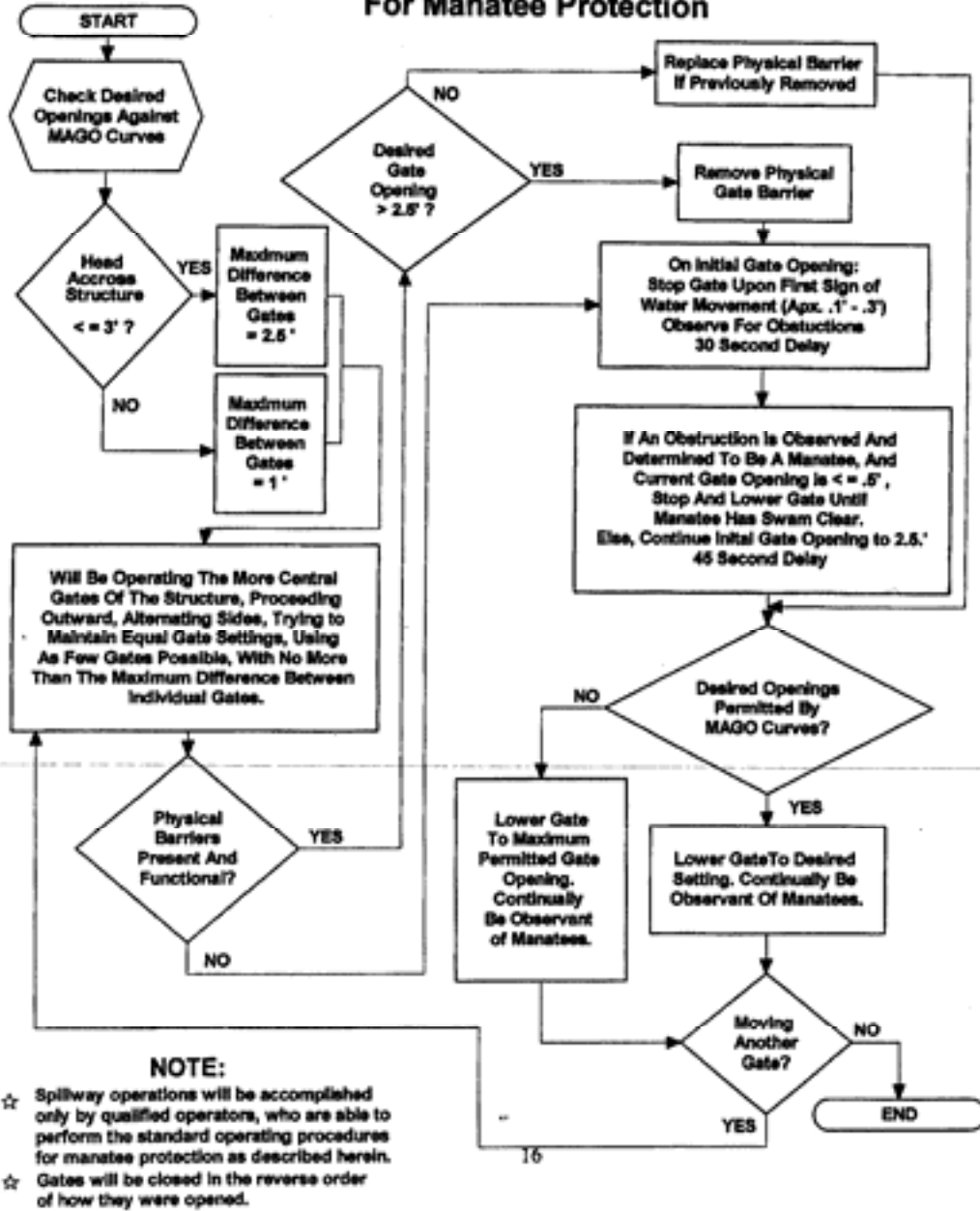
29 Canaveral Lock

30 Manatee screens on the lock sector gates  
31 Acoustic Array Manatee Protection System on lock sector gates  
32

33 C-10A Culvert

34 Physical barriers on the lakeside of culvert gates  
35

## Spillway Operation Decision Flowchart For Manatee Protection



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Figure 1