Lake Okeechobee Operations Interactive Simulation Exercise

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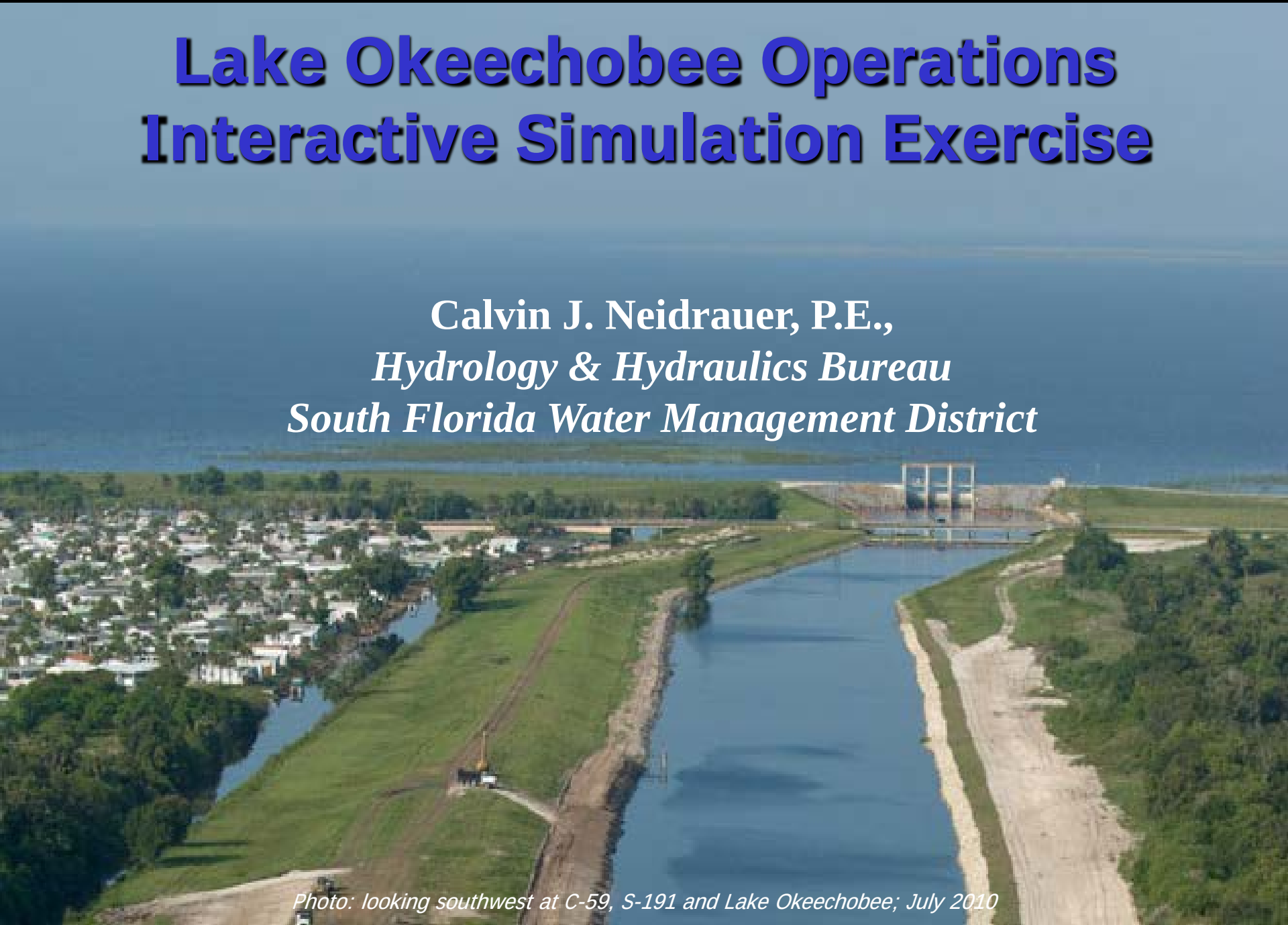
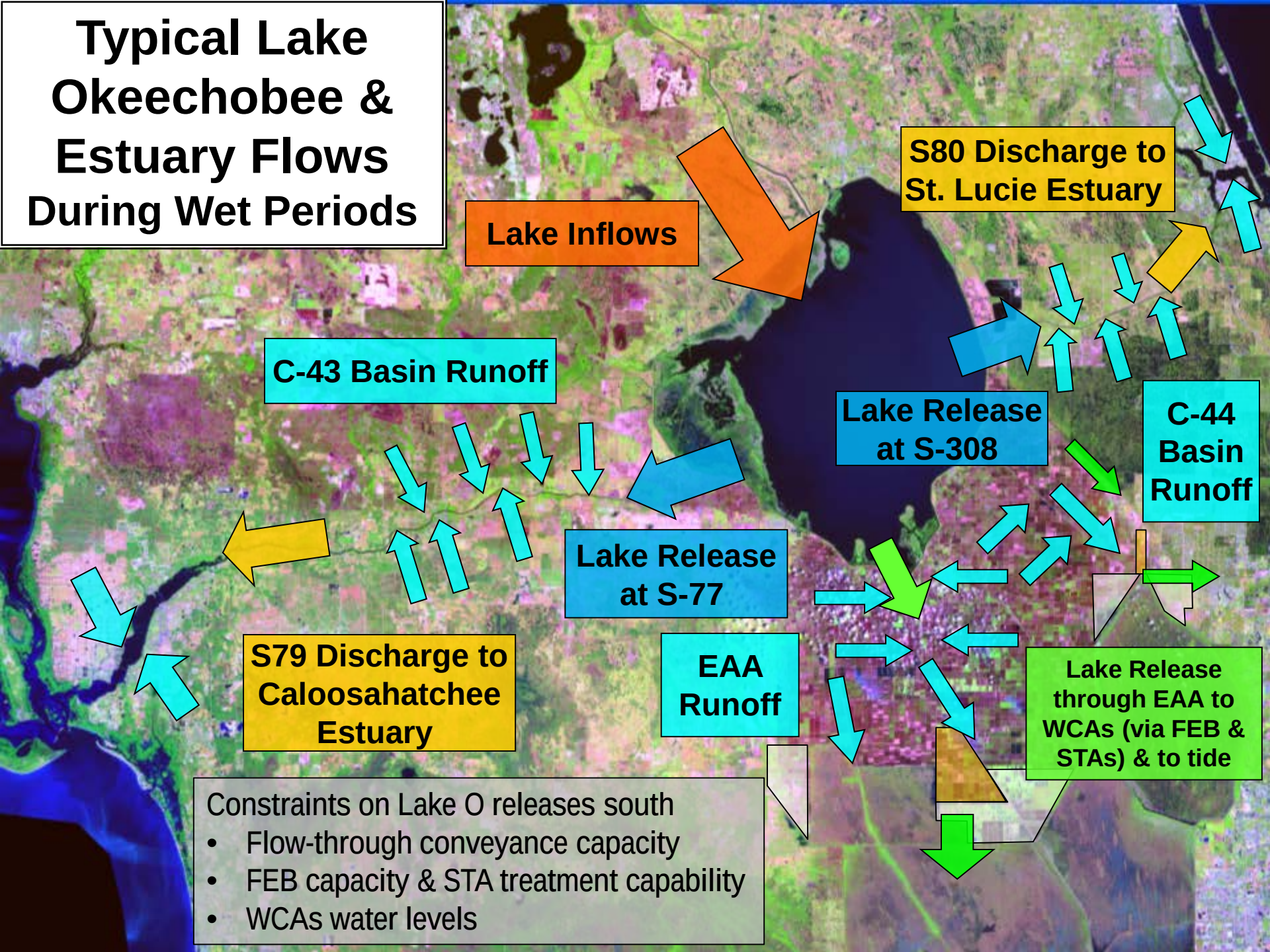


Photo: looking southwest at C-59, S-191 and Lake Okeechobee; July 2010

Typical Lake Okeechobee & Estuary Flows During Wet Periods

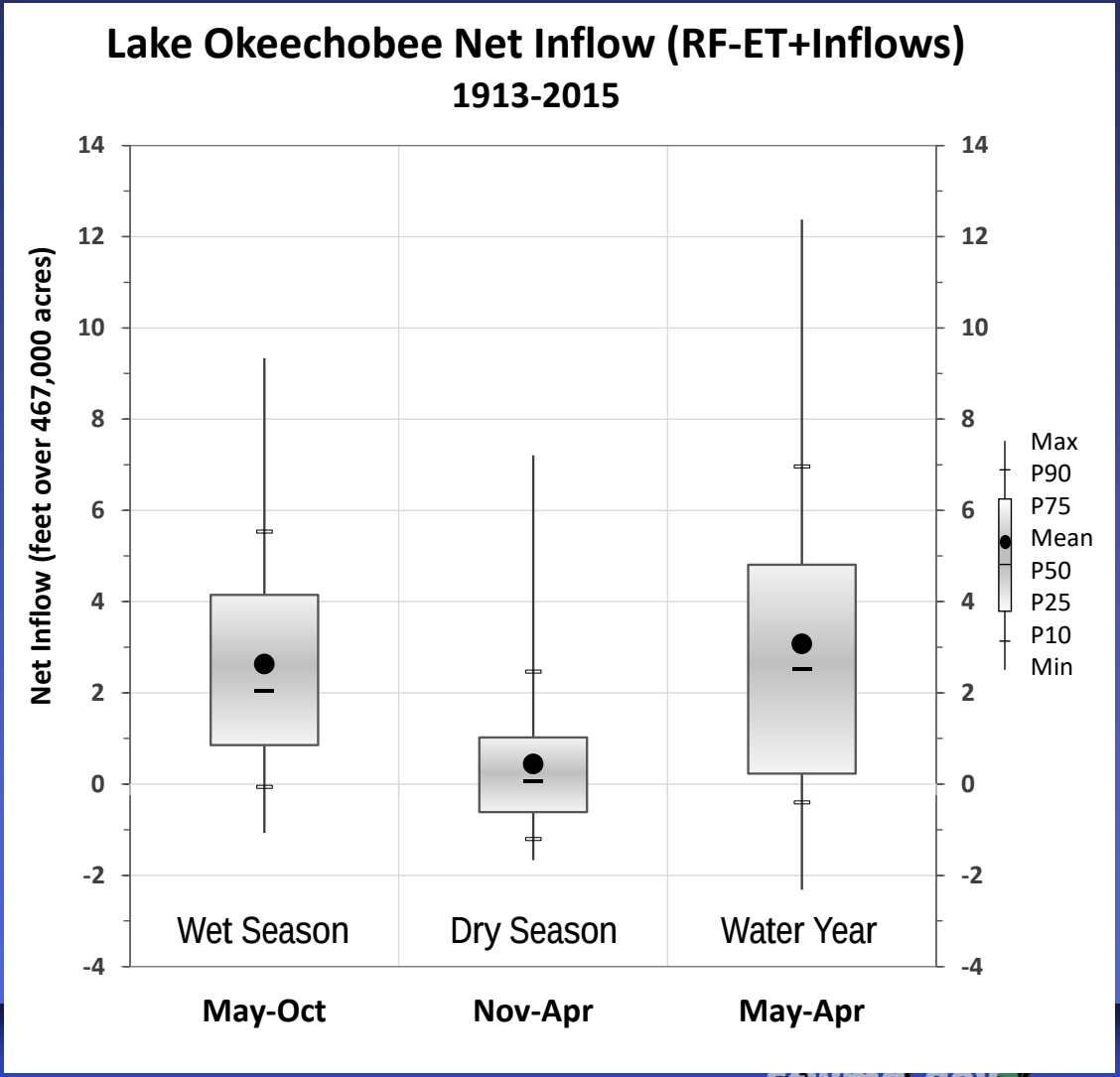


Constraints on Lake O releases south

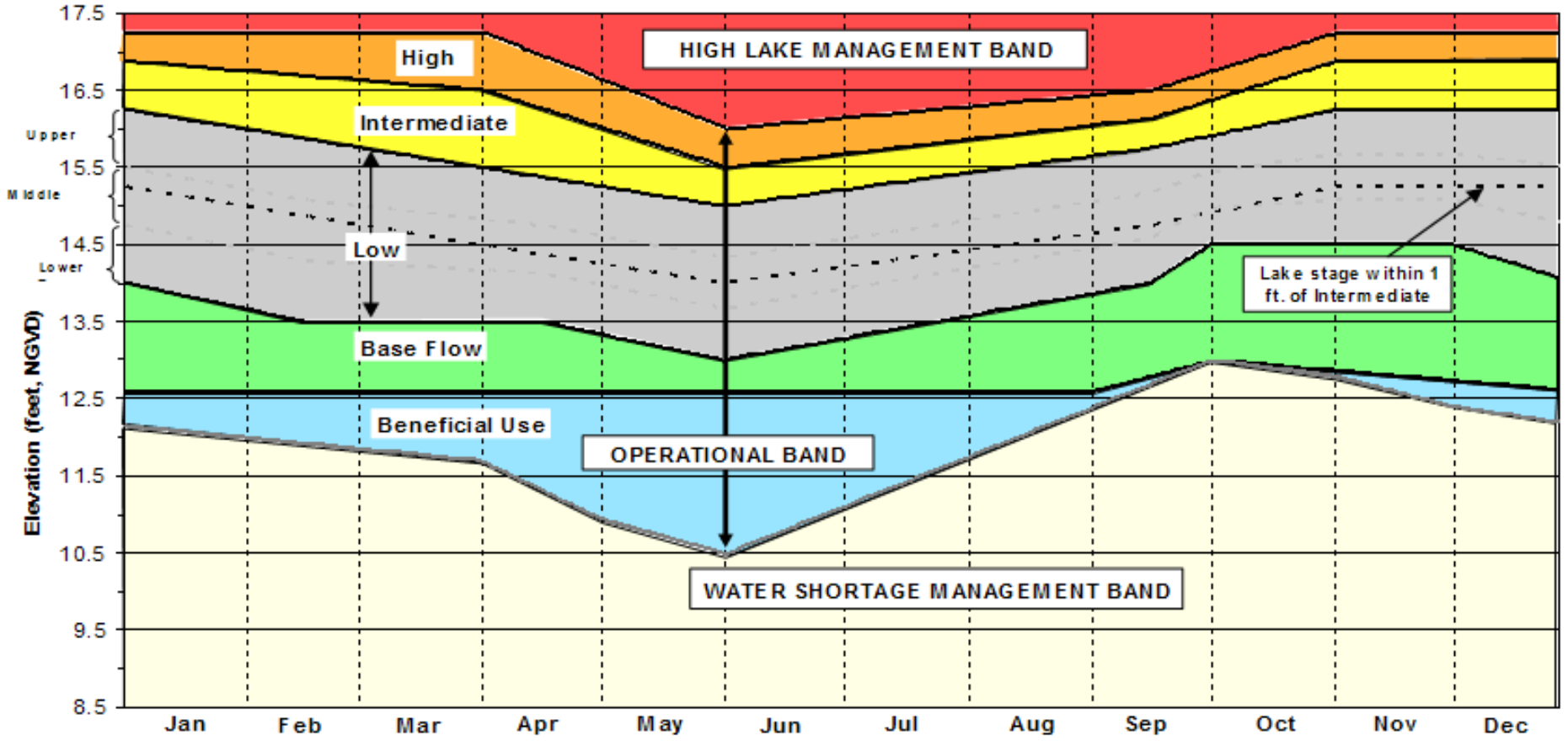
- Flow-through conveyance capacity
- FEB capacity & STA treatment capability
- WCAs water levels

Lake Okeechobee Net Inflow
Seasonal & Water Year Stats

- Large variability in net inflow
- USACE tries to manage Lake between 12.5'-15.5' (3 feet)
- Less lake storage in dry season
  - LORS receding to make room for wet season inflow
- Release of excess inflow is required in 2 out of 3 years, on average



2008 Lake Okeechobee Interim Regulation Schedule (aka LORS-2008)



NOTES:

High Lake Management Band: Outlet canals may be maintained above their optimum water management elevations.

Operational Band: Outlet canals should be maintained within their optimum water management elevations.

Water Shortage Management Band: Outlet canals may be maintained below optimum water management elevations.

CENTRAL AND SOUTHERN FLORIDA PROJECT

2008 LAKE OKEECHOBEE
INTERIM REGULATION SCHEDULE

PART B

DATED: March 2008
DEPARTMENT OF THE ARMY, JACKSONVILLE DISTRICT
CORPS OF ENGINEERS, JACKSONVILLE, FLORIDA

Figure 7-2

2008 LORS

Part D: Establish Allowable Lake Okeechobee Releases to Tide (Estuaries)

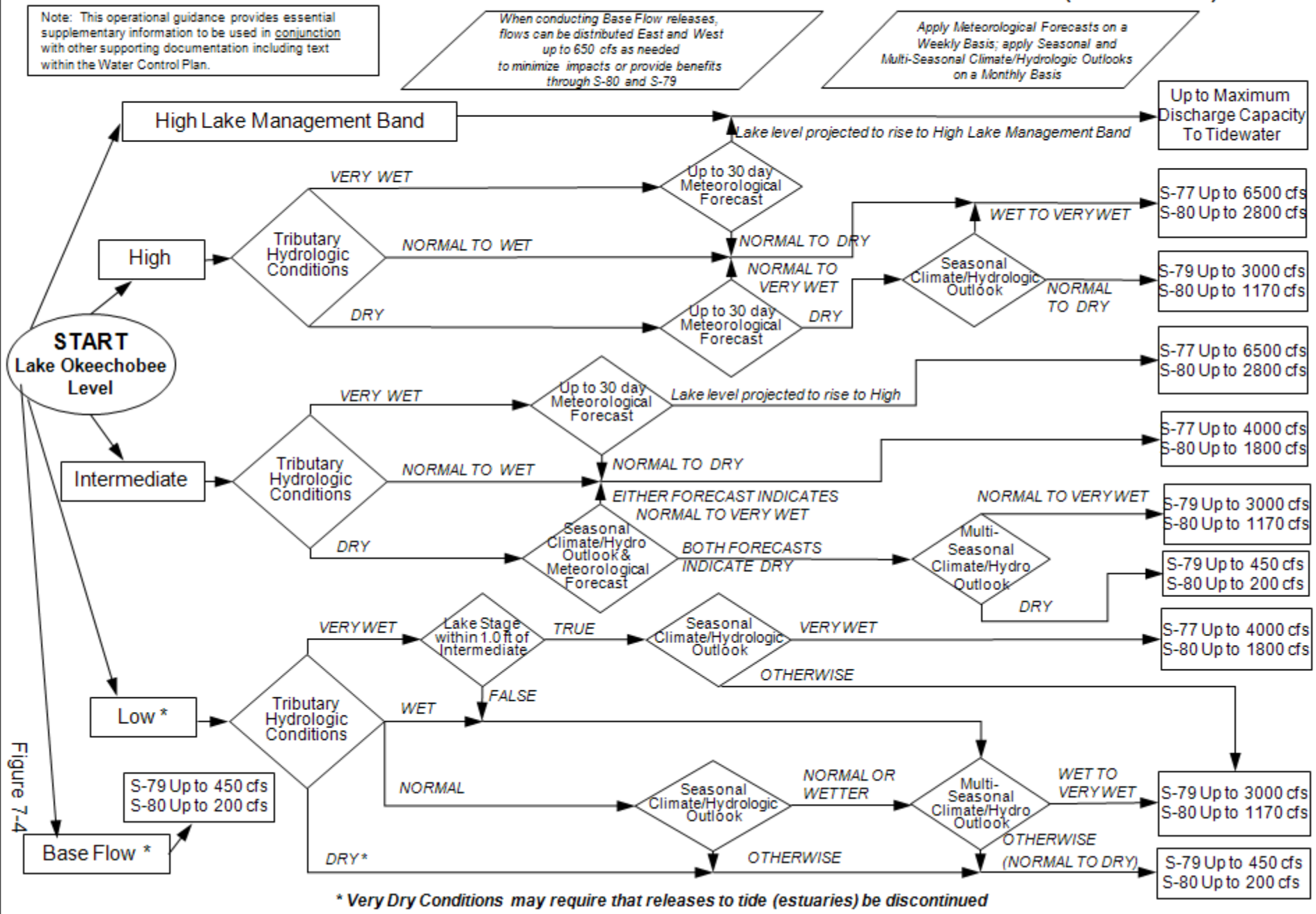
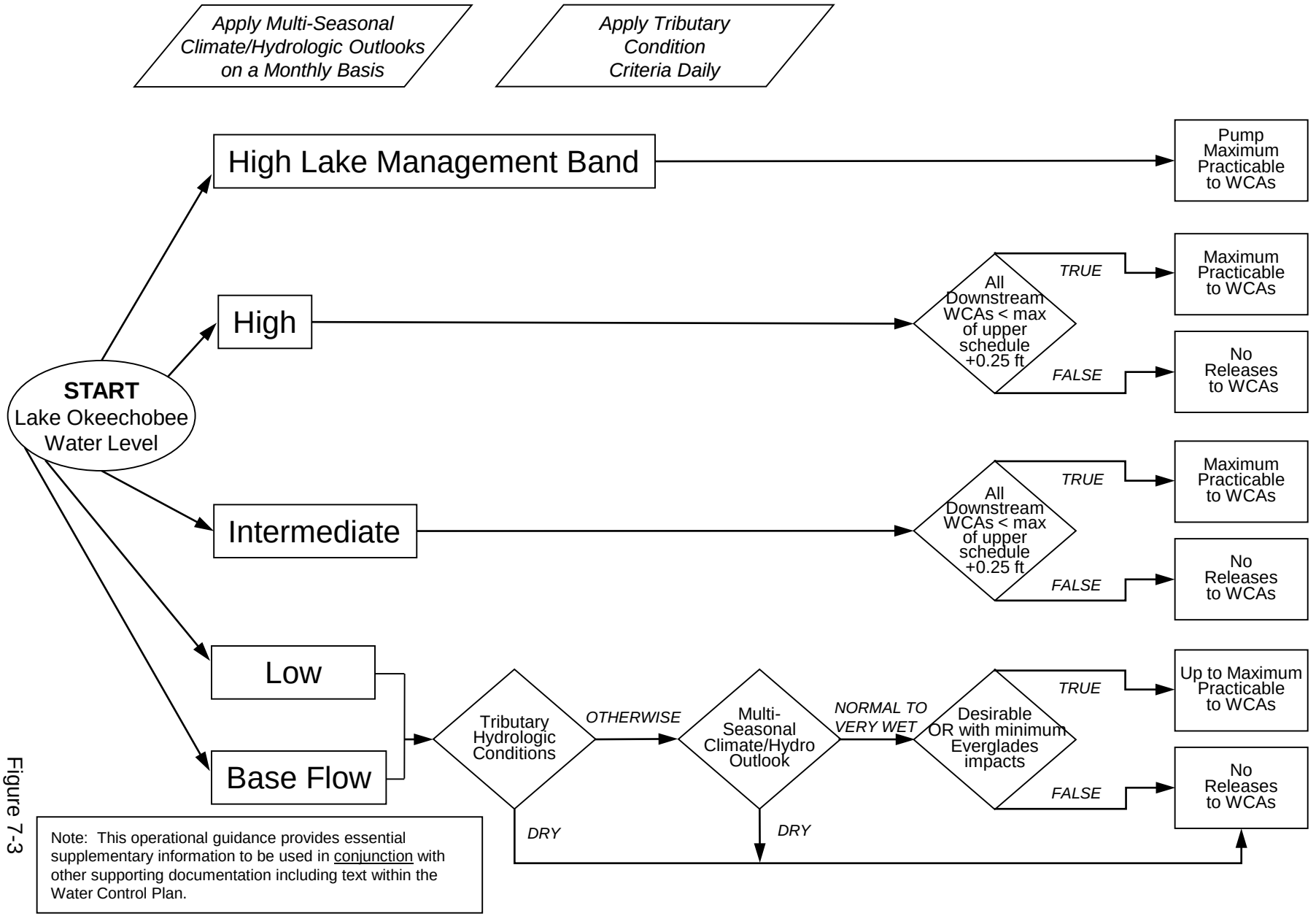


Figure 7-4

** Very Dry Conditions may require that releases to tide (estuaries) be discontinued*

2008 LORS

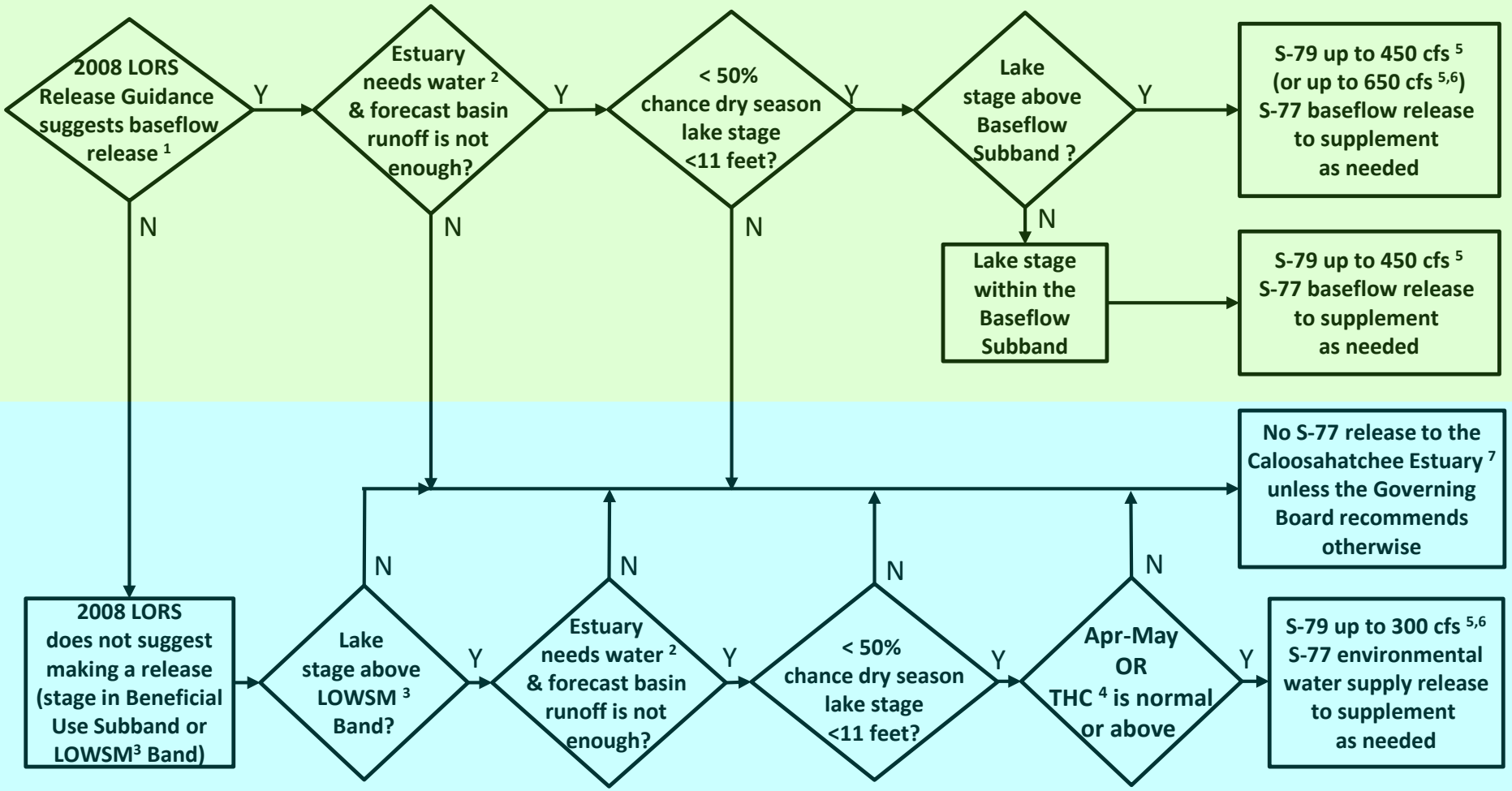
Part C: Establish Allowable Lake Okeechobee Releases to the Water Conservation Areas



Note: This operational guidance provides essential supplementary information to be used in conjunction with other supporting documentation including text within the Water Control Plan.

Figure 7-3

Flowchart to Guide Recommendations for Lake Okeechobee Releases to the Caloosahatchee Estuary for 2008 LORS Baseflow & for Environmental Water Supply (revised 9-Aug-2012)



[1]The 2008 LORS Release Guidance (Part D) can suggest baseflow releases in the Intermediate, Low, or Baseflow Subbands.

[2]Estuary "needs" water when the 30-day moving average salinity at I-75 bridge is projected to exceed 5 practical salinity units (psu) within 2 weeks.

[3]LOWSM = Lake Okeechobee Water Shortage Management.

[4]Tributary Hydrologic Condition (THC) is based on classification of Lake Okeechobee Net Inflow and Palmer Index.

[5]Can release less than the "up to" limit if lower release is sufficient to reach or sustain desired estuary salinity; cfs = cubic feet per second.

[6]After reviewing conditions in Water Conservation Areas (WCAs), Stormwater Treatment Areas (STAs), ENP, St. Lucie Estuary and Lake Okeechobee.

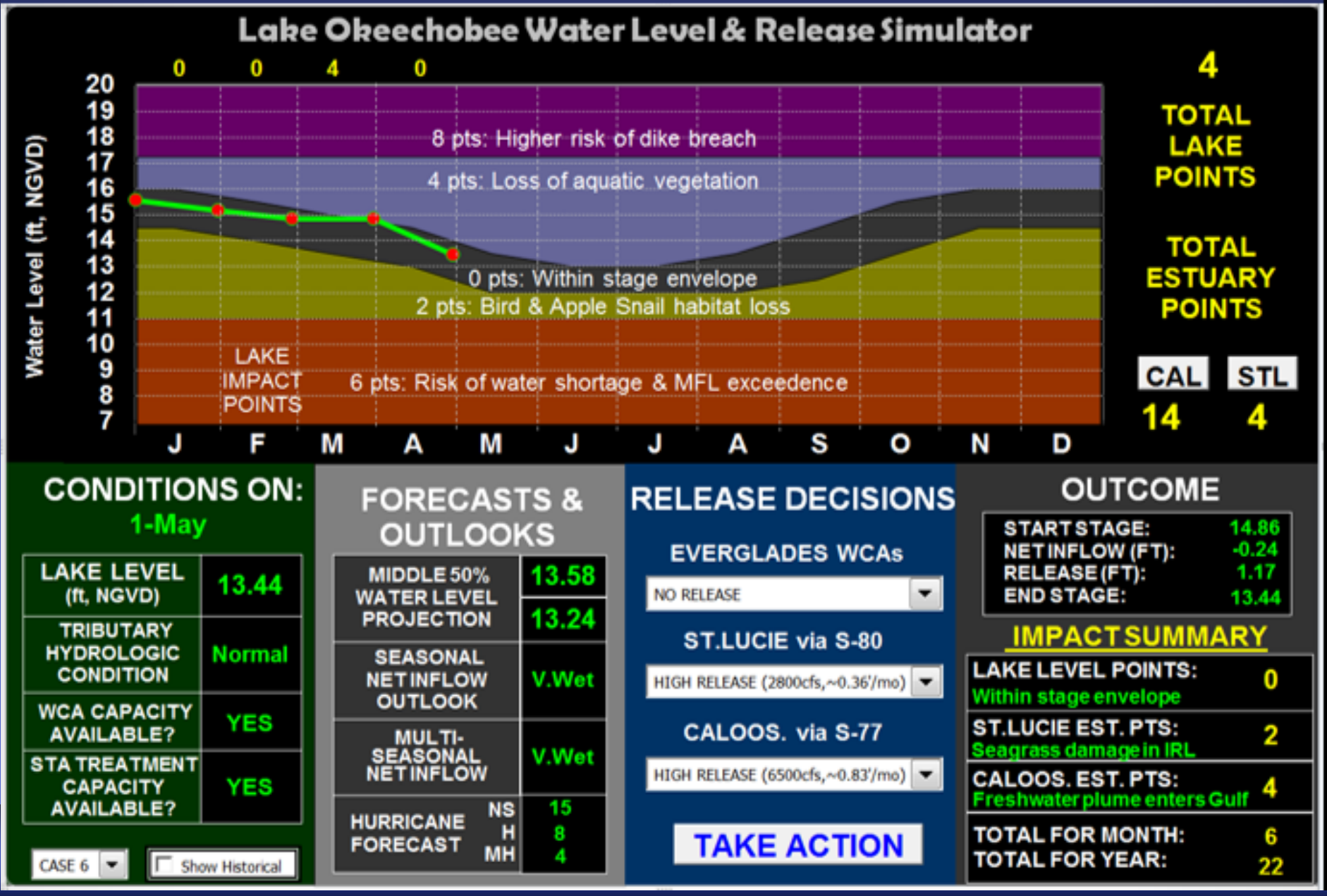
[7]Should this condition be reached, the Governing Board will be briefed at their next regularly scheduled meeting as part of the State of the Water Resources agenda item.

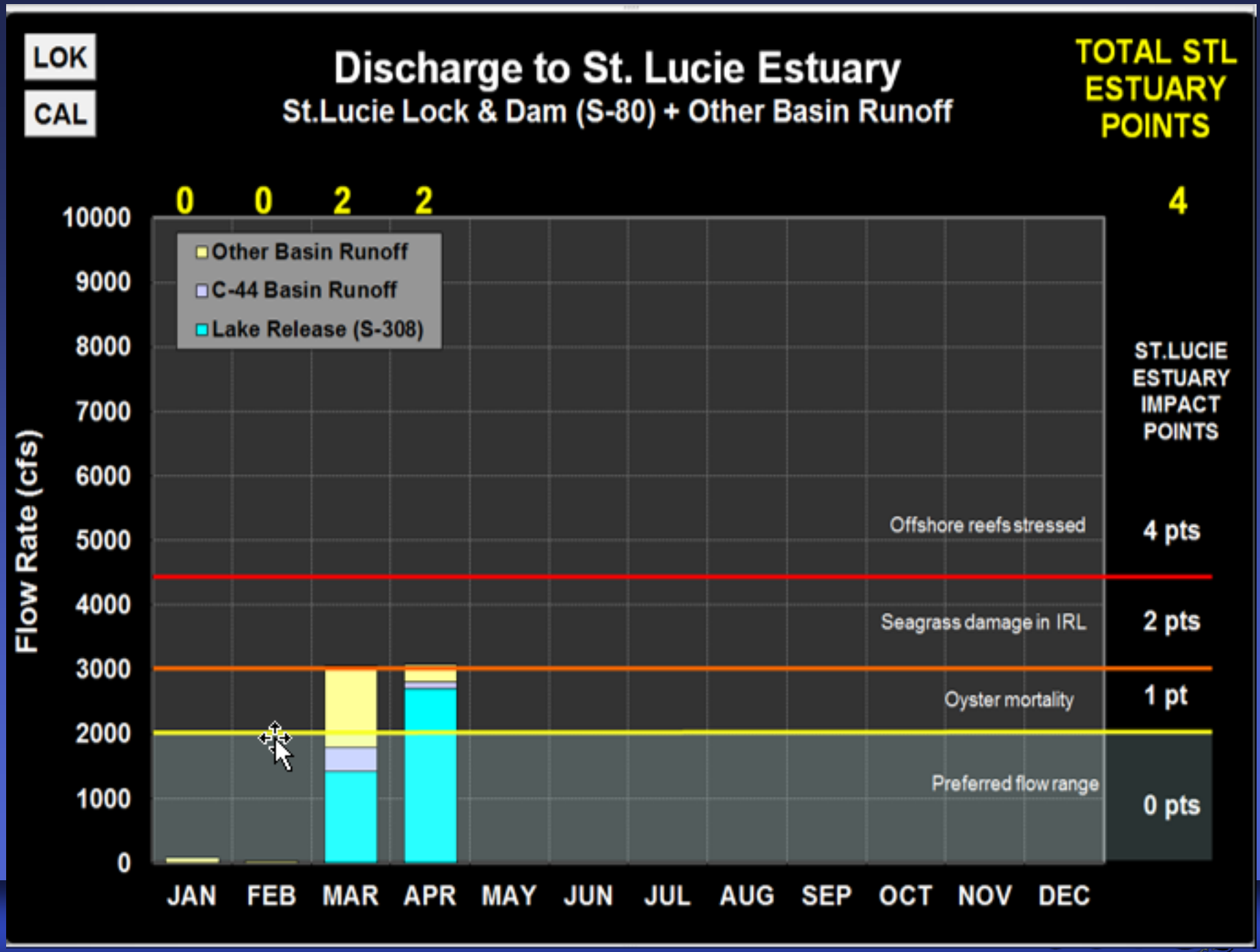
Reality vs Simulated Reality

- Reality – the USACE makes the release decisions to manage (regulate) Lake O water levels
  - Weekly decisions based on:
    - federal regulation schedule
    - SFWMD and other agency input
- Simulated Reality – You make the decision
  - One year simulation, monthly decisions
  - Goal: minimize penalty points, which are assessed:
    - for Lake stages that are too high or too low
    - for Estuary discharges that are outside preferred ranges

Lake Okeechobee Interactive Simulator

Calvin Neidrauer, P.E., SFWMD



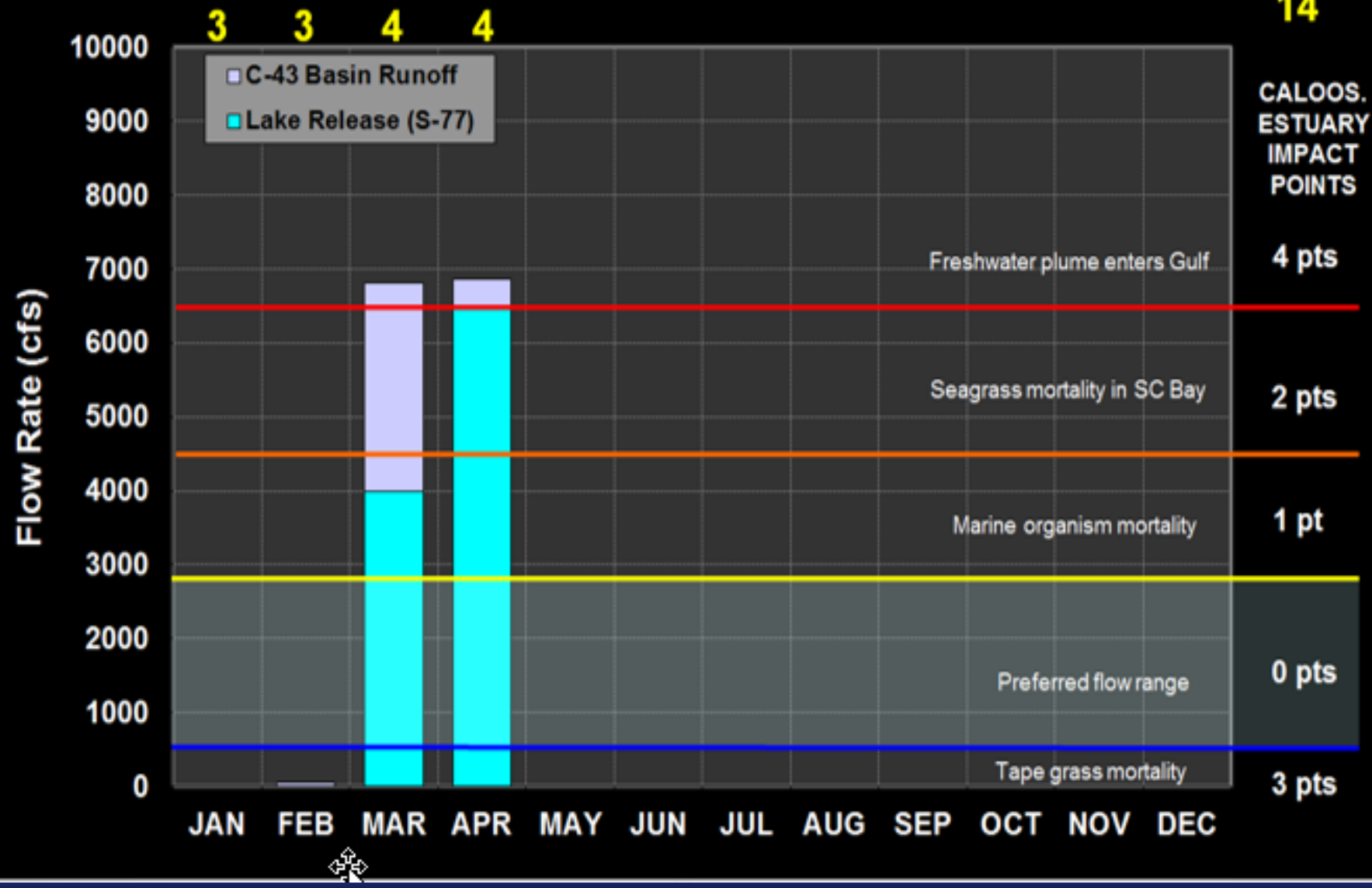

LOK
CAL
Discharge to St. Lucie Estuary
St.Lucie Lock & Dam (S-80) + Other Basin Runoff
TOTAL STL ESTUARY POINTS
0 0 2 2
4
Other Basin Runoff
C-44 Basin Runoff
Lake Release (S-308)
Flow Rate (cfs)
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
ST.LUCIE ESTUARY IMPACT POINTS
Offshore reefs stressed
4 pts
Seagrass damage in IRL
2 pts
Oyster mortality
1 pt
Preferred flow range
0 pts

LOK

STL

Discharge to Caloosahatchee Estuary

at the Franklin Lock & Dam (S-79)



Lake Okeechobee Discharge Options for the Interactive Simulation Exercise

CALOOSAHATCHEE VIA S-77

- MAX RELEASE (7800cfs,~0.99'/mo)
- HIGH RELEASE (6500cfs,~0.83'/mo)
- MEDIUM RELEASE (4000cfs,~0.51'/mo)
- LEVEL 3 PULSE (3000cfs,~0.38'/mo)
- LEVEL 2 PULSE (2300cfs,~0.29'/mo)
- LEVEL 1 PULSE (1600cfs,~0.20'/mo)
- (450cfs,~0.06'/mo)
- (300cfs,~0.04'/mo)
- NO RELEASE

ST. LUCIE VIA S-80

- MAX RELEASE (7200cfs,~0.92'/mo)
- HIGH RELEASE (2800cfs,~0.36'/mo)
- MEDIUM RELEASE (1800cfs,~0.23'/mo)
- LEVEL 3 PULSE (1170cfs,~0.15'/mo)
- LEVEL 2 PULSE (950cfs,~0.12'/mo)
- LEVEL 1 PULSE (730cfs,~0.09'/mo)
- NO RELEASE

EVERGLADES WCAs

- MAX RELEASE (1500cfs,~0.25'/mo)
- HIGH RELEASE (1000cfs,~0.13'/mo)
- LOW RELEASE (500cfs,~0.06'/mo)
- NO RELEASE

Impact (Penalty) Points* for the Interactive Simulation Exercise

Lake O water level	LOK Impact Points
Higher Risk of dike breach	6
Loss of aquatic vegetation	2
Within stage envelope	0
Bird & Apple Snail habitat loss	4
Risk of water shortage & MFL exceedance	8

Discharge to Caloosahatchee Estuary (S-79)	CAL Impact Points
>6500 cfs Freshwater plume enters Gulf	4
>4500 cfs Seagrass mortality in SC Bay	2
>2800 cfs Marine organism mortality	1
300-2800 cfs Preferred flow range	0
<300 cfs Tape grass mortality	3

Discharge to St. Lucie Estuary (S-80 + Other Basin Runoff)	STL Impact Points
Offshore reefs stressed >4500 cfs	4
Seagrass damage in IRL >3000 cfs	2
Oyster mortality >2000 cfs	1
0-2000 cfs Preferred flow range	0

**Penalty points are over-simplified measures derived from planning-level performance measures (PMs). More detail on planning-level PMs is available in SFWMD planning and USACE NEPA documents.*

Lake Okeechobee Interactive Simulation Exercise

Scores from recent sessions (same simulation year)

	2008 Lake O Regulation Schedule	SFWMD Governing Board May-2010	Broward Co. WRTF & TAC Oct-2010	CISRERP A.M. GROUP May-2011	CISRERP P.M. GROUP May-2011	UF Water Institute Students Aug-2011
Caloosahatchee	15	19	11	7	11	7
St. Lucie	10	10	6	7	10	6
Lake Okeechobee	16	26	20	20	24	28
Total	41	55	37	34	45	41

Lake Okeechobee Interactive Simulation Exercise

Scores from recent sessions (same simulation year)

	2008 Lake O Regulation Schedule	WRAC New Member Briefing Oct-2013	Optimal Deterministic Optimization (known inflow sequence)	UNESCO IHE Student Group #2 May-2012	UNESCO IHE Student Group #1 May-2015	WRAC Nov-2015	WRAC Sep-2018
Caloosa-hatchee	15	7	10	11	3	15	
St. Lucie	10	8	9	10	14	10	
Lake O	16	20	6	20	20	16	
Total	41	35	25	41	37	41	

**Best Possible Score (known inflows) (10+9+6=25)*