Lake Okeechobee System Operating Manual

Preferred Alternative - LOSOM Listening Session

Sanibel-Captiva Conservation Foundation

Conservancy of Southwest Florida

DRAFT - January 24, 2022

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Use cursor keys for navigation, press "O" for a slide Overview

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The Good

- Estuaries: ⇧ optimal flow & ⇩ stress and damaging flow
- Everglades: ⇧ flow south (via S351 & S354)

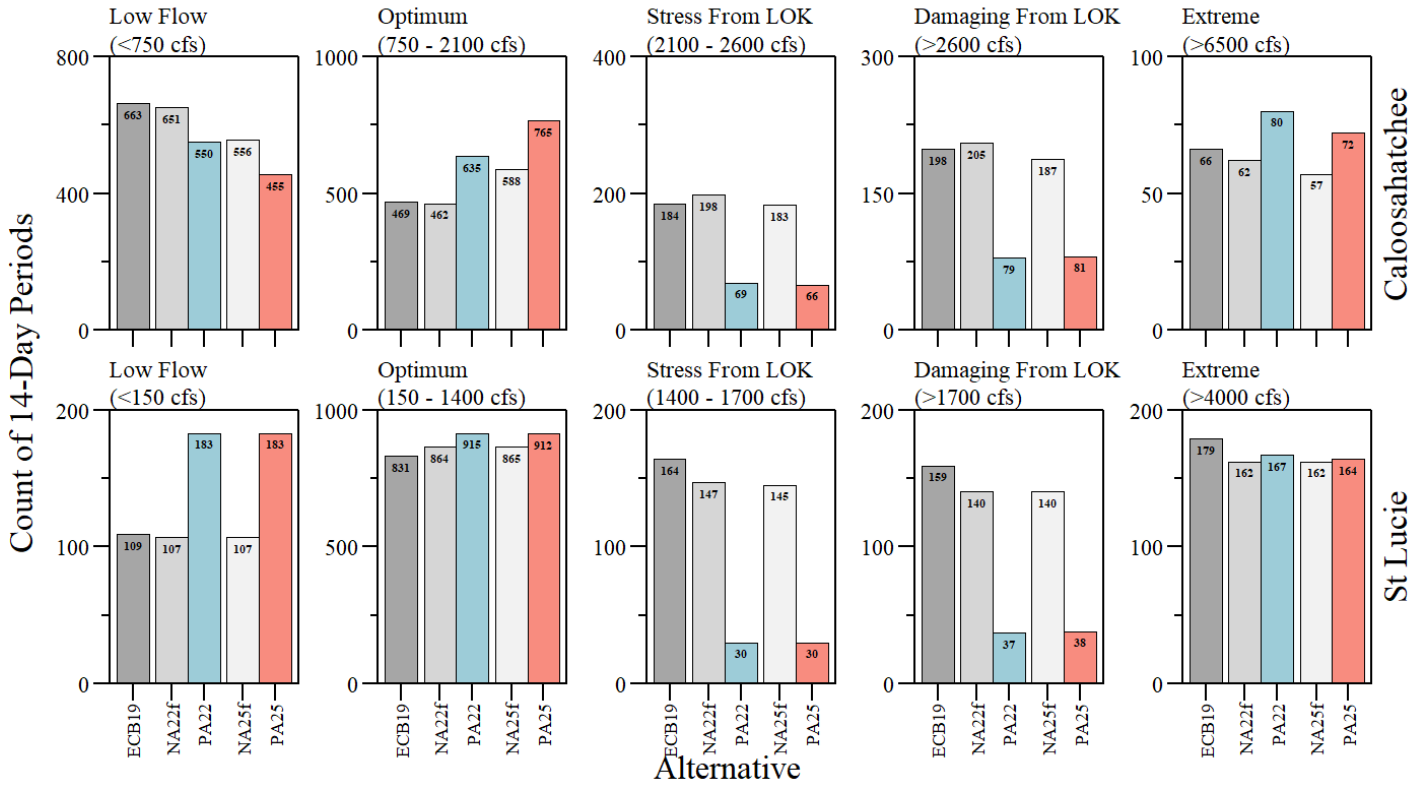
The Bad

- Estuaries: ⇧ extreme flow events
- Lake Okeechobee: ⇧ high stage (17 & 16 Ft NGVD metrics)
- Lake Okeechobee: ⇧ in stage envelope scores (+36% difference to FWO)

The Ugly

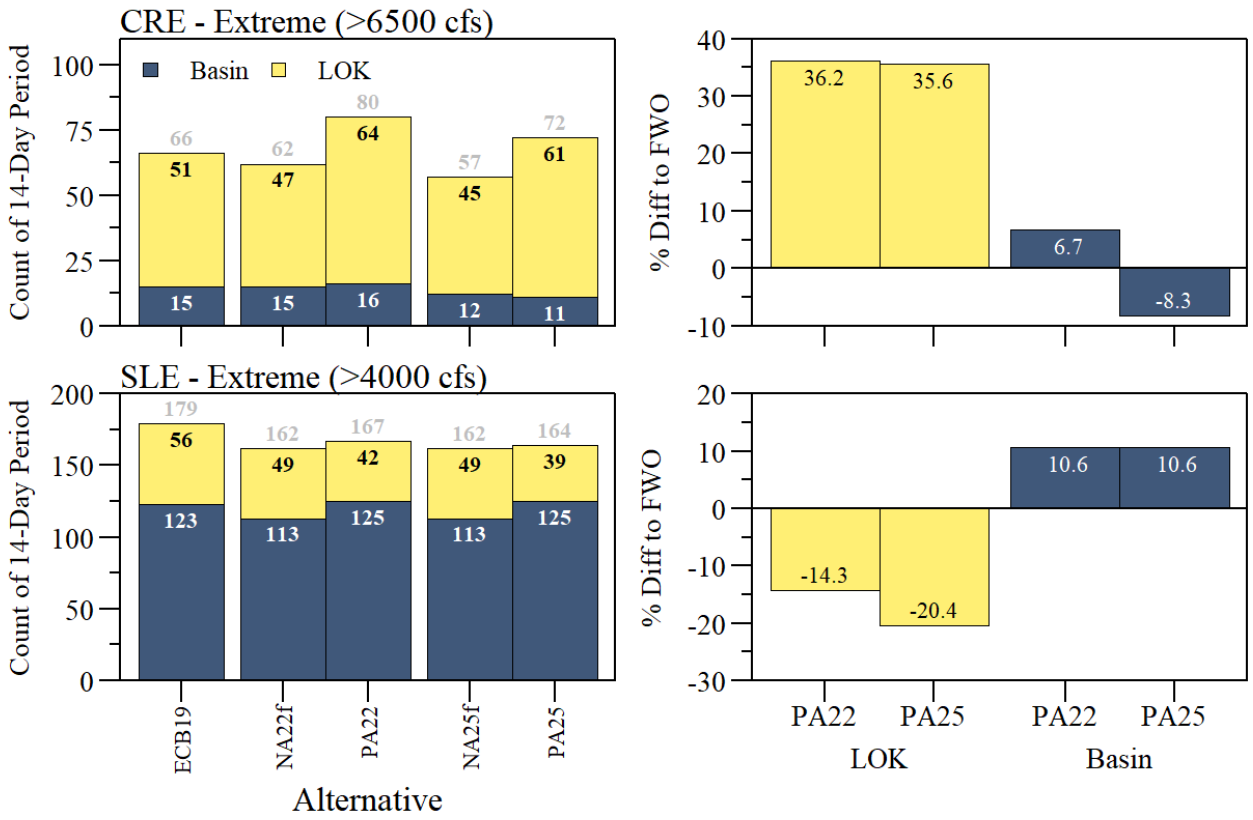
- Proposed 1.5 Ft WSM buffer

Salinity Envelope



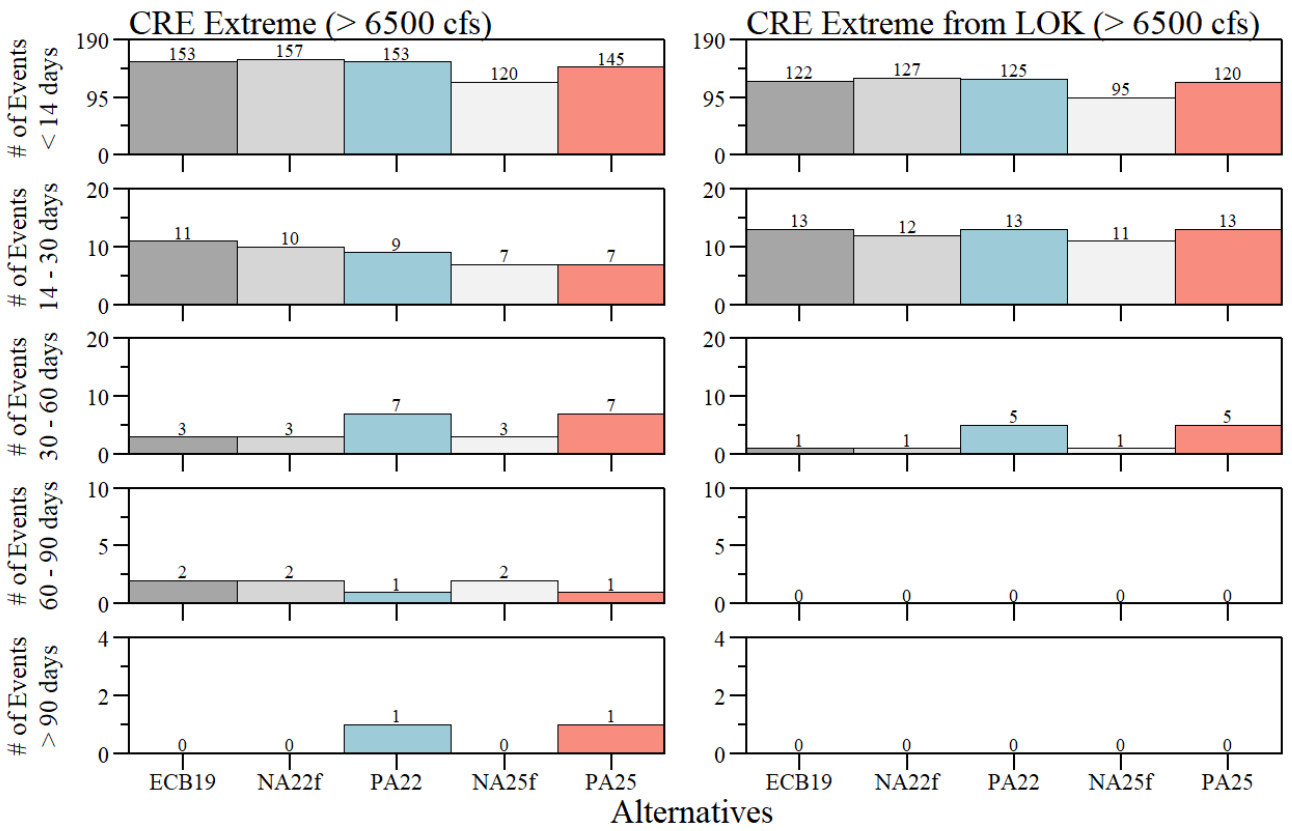
RECOVER salinity envelope evaluation during the simulation period of record for Caloosahatchee (top) and St Lucie (bottom) estuaries.

Salinity Envelope - Extreme



RECOVER salinity envelope - Extreme flow category evaluation relative to each respective FWO/No Action Alterantives during the simulation period of record for Caloosahatchee (top) and St Lucie (bottom) estuaries.

CRE - Extreme



Total (left) and Lake derived (right) extreme discharge events and duration for the Caloosahatchee River Estuary.

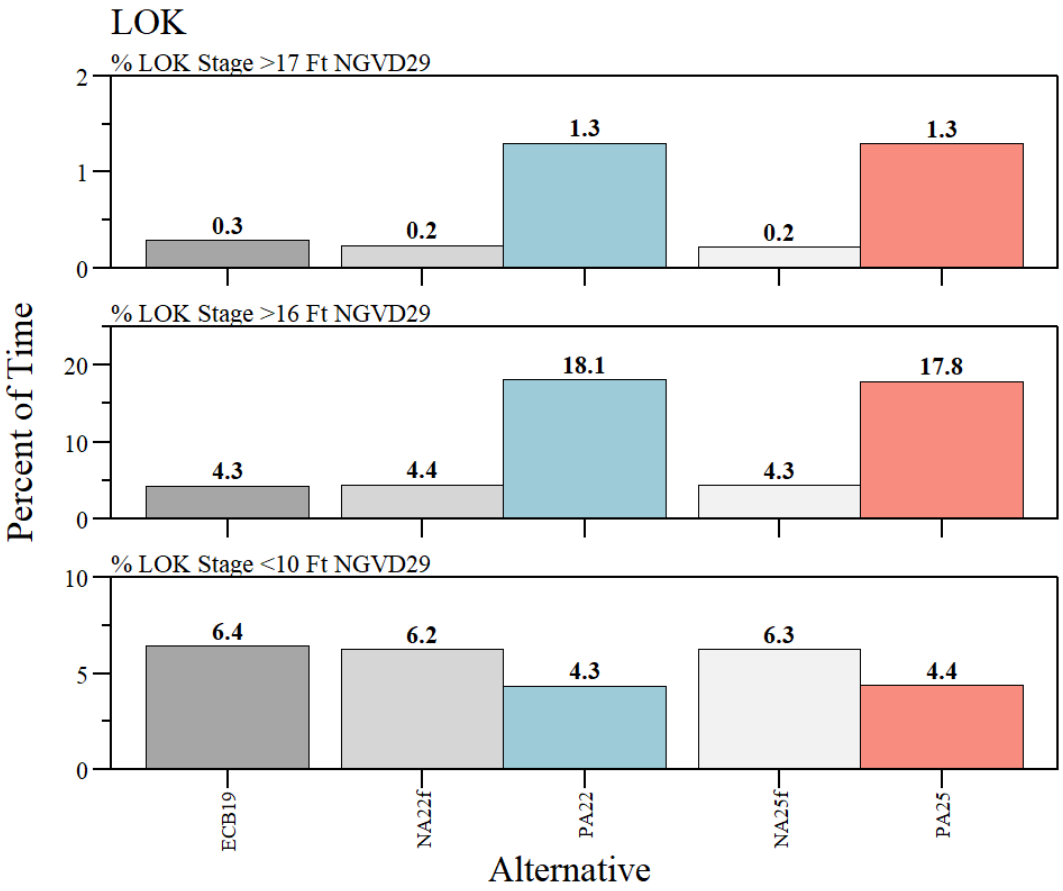
SLE Extreme Event & Duration

Extreme event - Recommendation

- While reduced LOK derived stressful and damaging flow events is good minimizing LOK derived extreme events for CRE is recommended.
- Extreme events (regardless of source) can adversely impact estuary and near shore environment.
    - nutrient transport, high color, prolonged freshwater conditions in estuary, etc.
- Large discharges can alter circulation patterns in lower estuary such that Gulf water is drawn into estuary through barrier islands' main inlets which can draw in and concentration *K. brevis* (if present) from Gulf rather than flush it out (Dye et al 2020 & Olabarrieta et al *In Prep*).

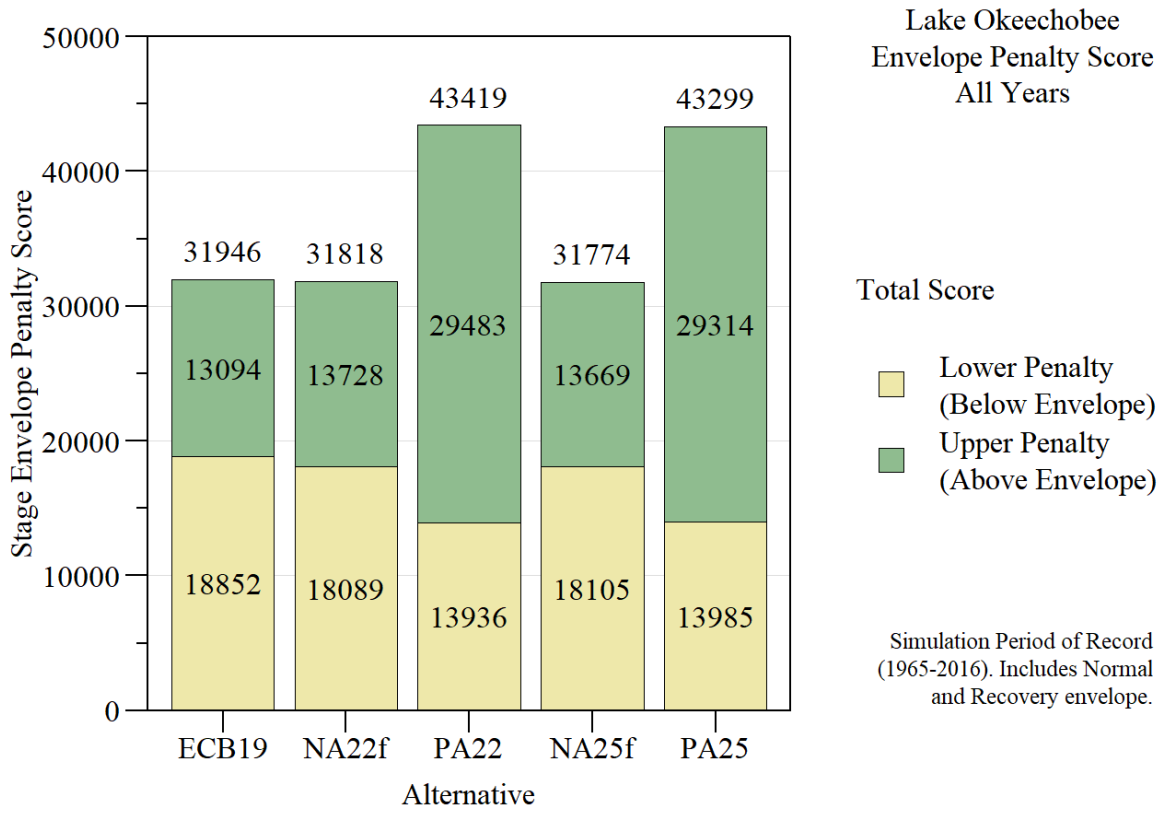
Dye, B., Jose, F., Allahdadi, M.N., 2020. Circulation Dynamics and Seasonal Variability for the Charlotte Harbor Estuary, Southwest Florida Coast. Journal of Coastal Research 36, 276–288. link

Lake Okeechobee



Percent of time LOK stage above 17 Ft, 16 Ft and below 10 Ft NGVD29 during the period of simulation.

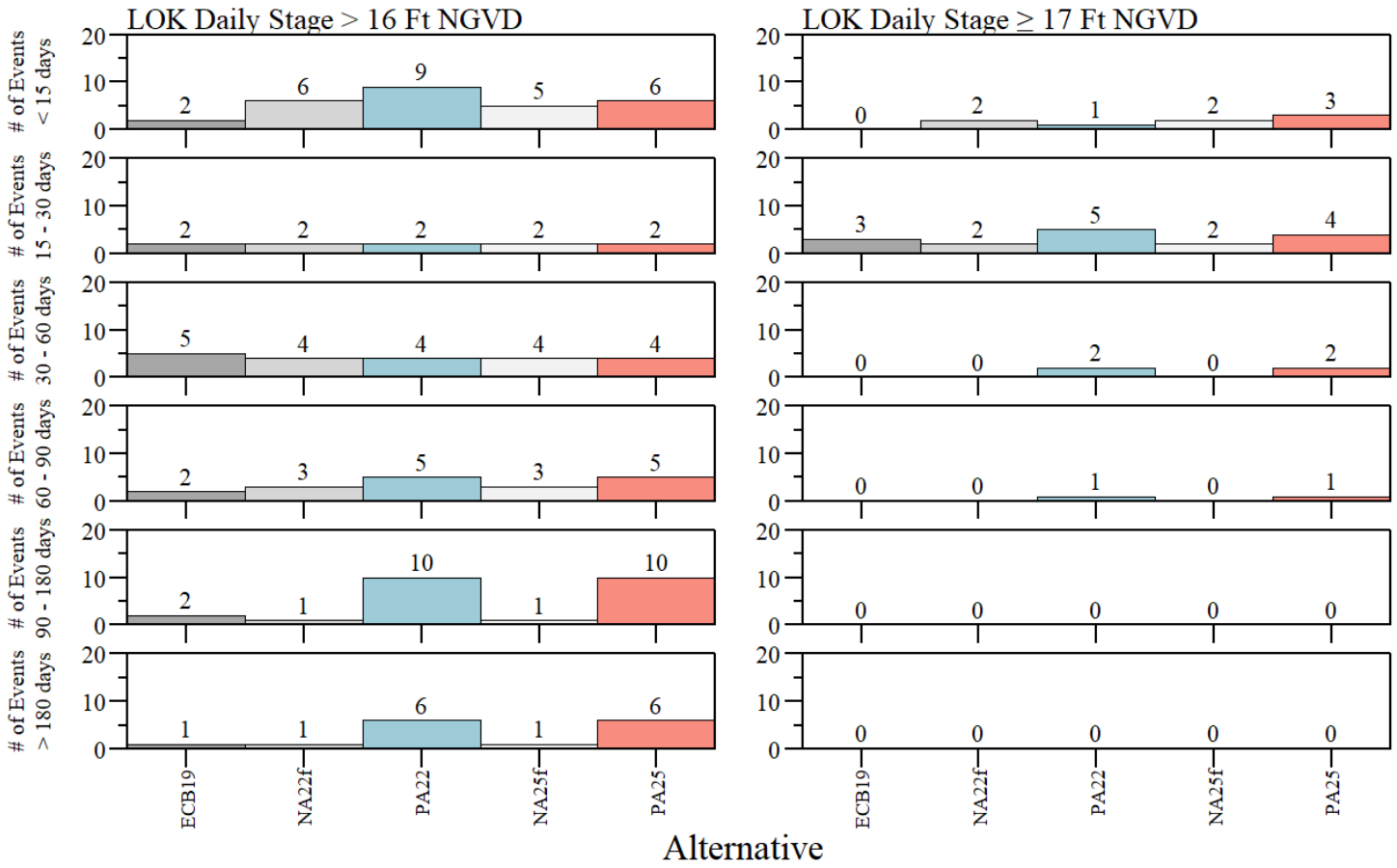
Lake Okeechobee - Stage Envelope



LOK ecological stage envelope total scores (all years).

+36% Diff to FWO Total Penalty; +115% Diff to FWO Upper Penalty; -22% Diff to FWO Lower Penalty

Lake Okeechobee - High Stage Events



Extreme high (left) and moderate high (right) stage events and duration for Lake Okeechobee.

Application of Hydrologic Restoration Goals for a Large Subtropical Lake *(In Prep.)*

Based on methodology of Havens (2002).

Lake stage is a major driver in Lake ecology (see Conceptual Ecological Model).

- Extreme high lake stage (>5.2 m/17 Ft NGVD29)
- Moderate high lake stage (>4.9 m/16 Ft NGVD29) > 90 days
- Moderate low lake stage (<3.3 m/11 Ft NGVD29) > 90 days
- Extreme low lake stage (<3.0 m/10 Ft NGVD29)
- Spring/SNKI nest period recession
  - March 1 - June 15
  - weekly recession rate between -0.05 and 0.05 Ft/wk (0.02 m/wk) for more than 1/4th of nesting period.
- Events per decade

Preliminary results:

Alternative	Score
ECB19	0.75
NA25f	0.78
PA25	0.53

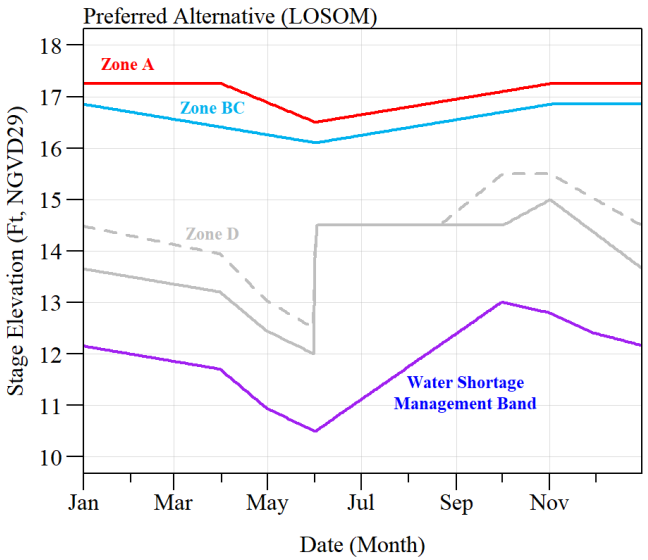
- PA25 has higher Extreme & Moderate high stage events (see Extreme Event Analysis slide) lowering the score.
- LOSOM is not a restoration plan but should take into account ecology of the system.
- Benefits to other parts of the system is balanced on the back of the Lake.

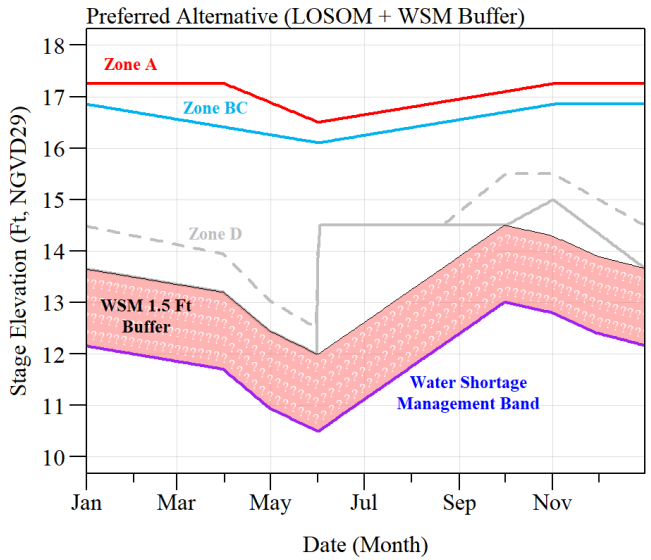
Havens (2002) Development and Application of Hydrologic Restoration Goals for a Large Subtropical Lake. Lake and Reservoir Management 18:285–292. doi: 10.1080/07438140209353934

Low lake stage management

- Last PDT meeting SFWMD stated

> the state *"is asking for explicit reliance on the District to guide operational decisions when Lake stages are at or below 1.5 feet above the Water Shortage Management Band."*



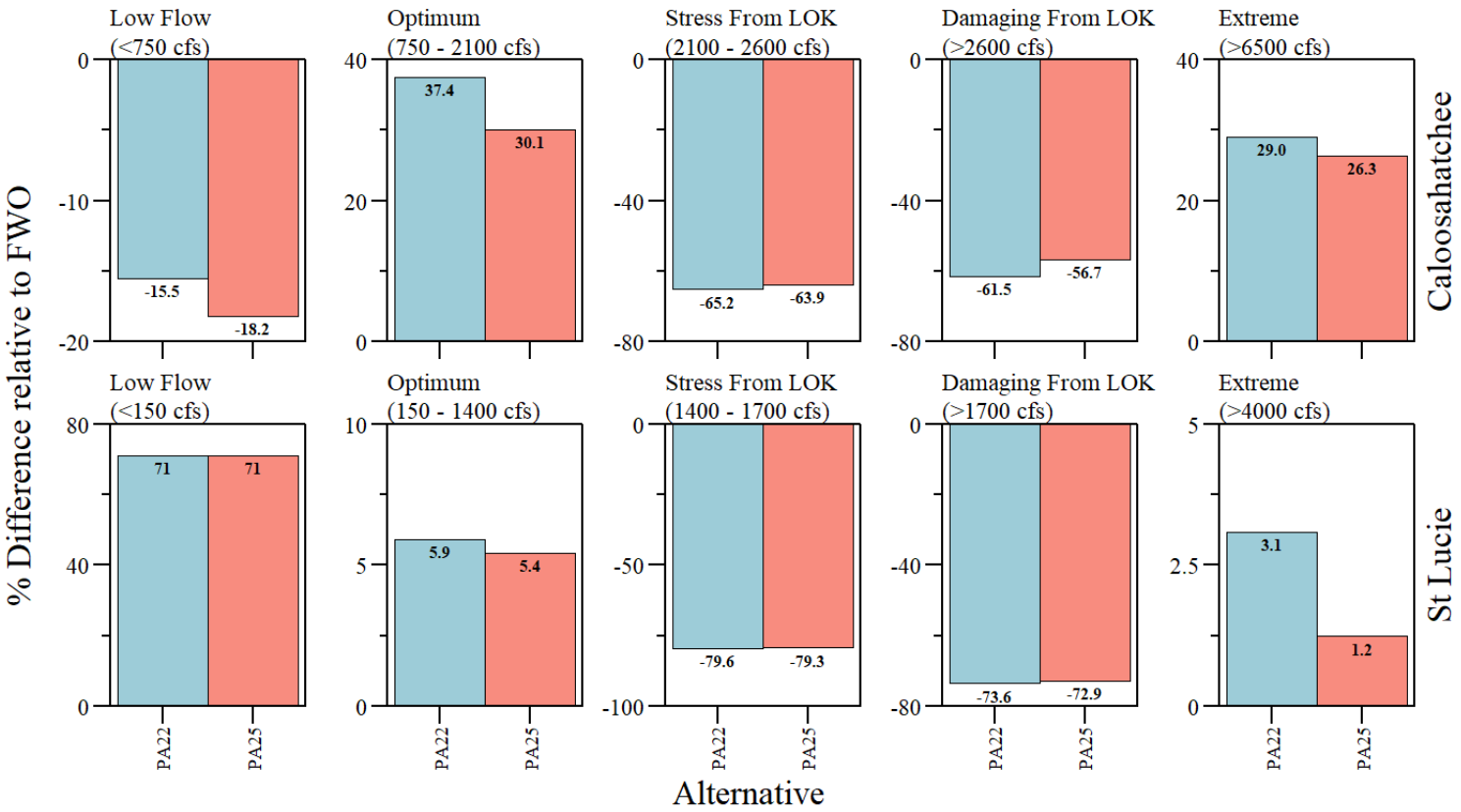


Low lake stage management

- The WSM buffer would effectively create a new management band in the schedule.
- This new concept is not included in the current modeling.
- Represents up to 520 - 591 kAc-Ft of water that could be moved around (or withheld from the estuaries and Everglades).
    - based on stage-volume relationship.
    - *Zone D3 to S79*[1] *(≤ 350 cfs)* a small fraction of total available volume in buffer (How it was modeled).
- In current modeling, Lake stage is within the proposed WSM buffer ~22% of time for both preferred alternatives (during period of simulation)
    - Conversely, Lake stage is within Zone D3 ~ 29% of the time for both preferred alternatives (during period of simulation).
- Joint letter on behalf of Friends of the Everglades, Calusa Waterkeeper, Sanibel Captiva Conservation Foundation, Florida Oceanographic and Conservancy of Southwest Florida sent to Col. Booth (link to letter).

[1] Release LOK water at S77 such that the LOK will not cause S79 flow to exceed this target; local runoff can still cause flow higher than this value at S79.

Salinity Envelope



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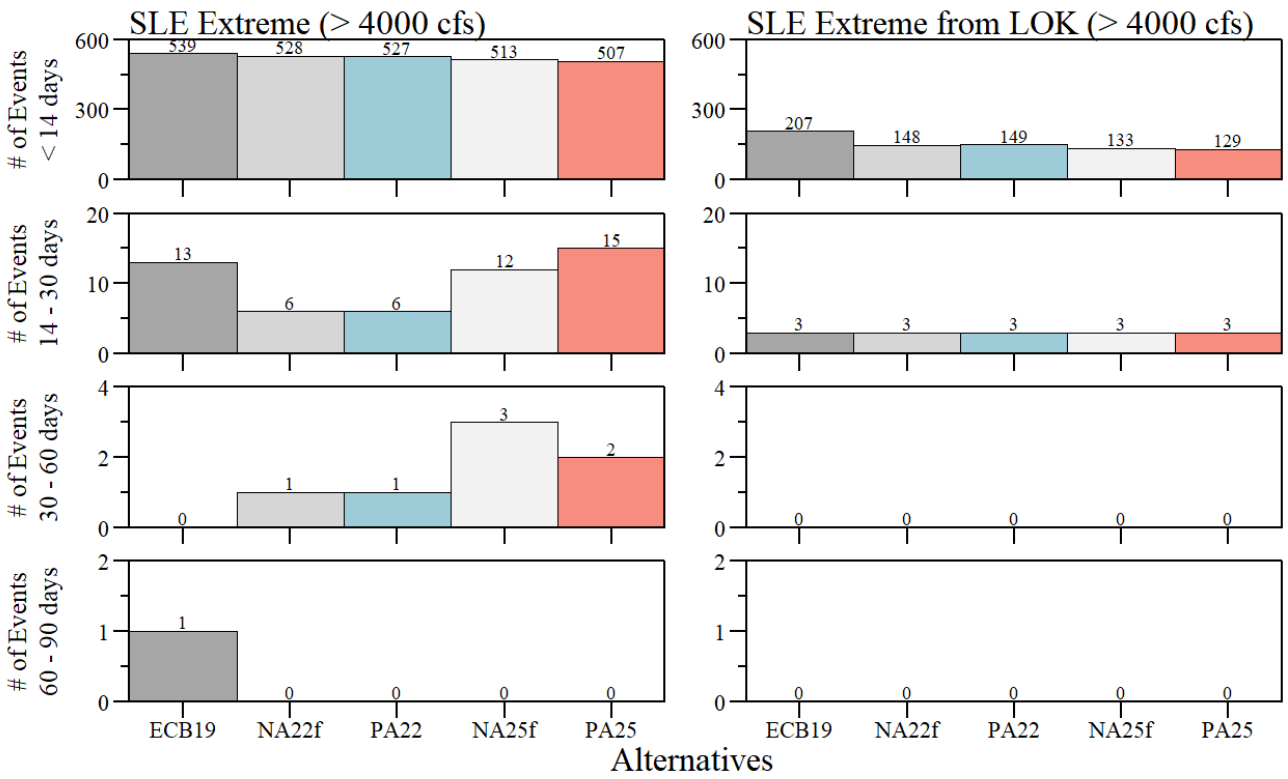
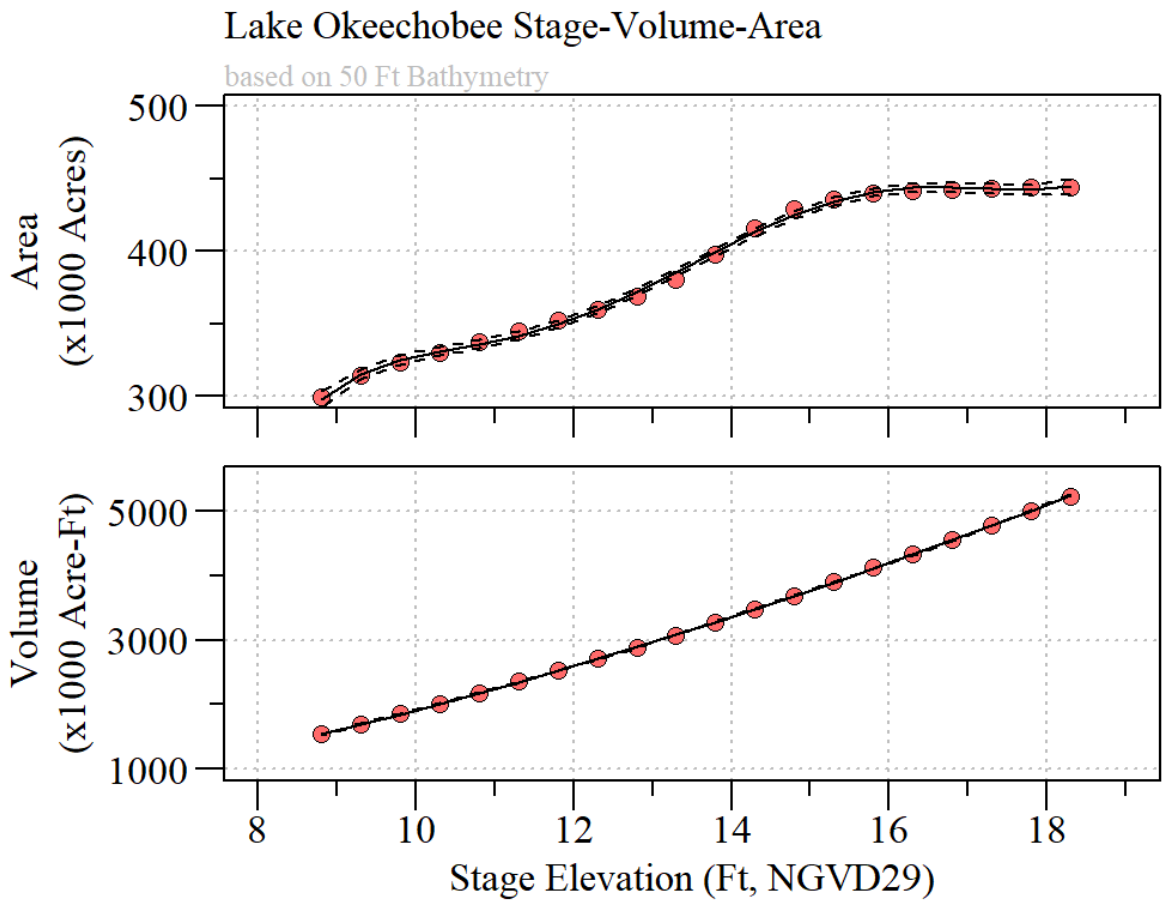


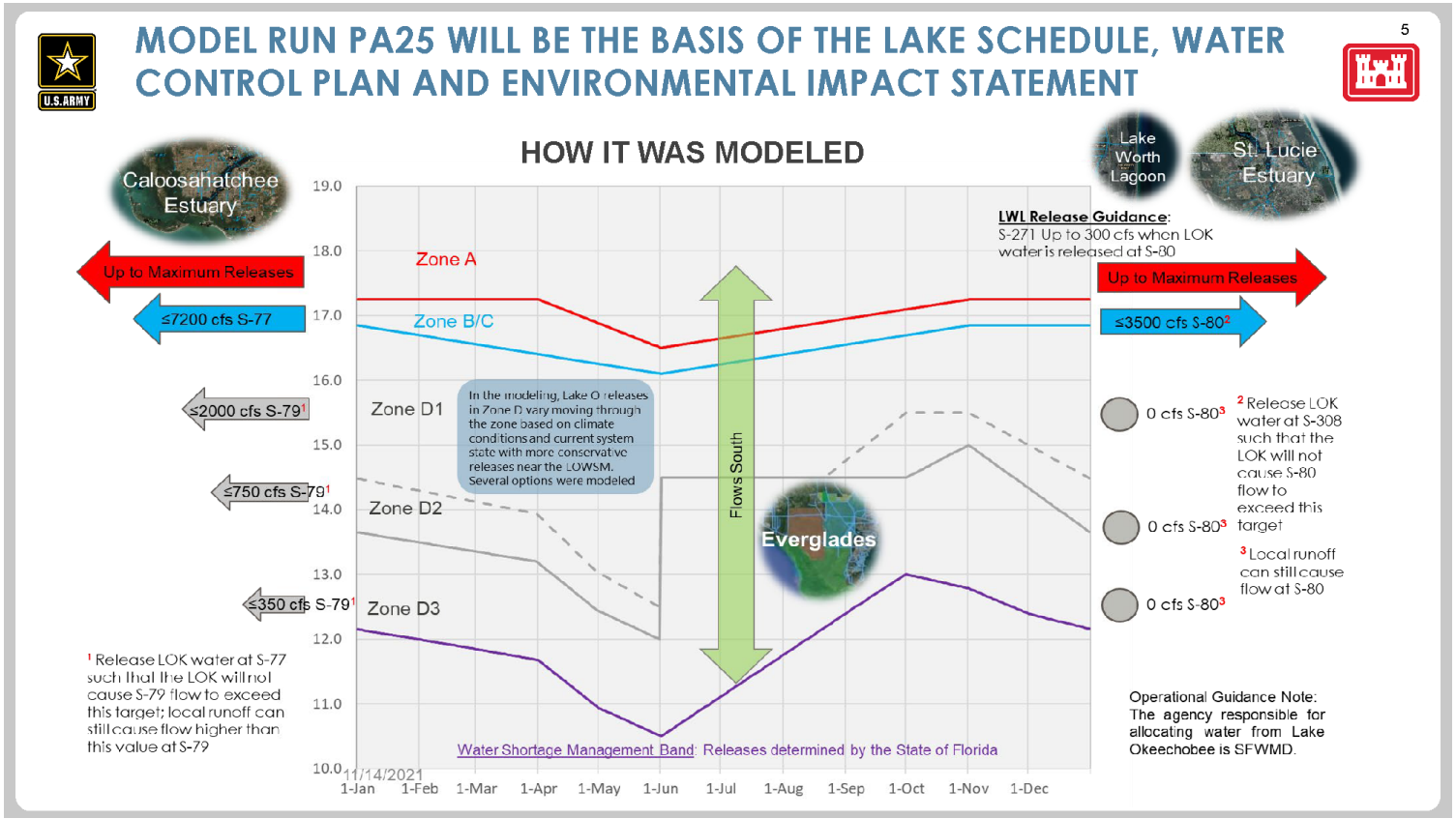
Total (left) and Lake derived (right) extreme discharge events and duration for the St Lucie Estuary.

LOK - Stage - Volume Relationship



Lake Okeechobee Stage-Volume-Area relationship based on 50 Ft Bathymetry.

How it (TSP) was modeled...



From USACE PDT 12 Jan 2022 meeting presentation