

# MODIFIED WATER DELIVERIES AND C-111 SOUTH DADE PROJECTS COMBINED OPERATIONAL PLAN (COP)

Water Quality Presentation to  
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# PURPOSE OF BRIEF TO THE TOC

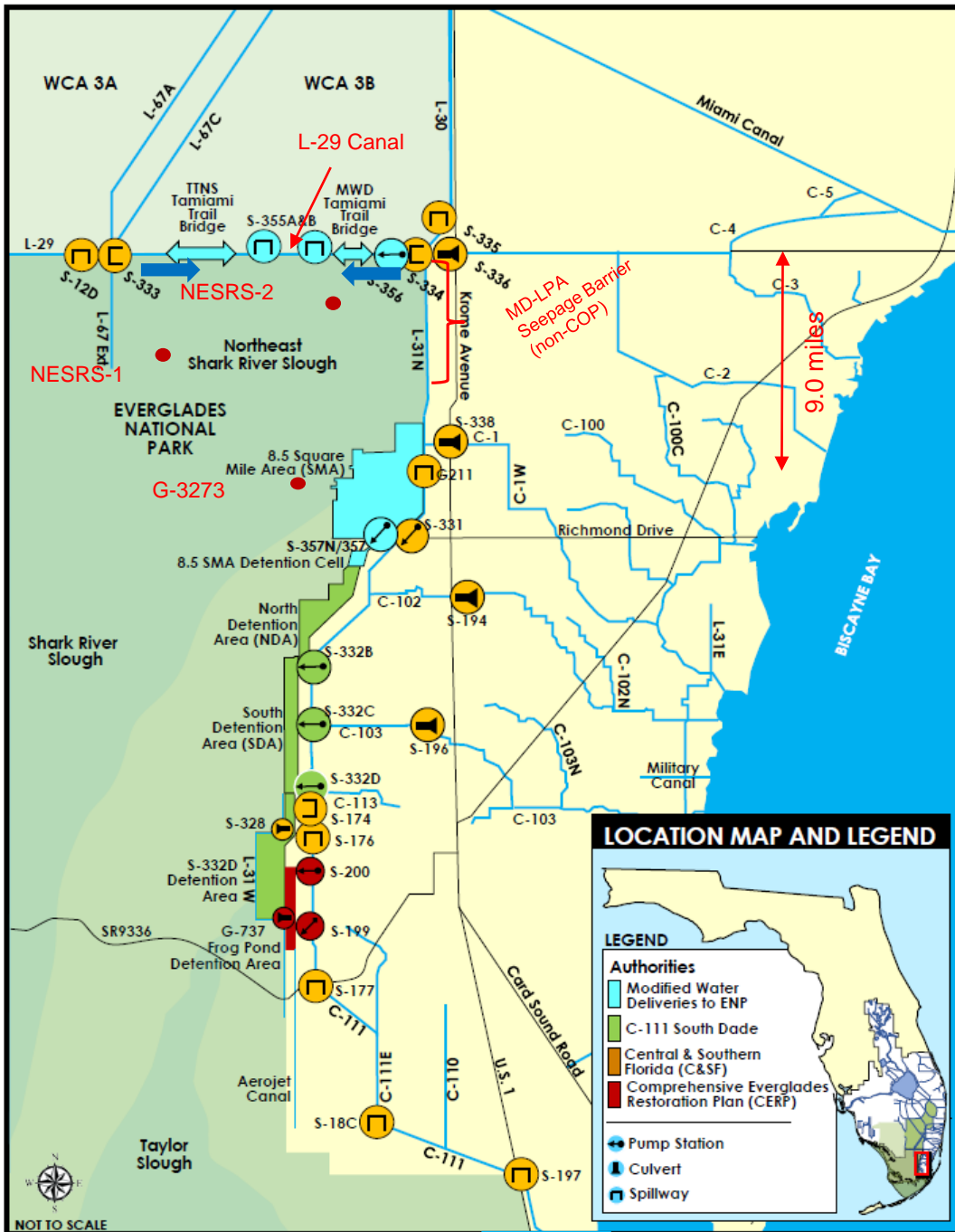


Update on the Combined Operational Plan (COP) that will potentially affect water quality (WQ) deliveries to the Shark River Slough. TOC was previously briefed in Oct 2018 on the WQ analysis methodology to be used for COP.

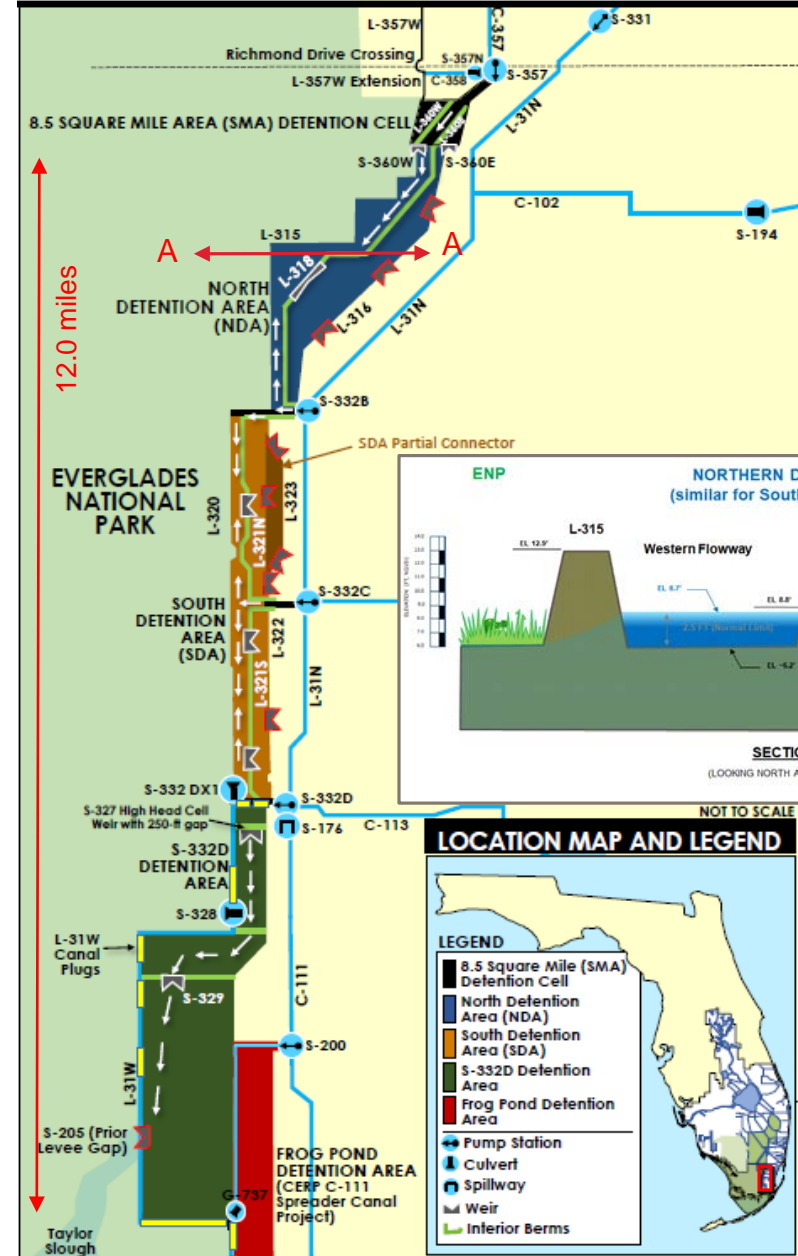
WQ analyses performed for the preferred COP alternative identified potential WQ concerns for North East Shark River Slough (NESRS) inflows.

Sensitivity runs/scenarios developed to investigate adaptive management measures to address potential WQ concerns for NESRS.

Adaptive management (AM) measures and strategy to address potential WQ concerns are only expected to be necessary until restoration strategies and the Central Everglades Planning Project (CEPP) features are completed and delivering additional water to NESRS. AM implementation is only necessary if conditions warrant.



## C-111 SOUTH DADE CONSTRUCTION: COMPLETED AS OF 09/01/2018





# COP OBJECTIVES AND PREFERRED PLAN - ALT Q+



- Improve water deliveries into Everglades National Park (ENP) and take steps to restore natural hydrologic conditions in ENP given current Central & Southern Florida infrastructure and features expected to be completed by the time of implementation, to the extent practicable by:
- Water deliveries schedule altered to fluctuate in consonance with local meteorological conditions and allow for long term and annual variation in ecosystem conditions in the Everglades (TIMING): new COP Tamiami Trail Flow Formula
  - Adjusts the magnitude of water discharged to ENP to minimize effects of too much or too little water (VOLUME): ENP avg. annual inflow increased by ~162 kAF(+28%)
  - Restore NESRS as a functional component of the Everglades hydrologic system (LOCATION): Distribution at Tamiami Trail to NESRS increased from 58% to 77%

Maximize progress towards restoring historic hydrologic conditions in the Taylor Slough, Rocky Glades, & eastern Panhandle of ENP.

- increase annual flow to Taylor Slough (6 kAF; +7%) & Panhandle (30 kAF; +27%)

Protect the intrinsic ecological values associated with Water Conservation Area 3A (WCA-3A) and ENP



# COP OBJECTIVES AND PREFERRED PLAN ALT Q+

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Minimize the damaging freshwater flows to Manatee Bay/Barnes Sound through the S-197 structure and increase flows through Taylor Slough and coastal creeks

– Reduces use of S-197 (avg. annual reduced by 42 kAF (-69%))

Include consideration of cultural values and tribal interests & concerns within WCA-3A and ENP



# DESCRIPTION OF PREFERRED PLAN ALT Q+



Full utilization of completed MWD, C-111 South Dade and available Comprehensive Everglades Restoration Plan (CERP) projects

Revised Tamiami Trail Flow Formula (TTFF) for WCA-3A to ENP flows based on ecological restoration stage targets

L-29 Canal maximum stage limit of 8.5 feet NGVD (MWD), per Florida Department of Transportation criteria (90d/yr)

Elimination of regulatory releases from WCA-3A to South Dade, except during Extreme High Water Levels in WCA-3A (varies 11.0-12.0 ft NGVD)

Deliveries from L-30/WCA-3B to Taylor Slough and Rocky Glades

South Dade Canal levels maintained consistent with incremental field test (0.2-0.3 lower vs. 2002-2015 levels) with full usage of completed C-111 detention areas



# PREFERRED PLAN ALTERNATIVE Q+



## Description of Preferred Plan, Alternative Q+

- Reduced discharges at S-197 with removal of S-177 criteria and low-volume releases
- 8.5 SMA & C-111 South Dade operated to maintain authorized flood risk management
- Alternative Q was modeled with Regional System Model - Glades Lexa (RSM-GL),  
Alternative Q+ includes criteria assessed in sensitivity runs
- COP Water Control Plan includes flexibility & Adaptive Management for TTFF and WQ



# OVERVIEW OF WATER QUALITY ANALYSIS FOR COP



Water quality improvement is not an authorized purpose for C&SF as modified by MWD/C111. WQ not considered in the formulation of the selected alternative.

Alternative Q+, the preferred alternative, was not analyzed for WQ but the operational differences between Alternative Q and Alternative Q+ is not expected to indicate any change in WQ performance. Therefore the analyses performed for Alternative Q and the sensitivity runs are considered applicable to Alternative Q+.

WQ modeling of Alternative Q showed a potential increase in the flow weighted mean (phosphorus) (FWM) delivered to NESRS as compared to the existing baseline condition (ECB19RR under 2018 conditions).

COP water quality group analyzed Alternative Q for WQ impacts and developed AM strategies to address the potential concerns.

Modeling (sensitivity runs/scenarios) of the AM strategies developed by the COP water quality group indicated that the potential increased risk to WQ delivered to NESRS could be mitigated/decreased (average FWM equal to ECB or improved) by 2023.





# KEY POINTS IN INITIAL WQ MODELING EVALUATIONS



The stages within WCA-3A and the location of discharge are primary Total Phosphorus drivers for water delivered into the NESRS of ENP that are altered by COP.

Sensitivity Runs/scenarios were developed to:

- Temporarily shift flows (based on water quality sampling and stage conditions) delivered to NESRS from structures with lower phosphorus concentrations
- Reduce duration of dry-out conditions in the upstream WCA-3A by slowing releases from WCA-3A towards end of wet season.
- No reductions in volumes delivered to ENP, just a shift in release points and timing of deliveries



# DESCRIPTION OF ROUND 3 WQ ANALYSIS – ALT Q AND 2 SENSITIVITY RUNS/SCENARIOS



Three primary alternatives (Alternative Q, 2 WQ Sensitivity Runs (SR)/scenarios based on Alternative Q) were compared with the existing condition baseline (ECB19RR):

- ALT-Q
- SRQ2 - Minimum Flow = 150 cfs; defer flow releases to S-12D & S-333 primarily in late dry season & early wet season in dry years, when Phosphorus spikes at the Shark River Slough (SRS) inflow structures are typically observed.
- SRQ3 - Minimum Flow = 150 cfs; reduce dry-season recession rates in WCA-3A to reduce frequency of low-stage conditions associated with Phosphorus Spikes in dry years.

Each sensitivity runs/scenario shifts ~25% of the Alternative Q flow from S-12D (representative of canal flow) to S-12C (representative of marsh sheet flow). There was no net impact on the average total inflows to NESRS or SRS as a whole.

\*Two other preliminary sensitivity runs/scenario assumed a minimum flow of 50 cfs showed greater water quality benefits to the Long Term Flow Weighted Mean and excess loads delivered above 8 ppb to the NESRS but adverse impact on NESRS2 stage relative to both Alternative Q and ECB19R2.



# IMPROVING TREND IN WQ DELIVERED TO WCA-3A



There is an improving trend for water quality delivered to WCA-3A, the source of water delivered to ENP and water delivered to ENP. Slides to follow will show that trend.

This trend is independent of restoration strategies (RS) and implementation of the CEPP South features.

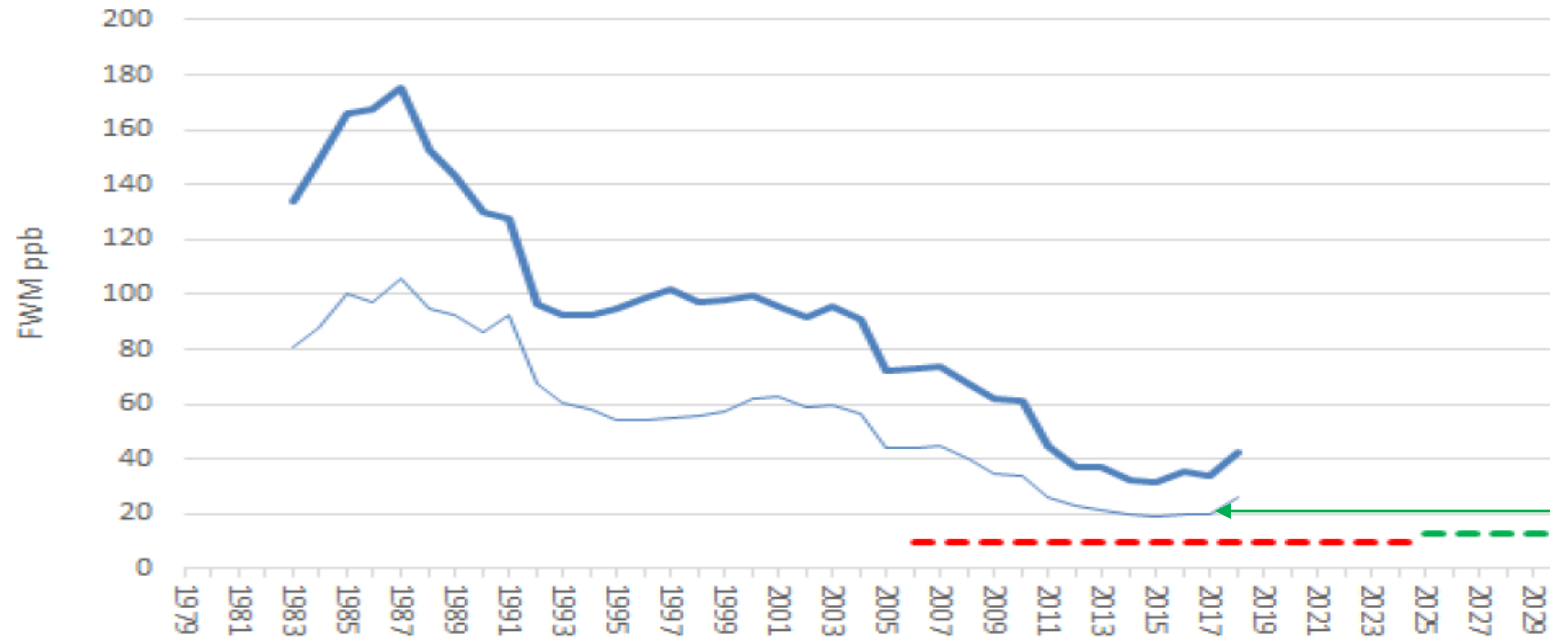
Upon the successful completion/implementation of RS/CEPP South features and after additional flows are being delivered to WCA-3A, it is expected the trend in WQ improvement will improve over the current trend.

Due to this positive direction in WQ, independent of RS/CEPP south features, 2018 and 2023 years were modeled, to show impact of this improving trend.



# LONG-TERM TRENDS IN WCA-3A INFLOW TP CONCENTRATIONS

### 5-Year Flow-Weighted Means



Uptick Due to Hurricane in 2017

— All Inflows    — EAA & Western Basins    - - - Settlement Agreement / CERP    - - - WQBEL

Measured Values vs. Water Year:  
 EAA & Western Basins = S8 + S150 + C139/STA56\_S + S190 + S140 - G409  
 All Inflows = EAA & Western Basins + S9 + S9A + S11

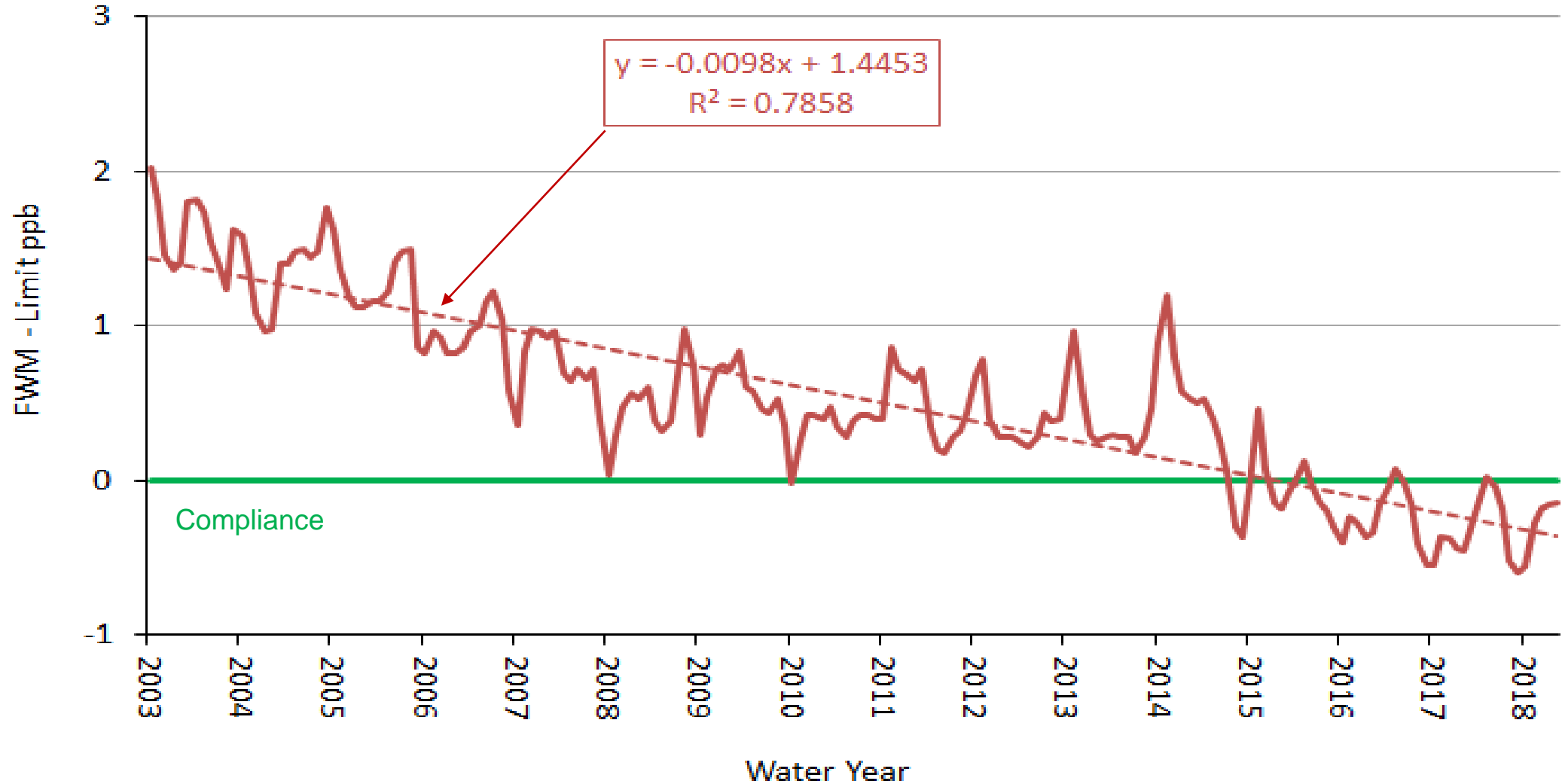
Settlement Agreement / CERP (>WY 2006) ~10 ppb  
 Restoration Strategies / WQBEL (>WY 2025) = 13 ppb



# LONG-TERM TRENDS IN WCA-3A INFLOW TP CONCENTRATIONS

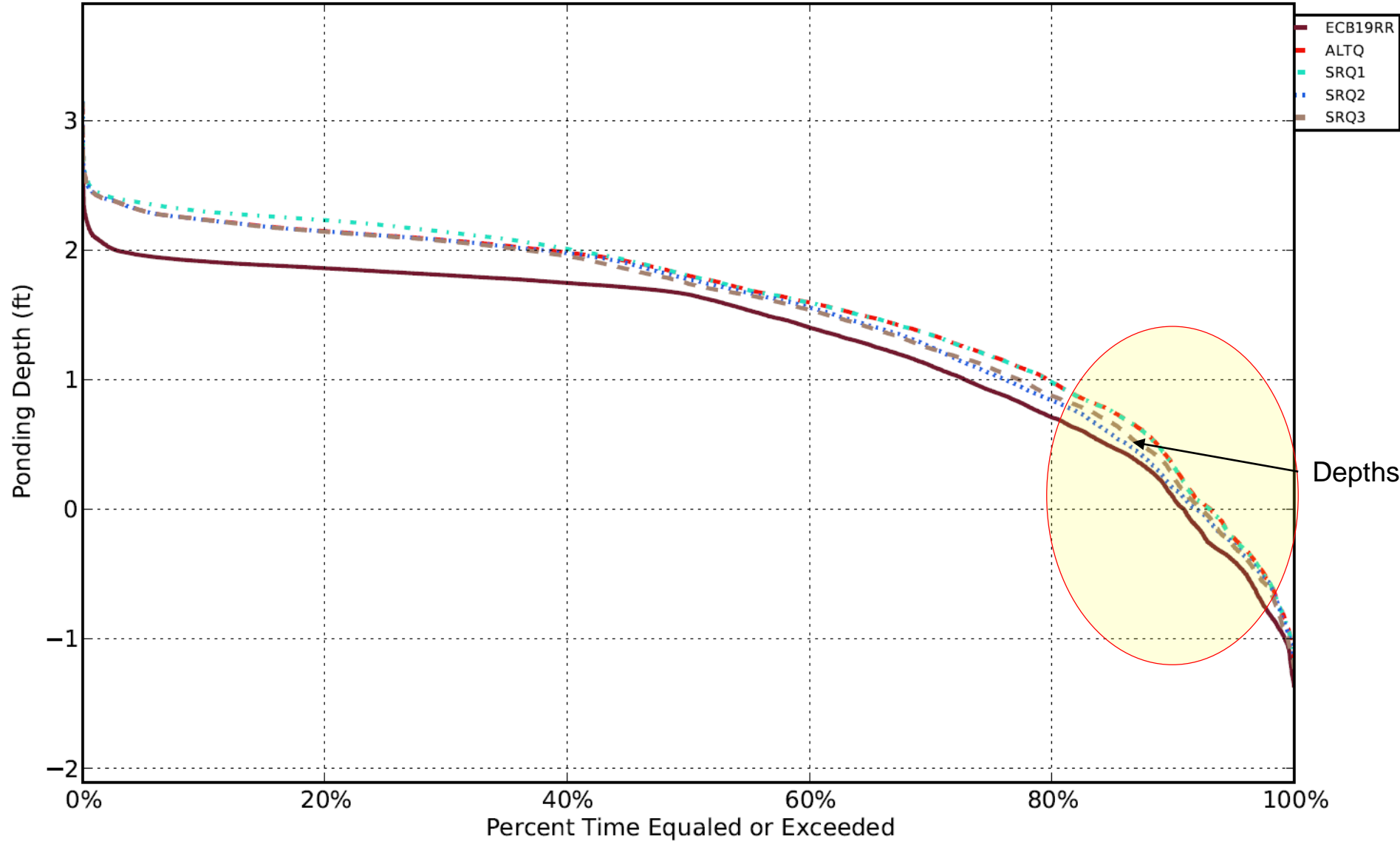


5-Year Rolling Average ENP Inflow FWM - LongTerm Limit





### Normalized Duration Curves for ENP\_NESRS2 Elev: 5.75 ft, NGVD29; Cell ID: 2373



Depths Between Baseline and ALTQ

Minimum Flow = 150 cfs



# SUMMARY OF ROUND 3 WQ ANALYSIS

Summary of COP Round 3 Water Quality Analysis - Relative Scales

Scenario	LTFWM ppb	Average FWM- Limit ppb	Excess P Load kg	SRS Impacted Area kac			WCA3A Avg % Dry	NESRS2 Depth Frequency	
				> 4 ppb	> 6 ppb	> 8 ppb		< 0.0 ft	< 0.5 ft
Existing Condition Baseline (ECB19R2)									
ECB19R2	8.2	-0.1	1614	24.5	11.3	3.2	51%	9.3%	11.6%
Uncertainty	> 0.2	> 0.2	> 36	> 6	> 3	> 0.8	?	?	?
Increases vs. Existing Condition Baseline (ECB19R2)									
<u>2018 Forecasts</u>									
ALTQ	0.8	1.2	856	12.7	7.0	3.5	7%	-2.3%	-2.0%
SRQ2_50	0.3	0.5	108	7.9	3.8	1.3	4%	0.5%	1.1%
SRQ3_50	0.0	0.0	-182	5.6	2.2	0.2	2%	1.5%	2.5%
SRQ2	0.4	0.7	278	8.9	4.5	1.9	5%	-1.1%	-0.5%
SRQ3	0.5	0.8	463	9.1	4.9	2.5	4%	-1.5%	-1.4%
<u>2023 Forecasts</u>									
ALTQ_2023	0.2	0.5	90	10.1	4.4	0.9	7%	-2.3%	-2.0%
SRQ2_50_2023	-0.3	-0.2	-519	5.6	1.4	-1.1	4%	0.5%	1.1%
SRQ3_50_2023	-0.5	-0.6	-753	3.4	0.0	-2.0	2%	1.5%	2.5%
SRQ2_2023	-0.2	0.0	-368	6.5	2.1	-0.5	5%	-1.1%	-0.5%
SRQ3_2023	-0.1	0.2	-188	6.7	2.6	0.1	4%	-1.5%	-1.4%

Red = Adverse Impact vs. Baseline

Blue = Beneficial Impact vs. Baseline



# SUMMARY OF ROUND 3 RESULTS



Key Points/Recommendations for preferred plan, Alternative Q+

- WQ performance differences among sensitivity runs/scenarios are small relative to modeling uncertainties and random year-to-year variability, as captured by the 10-90th percentile lines in the FWM & excess load charts.
- Differences between Alternative Q and sensitivity runs/scenarios are likely to decrease over time due to existing long-term WQ improvement trends and the additional WQ improvement expected once Restoration Strategies and CEPP features are completed.
- Implementation of AM strategies will help reduce WQ performance concerns
  - Select Alternative Q + as base operating scenario
  - Design & implement strategies to minimize WQ potential concerns and optimize hydrologic benefits using SRQ2 and SRQ3 concepts
  - Exact method of including the WQ adaptive management strategies into the water control plan is being finalized





# IMPLEMENTATION OF WATER QUALITY ADAPTIVE MANAGEMENT MEASURES



The Corps is considering interagency WQ meetings with Tribes, DEP, SFWMD, FDACS, DOI, and other agencies with expertise, when conditions may warrant implementation of WQ adaptive management measures. Such meetings are expected to be primarily during the transition from dry season to wet season conditions and/or when WQ conditions are problematic. The Corps will consider WQ input in making operational decisions.