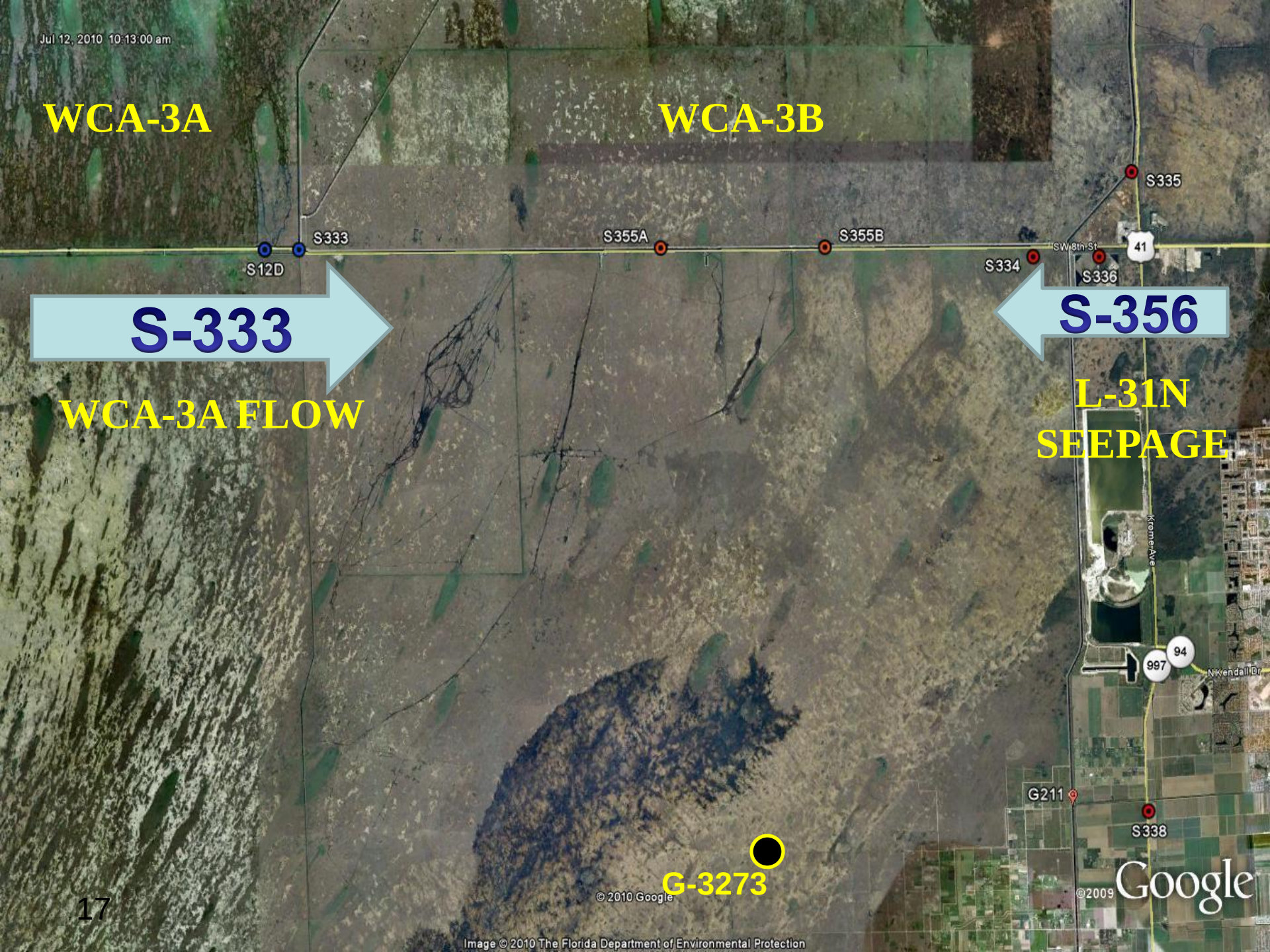
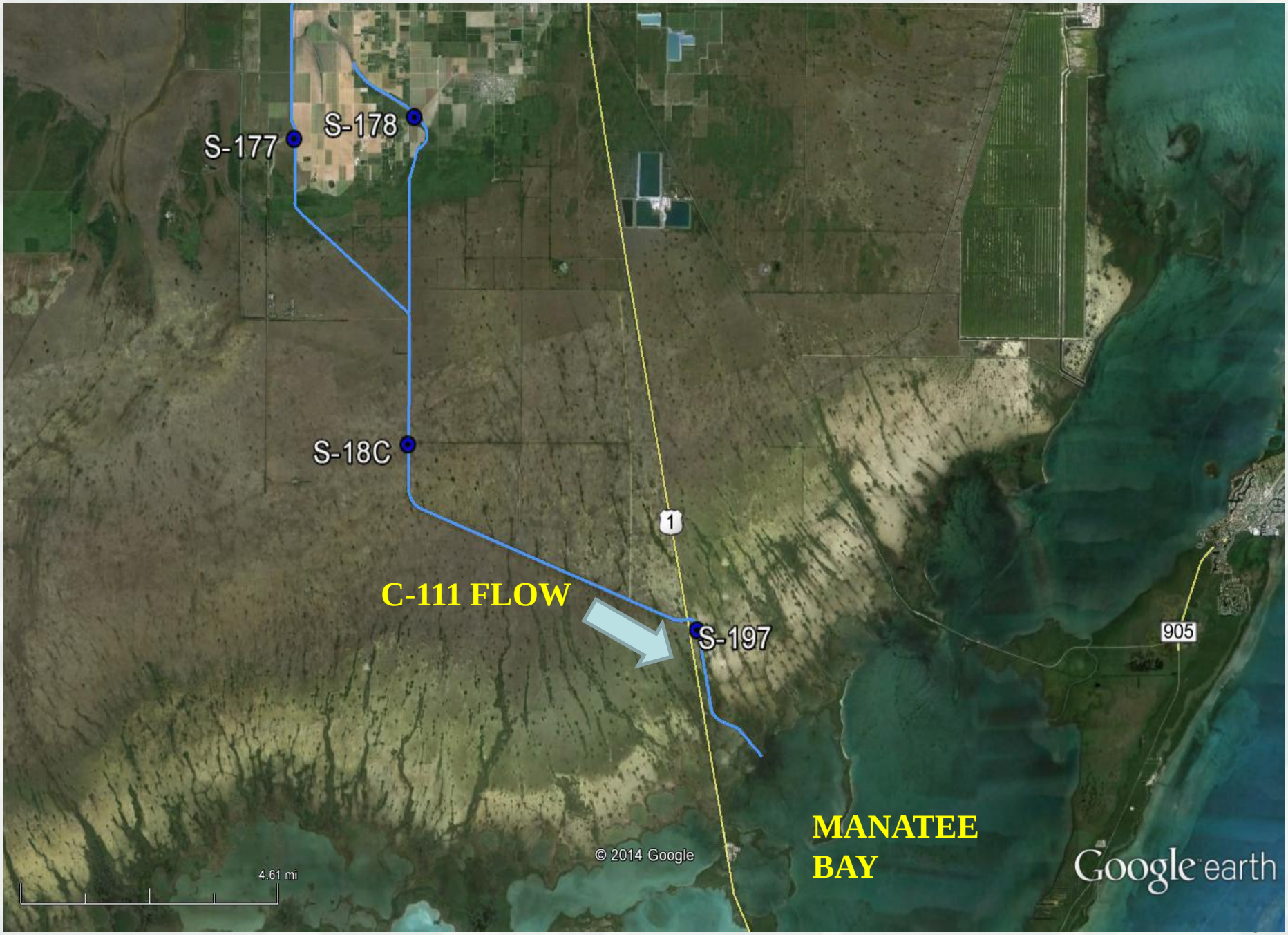
H&H/Operations Sub Team Update

Operational Strategy Hybrid


Jul 12, 2010 10:13:00 am
WCA-3A
WCA-3B
S335
S333
S355A
S355B
S12D
S334
SW 8th St
41
S336
S-333
S-356
WCA-3A FLOW
L-31N
SEEPAGE
Krome Ave
94
997
N Kendall Dr
G211
S338
G-3273
© 2010 Google
©2009 Google
Image © 2010 The Florida Department of Environmental Protection


S-177
S-178
S-18C
1
C-111 FLOW
S-197
905
MANATEE
BAY
© 2014 Google
4.61 mi
Google earth

Overview

- Management of WCA-3A
- L-31N Canal Seepage Management
- New Seepage Management
- Water Management Operating Criteria

Management of WCA-3A

Includes existing:

- Rainfall Plan
- L-29 Canal constraint of 7.5 ft., NGVD
- Column 2 during S-12s CSSS Closure Period
- Water supply

New:

- S-333 flows no longer have a constraint at G-3273
- WCA-3A water level Action Line sets priority of S-333, S-356 flows to NESRS
- S-332B,C,D available capacity determines maximum S-334 release during Column 2 (S-332s < 1125 cfs, S-334: 250 cfs) (S-332s < 1000 cfs, S-334: 400 cfs)
- Column 2 S-334 use outside Closure Period limited to 15 July through 14 August when Rainfall Plan water has not been successfully removed from WCA-3A through 14 July

L-31N Canal Seepage Management

Includes Existing:

L-29 Canal constraint of 7.5 ft., NGVD

L-31N Canal range of 5.5 to 5.8 ft., NGVD

New:

S-356 flows to NESRS with no G-3273 constraint

S-356 flows of 250 cfs guaranteed until WCA-3A water level rises to Action Line

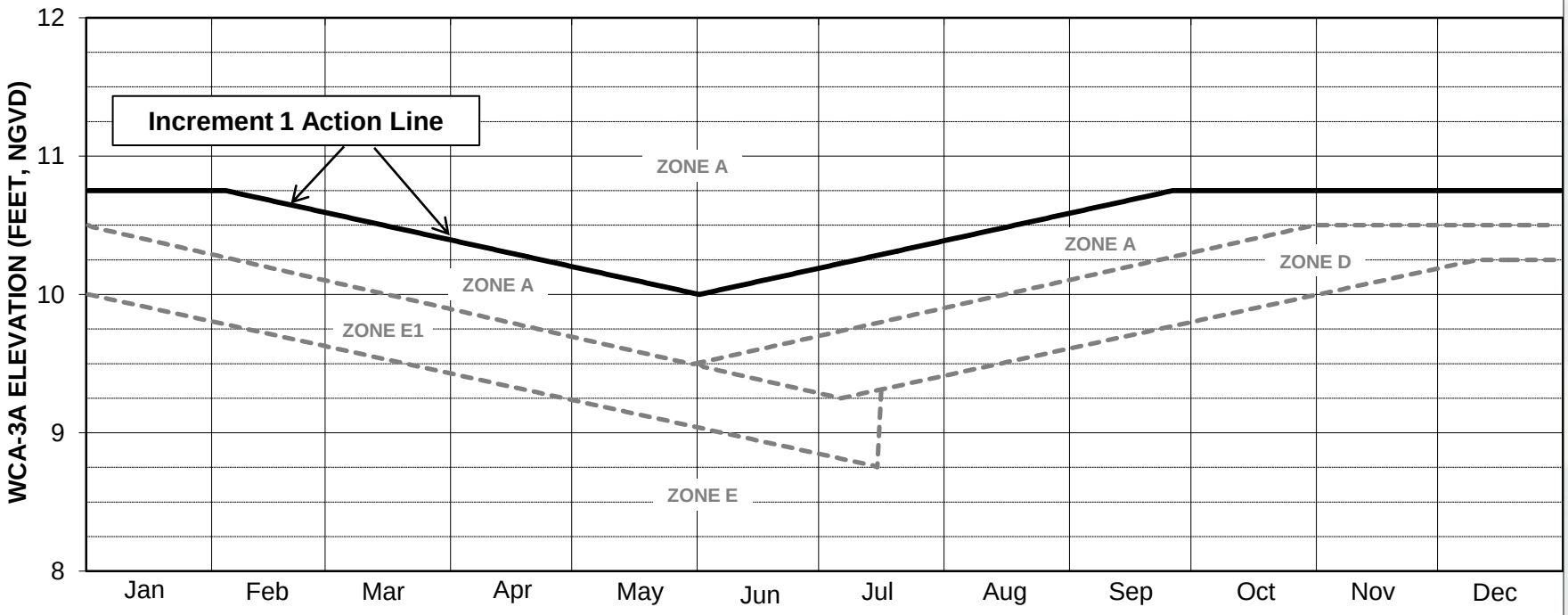
New Seepage Management

- C-111 Column 2 operational criteria when G-3273 above 6.8 ft., NGVD and WCA-3A is above Action Line

- *Added S-178 TW as S-197 opening trigger when WCA-3A above Action Line (*C-111 Column 2 operational criteria) *and S-18C gates are full open. Established incremental increase in S-197 discharges to 500 cfs (Level 1 flows may occur earlier but lower flows 500 vs 800 cfs ,S-197 opening triggers at S-177 and S-18C remain)*

- S-357N testing protocol to establish S-357N operating criteria, iterative approach consisting of 4 to 5 weeks of gate changes in wet season, gate changes intended to measurably stress the system

DRAFT



NOTES:

WCA-3A Elevation is the average of Sites 63, 64, and 65.

Increment 1 Action Line is not part of the 2012 WCA-3A Interim Regulation Schedule.

For ease of reference, Increment 1 Action Line is shown with the 2012 WCA-3A Interim Regulation Schedule Zones.

Increment 1 Action Line to be referenced as indicated in the G-3273 Constraint Relaxation/S-356 Field Test and S-357N Operational Strategy.

CENTRAL AND SOUTHERN FLORIDA PROJECT

G-3273 Constraint Relaxation/S-356 Field Test and S-357N Operational Strategy

Increment 1 Action Line

DATED: August 2014
US ARMY ENGINEER DISTRICT
JACKSONVILLE, FLORIDA

Year-round when stage at G-3273 is below 6.8 and WCA-3A stage is below the Increment 1 Action Line

- S-333 has priority; S-356 use is secondary to S-333 but S-356 can and should be used subject to L-29 constraint
  - ► S-333 will be used to release up to the full rate prescribed by Rainfall Plan into NESRS subject only to the L-29 constraint.
  - ► S-356 will be used to control the stage in L-31N between 5.5 and 5.8 ft., NGVD to the extent there is capacity in L-29 without reducing the ability to release the full allocation through S-333.
  - ► Excess flow from L-30 through S-335 may be diverted into NESRS using S-356 if desired by the agencies.

Year-round when stage at G-3273 is above 6.8 and the WCA-3A stage is below the Increment 1 Action Line

- S-333 will be used to release up to the full Rainfall Plan into NESRS subject to the L-29 constraint and an assured minimum available capacity of 250 cfs through S-356.
- S-356 will be used to control the stage in L-31N between 5.5 and 5.8 feet NGVD with an assured minimum available capacity of 250 cfs through S-356 (S-356 limited priority over S-333), subject only to the L-29 constraint.

When WCA-3A is above the Increment 1 Action Line from 1 November through 14 July (CSSS Closure Period)

- S-333 has priority
  - S-356 is not operated.
  - S-333 makes maximum releases to NESRS subject to L-29 constraint.
  - When L-29 constraint is reached or exceeded and;
    - S-12C and S-12D are full open, and
    - the discharge to tide from all of the WCAs are maximized to the extent that downstream condition allow, and
    - the SDCS has available capacity (combined pumping rate at S-332B,C,D is less than 1125/1000 cfs maintaining stage in the lower half of the range).

When WCA-3A is above the Increment 1 Action Line from 1 November through 14 July (CSSS Closure Period) - continued

- S-334 may be utilized up to a maximum flow rate of 250/400 cfs (1125/1000 cfs at S-332 B,C,D) to maintain the L-29 canal stage at or below 7.5 ft., NGVD.
  - C-111 structures (S-332B,C,D, S-176, S-177, S-18C, S-194, and S-196) will be operated according to the 2012 WCP Column 2 criteria and S-338 operated consistent with the 2012 WCP.
  - When the S-18C gate is fully open, *S-197 will be opened incrementally based upon S-178 TW:*

S-178 TW (feet, NGVD)	*2.5 to 2.6*	*2.61 to 2.7*	*2.71 to 2.9*	*Greater than 2.9*
S-197 Discharge (cfs)	*50 to 100*	*100 to 150*	*150 to 200*	*500*

  - When S-18C TW falls below 2.4 for 24 hours, S-197 will be reduce as necessary to bring S-18C HW above 2.4 feet in 24 hours.

When WCA-3A is above the Increment 1 Action Line from 15 July through 31 October

- S-333 has priority with no use of S-334.
  - S-333 makes maximum releases to NESRS subject only to L-29 constraint
  - S-356 is not operated and S-334 remains closed.
  - C-111 structures (S-332B,C,D, S-176, S-177, S-18C, S-194, and S-196) are operated according to the 2012 WCP Column 2 criteria and S-338 operated consistent with the 2012 WCP.
  - When the S-18C gate is fully open, *S-197 will be opened incrementally based upon S-178 TW:*

S-178 TW (feet, NGVD)	*2.5 to 2.6*	*2.61 to 2.7*	*2.71 to 2.9*	*Greater than 2.9*
S-197 Discharge (cfs)	*50 to 100*	*100 to 150*	*150 to 200*	*500*

  - When S-18C TW falls below 2.4 for 24 hours, S-197 will be reduce as necessary to bring S-18C HW above 2.4 feet in 24 hours.

Potential Hydrologic Effects from proposed changes to S-197 operational criteria

Increment 1 PDT meeting

09 December 2014

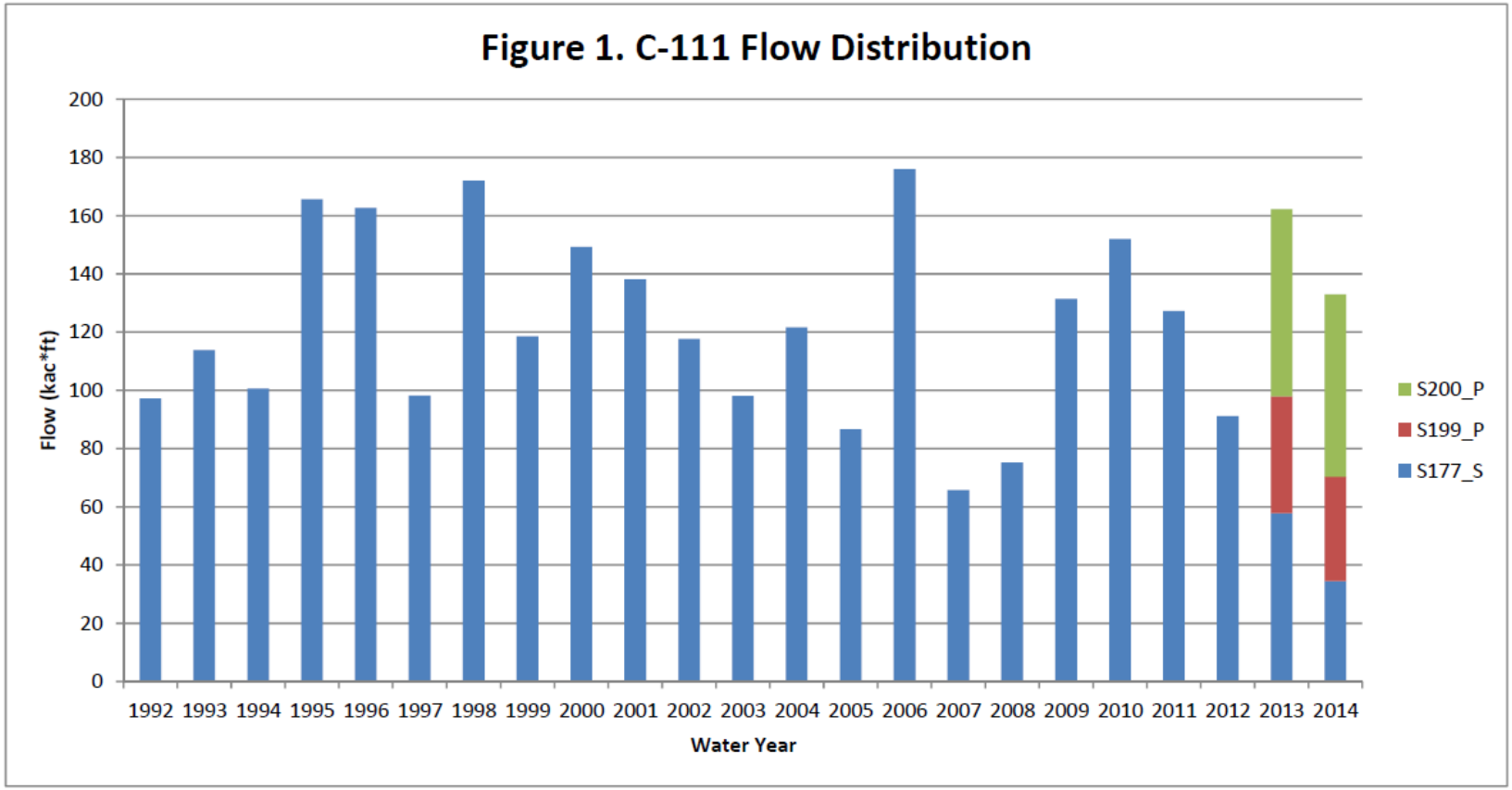
Data Analysis Assumptions

- Period of analysis limited to operations period of CERP C-111Spreader Canal Project (July 2012-June 2014) – no hydrologic modeling
- Used ERTP historical stages for WCA-3A 3-gauge average and S-18C gate openings from SFWMD DBHYDRO to estimate periods of new S-197 discharges
- Historical discharges from S-197 assumed unchanged for Alternative E
- Historical discharges from S-197 updated for Alternative G, per operational criteria
- Empirical relationships between S-18C HW/TW stages (gates fully open) and S-197 discharges during 2002-2014 were used to adjust historical S-18C HW stages/S-178 TW stages in response to new proposed S-197 discharges
  - In lieu of solely relying on historical S-18C/S-178 TW stages to estimate the duration and magnitude of new potential S-197 discharges (basis for October 2014 PDT analysis)

Data Analysis Assumptions

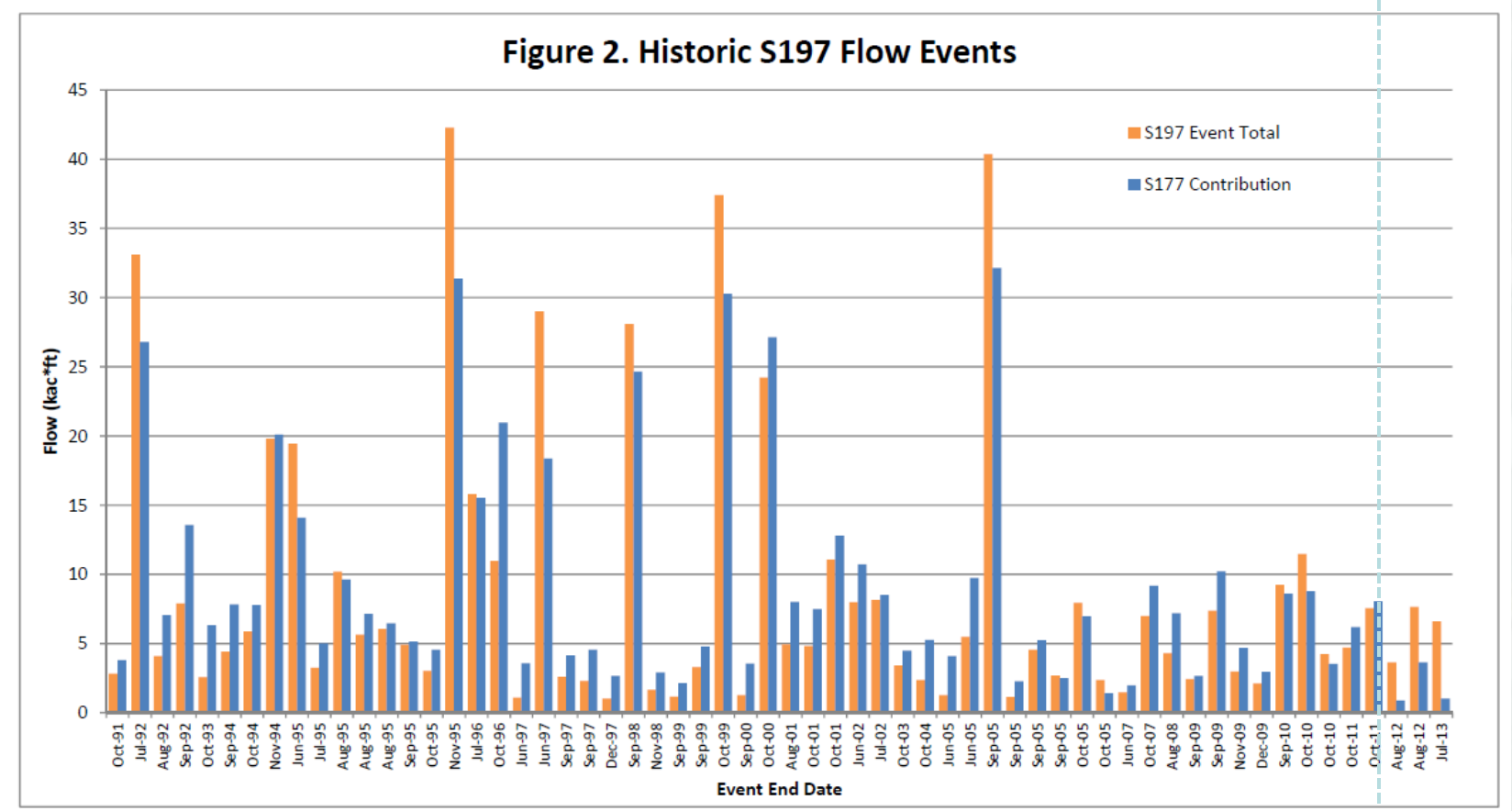
- Potential effects not accounted for:
  - Climatological/hydrologic conditions not observed during analysis period
  - WCA-3A changes from ERTP Regulation Schedule during July – Sept. 2012 (ERTP Oct. 2012)
  - WCA-3A stage changes which would result from Increment 1 operations, with increased flows to NESRS and revised criteria for regulatory releases to the SDCS via S-334 (ERTP Column 2)
  - Effects from S-18C gate opening when S-18C HW > 2.25 when WCA-3A stage is above the Action Level during S-12A closure period (included in all action alternatives)
  - Potential additional or prolonged S-197 gate openings if operated below prescribed flow rates
  - Water management operations to minimize open/close cycles at S-197

CERP C-111 Spreader Canal Operational Changes



Source: T. MacVicar (29OCT2014 Ops/H&H sub-team)

CERP C-111 Spreader Canal Operational Changes

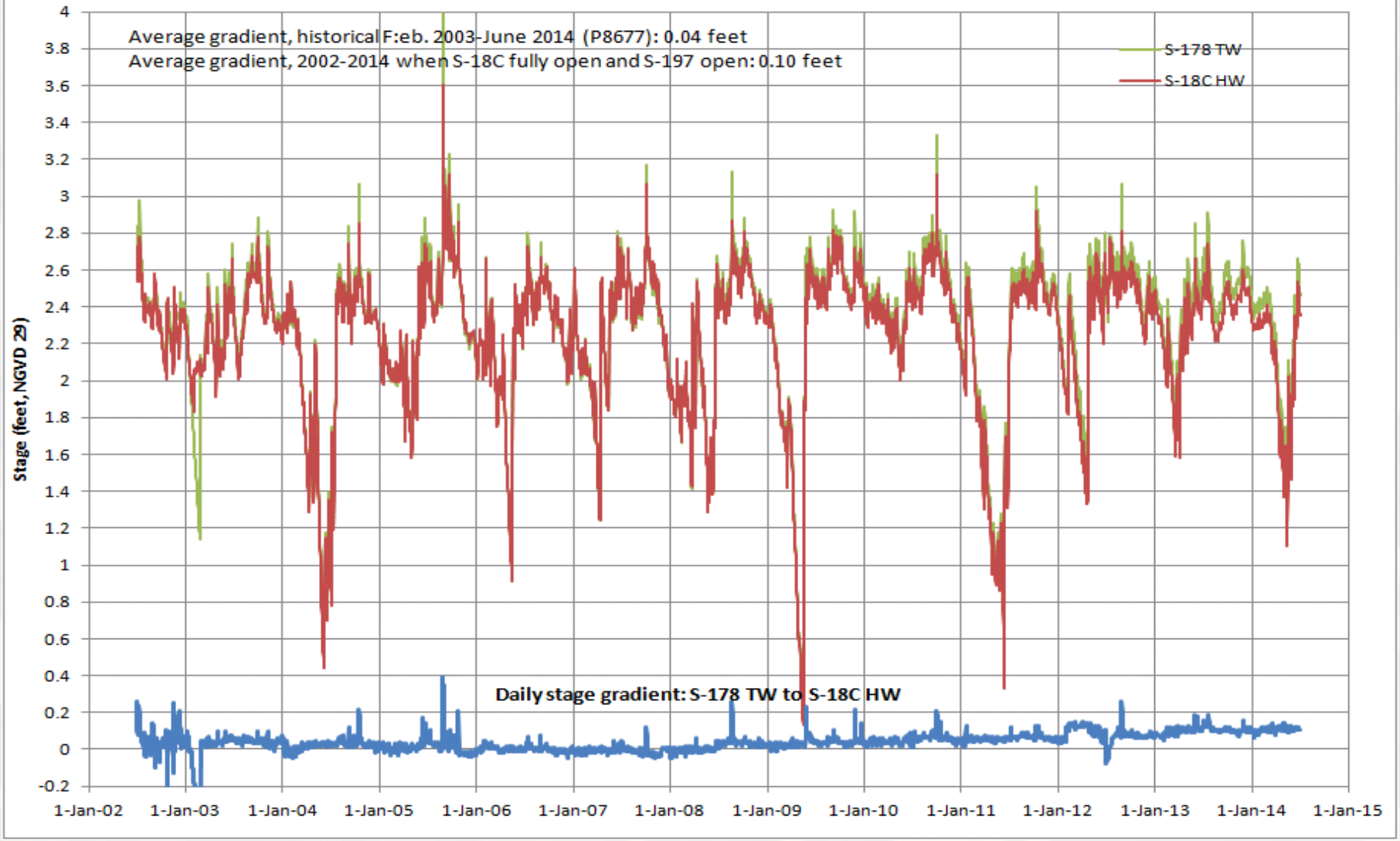


Source: T. MacVicar (29OCT2014 Ops/H&H sub-team)

ERTP WCP: S-18C and S-197

Structure/ Operational Component	Column 1: No WCA-3A Regulatory Releases to SDCS or SRS	Column 2: WCA-3A Releases to SDCS	WCA-3A Ecological Intent (defined at bottom of Table)
	Close 4.8 feet, NGVD	Open 4.9 feet, NGVD Close 4.5 feet, NGVD	
S-176	Open 5.0 feet, NGVD Close 4.75 feet, NGVD	Open 4.9 feet, NGVD Close 4.7 feet, NGVD	
S-177	Open 4.2 feet, NGVD (see S-197 open) Close 3.6 feet, NGVD		
S-18C	Open 2.6 feet, NGVD Close 2.3 feet, NGVD	Open 2.25 feet, NGVD Close 2.0 feet, NGVD	
S-197	If S-177 headwater is greater than 4.1 feet, NGVD or S-18C headwater is greater than 2.8 feet, NGVD, open 3 culverts. If S-177 headwater is greater than 4.2 feet, NGVD for 24 hours or S-18C headwater is greater than 3.1 feet, NGVD; open 4 more culverts for a total of 7 culverts open. If S-177 headwater is greater than 4.3 feet, NGVD or S-18C headwater is greater than 3.3 feet, NGVD, then open 6 more culverts for a total of 13 culverts open. Close gates when all the following conditions are met: 1. S-176 headwater is less than 5.2 feet, NGVD and S-177 headwater is less than 4.2 feet, NGVD. 2. Storm has moved away from the basin 3. After Conditions 1 and 2 are met, keep the number of S-197 culverts open necessary only to match residual flow through S-176. All culverts should be closed if S-177 headwater is less than 4.1 feet, NGVD after all conditions are satisfied.		

IOP/ERTP Hydrographs: C-111 Canal at S-178TW and S-18C HW



Alternative E

Alternative E: S-197 Criteria

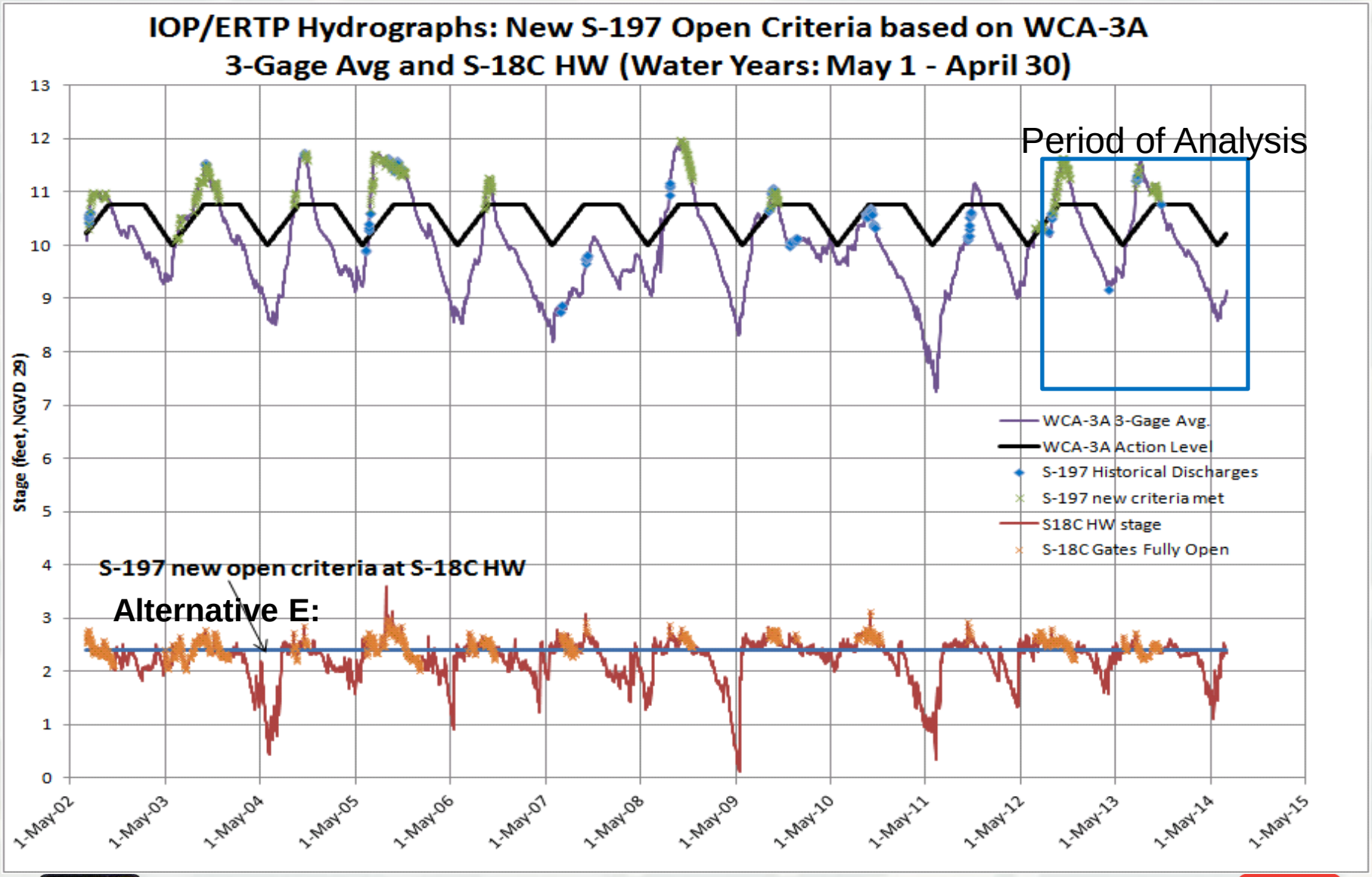
- Maintain IOP/ERTP Gate Open Criteria for S-197:
  - Level 1: S-177 HW > 4.1 feet NGVD or S-18C HW > 2.8 (~800 cfs)
  - Level 2: S-177 HW > 4.2 feet NGVD or S-18C HW > 3.1 (~1600 cfs)
  - Level 3: S-177 HW > 4.3 feet NGVD or S-18C HW > 3.3 (~2400 cfs)

- Additionally, if the following conditions are met:
  - WCA-3A stage > Action Line (IOP Zone A)*;
  - S-18C Fully Open (Bottom of gates > S-18C HW);
  - S-18C HW > 2.4 feet NGVD (Column 2 S-18C HW criteria: 2.25/2.0);

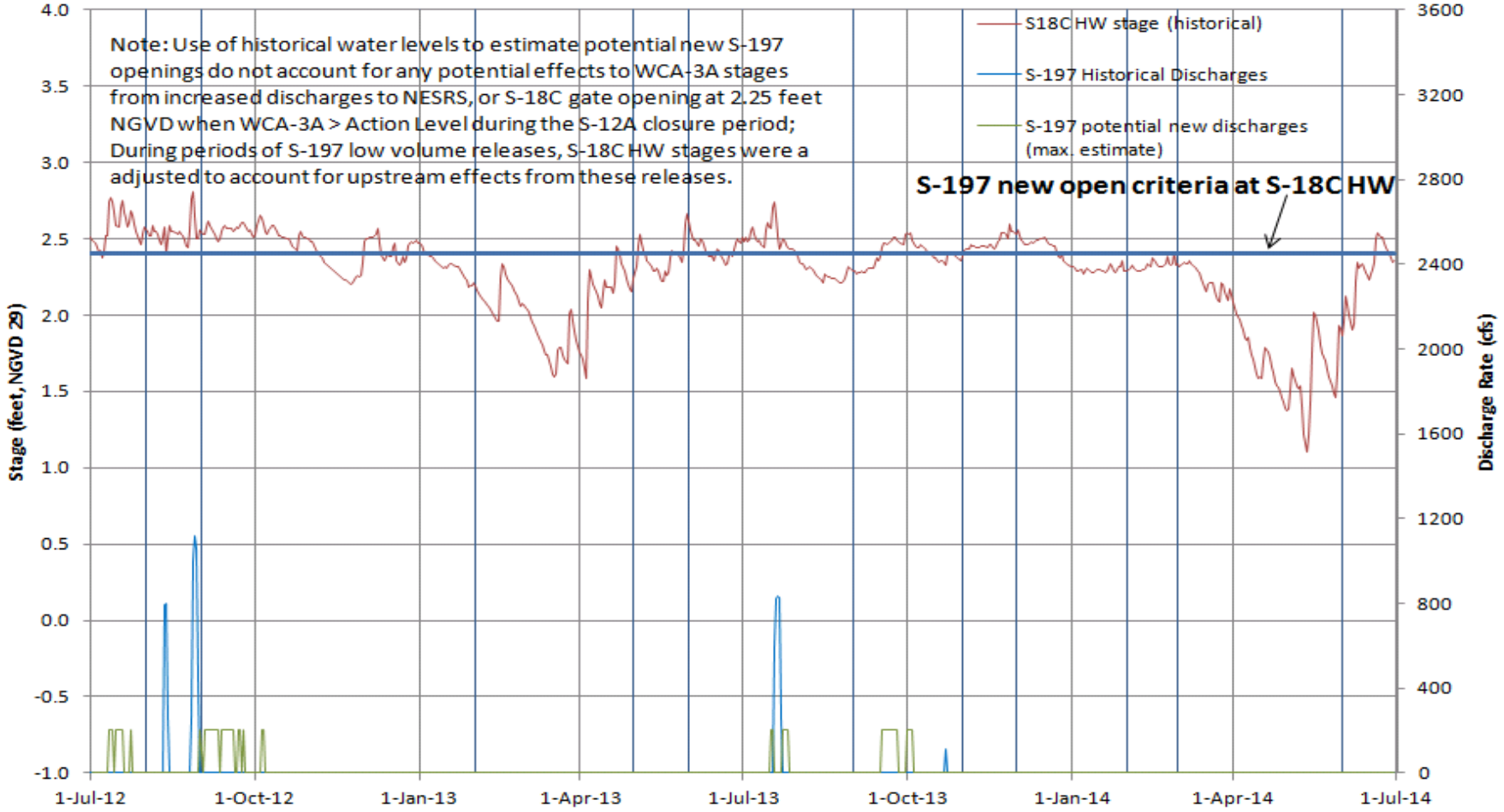
Then, S-197 may be operated up to 200 cfs

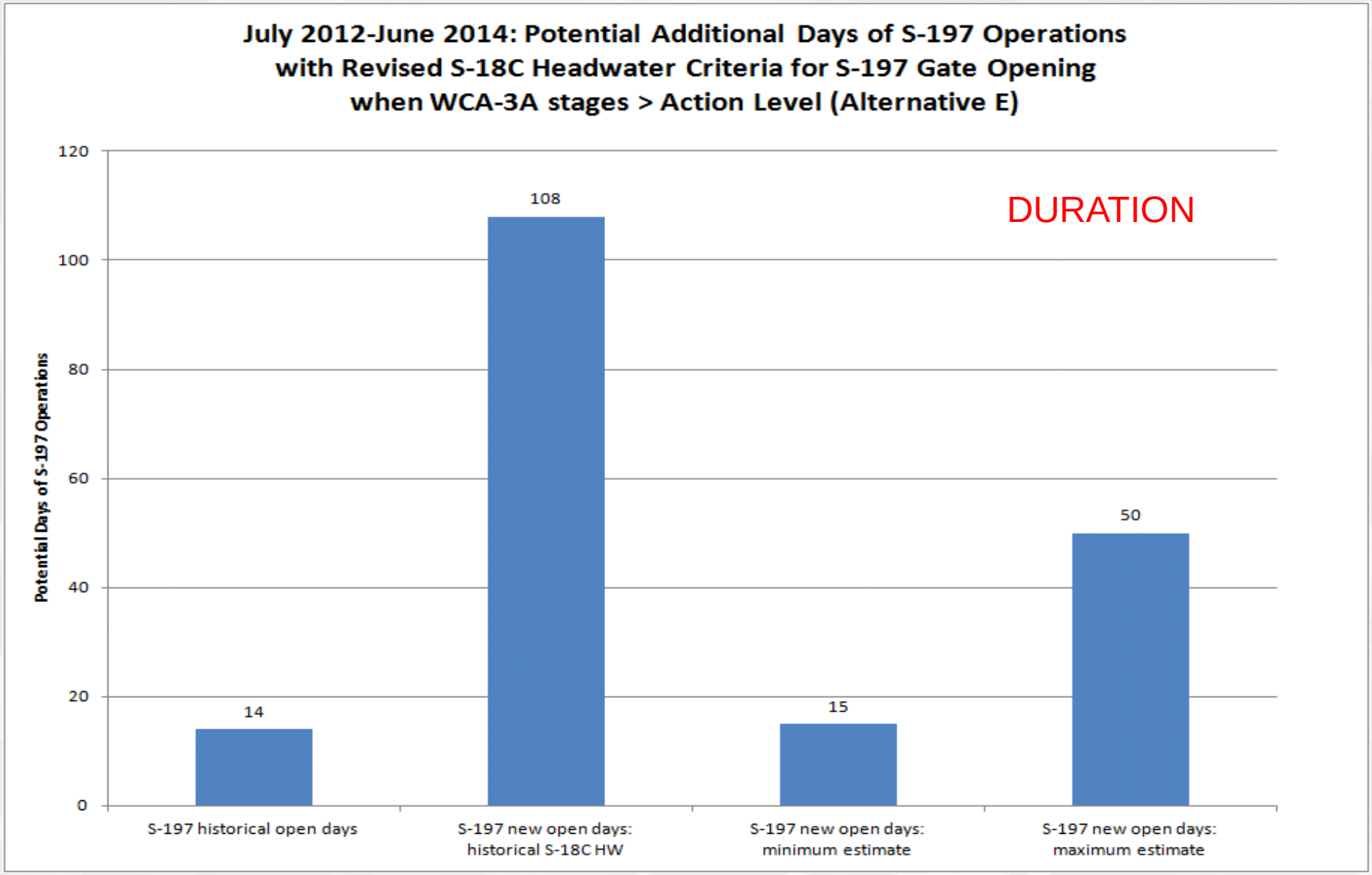
(200 cfs used for effects assessment)

*Column 2 Operational Criteria used for SDCS (S-356 off)

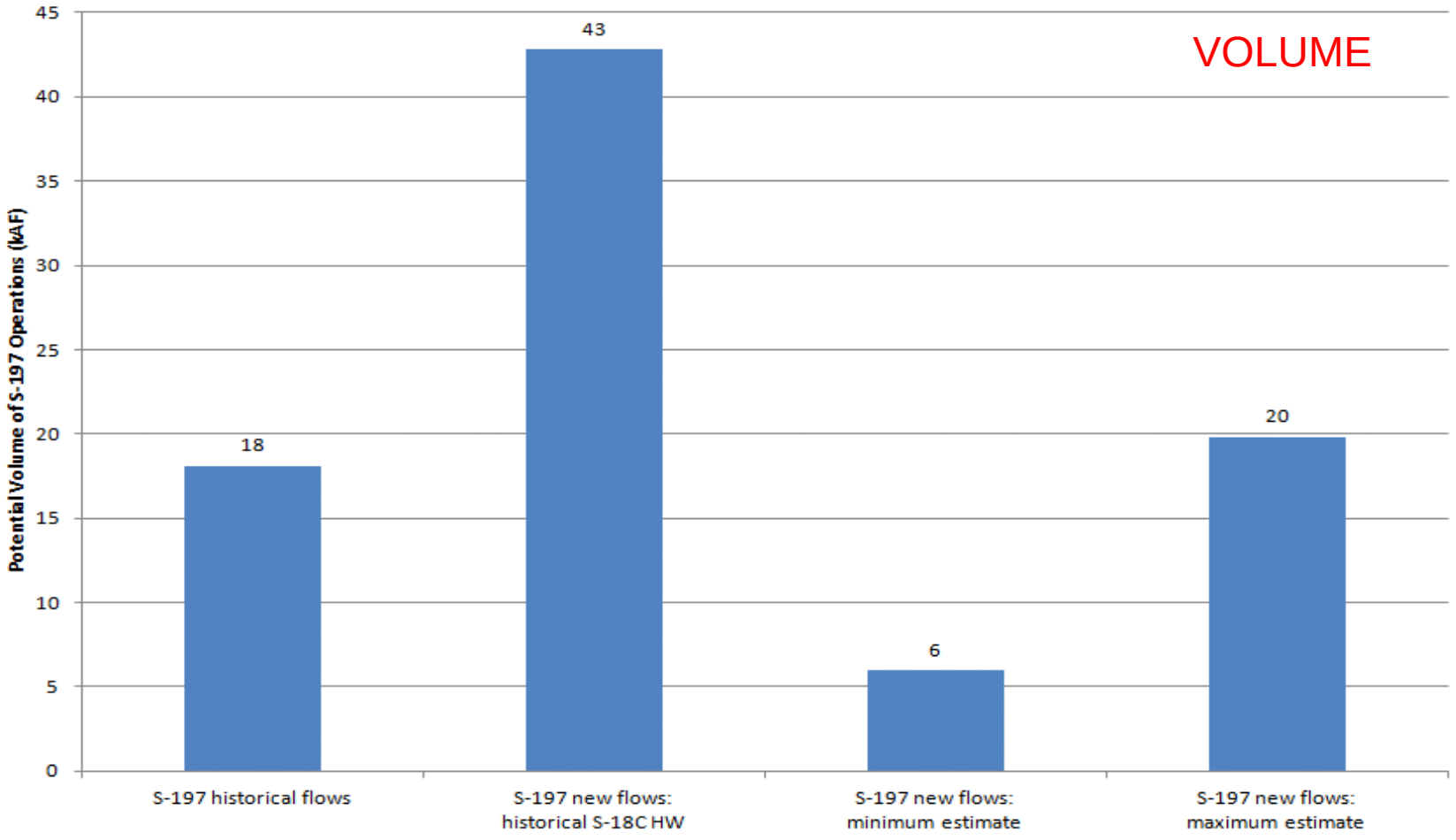

IOP/ERTP Hydrographs: New S-197 Open Criteria based on WCA-3A
3-Gage Avg and S-18C HW (Water Years: May 1 - April 30)
Period of Analysis
Stage (feet, NGVD 29)
WCA-3A 3-Gage Avg.
WCA-3A Action Level
S-197 Historical Discharges
S-197 new criteria met
S18C HW stage
S-18C Gates Fully Open
S-197 new open criteria at S-18C HW
Alternative E:
13
12
11
10
9
8
7
6
5
4
3
2
1
0
1-May-02
1-May-03
1-May-04
1-May-05
1-May-06
1-May-07
1-May-08
1-May-09
1-May-10
1-May-11
1-May-12
1-May-13
1-May-14
1-May-15

IOP/ERTP Hydrographs, Alternative E: Potential New S-197 Discharges based on WCA-3A3-Gage Avg and S-18C HW (July 2012- June 2014)

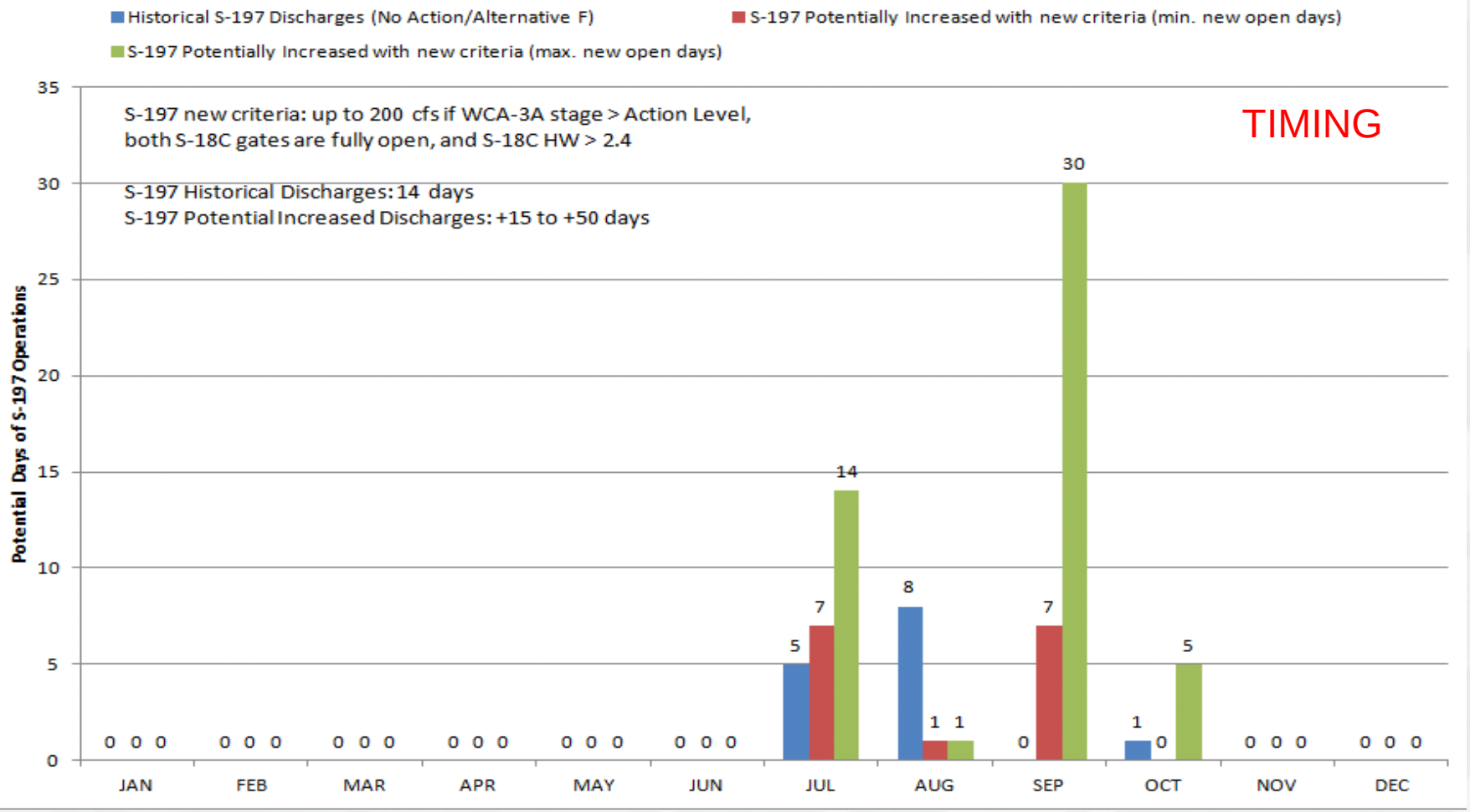



July 2012-June 2014: Potential Additional Days of S-197 Operations
with Revised S-18C Headwater Criteria for S-197 Gate Opening
when WCA-3A stages > Action Level (Alternative E)
DURATION
Potential Days of S-197 Operations
120
100
80
60
40
20
0
14
108
15
50
S-197 historical open days
S-197 new open days: historical S-18C HW
S-197 new open days: minimum estimate
S-197 new open days: maximum estimate

July 2012-June 2014: Potential Additional Days of S-197 Operations with Revised S-18C Headwater Criteria for S-197 Gate Opening when WCA-3A stages > Action Level (Alternative E)



July 2012-June 2014: Potential Additional Days of S-197 Operations with Revised S-18C Headwater Criteria for S-197 Gate Opening when WCA-3A stages > Action Level (Alternative E)



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Alternative G

Alternative G: S-197 Criteria

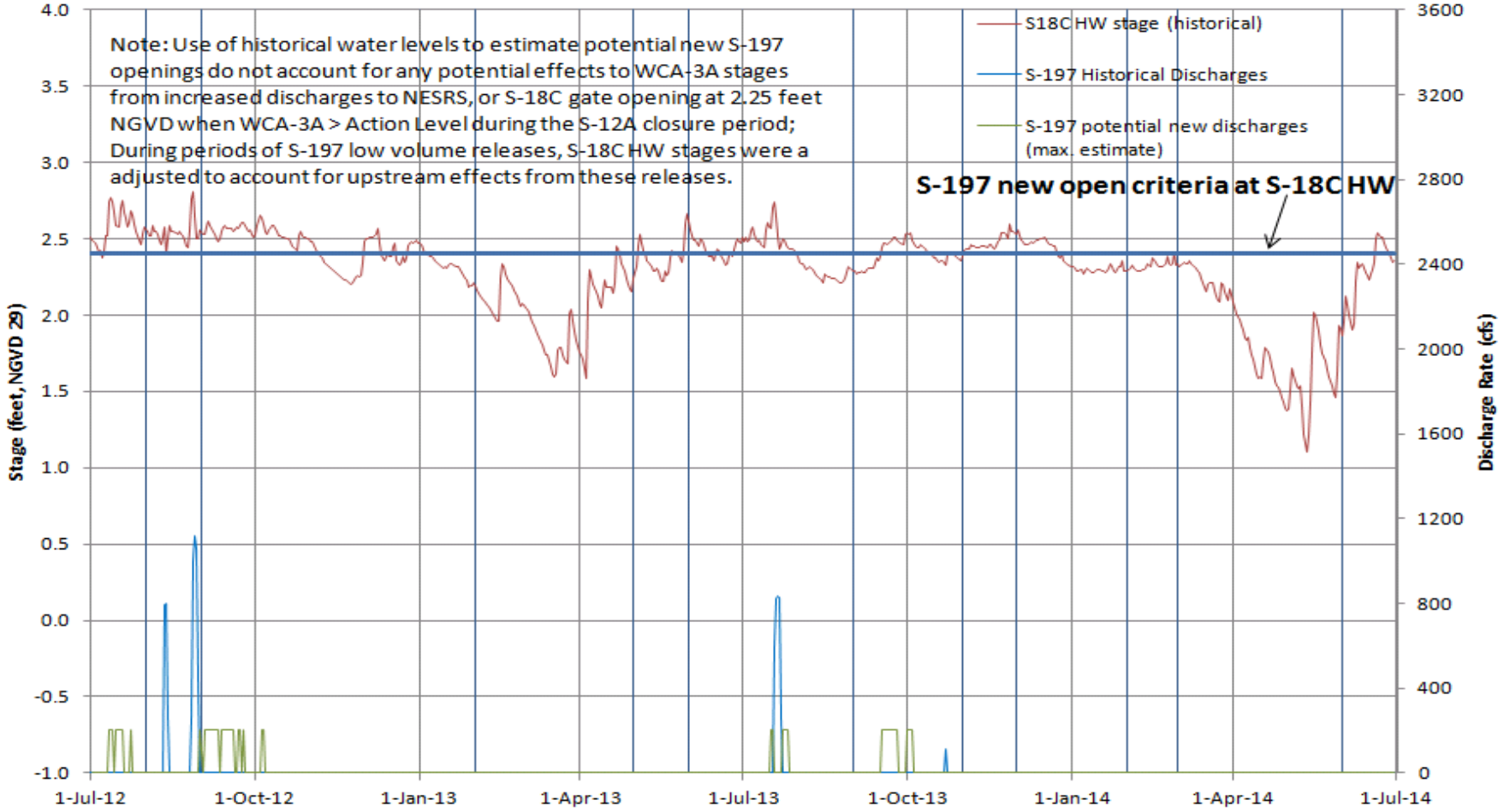
- Maintain IOP/ERTP Gate Open Criteria for S-197
  - S-177 HW > 4.1 feet NGVD (Level 1, Level 2, and Level 3)
  - S-18C HW > 3.1 (Level 2 and Level 3 only)
- Revised IOP/ERTP Gate Open Criteria for S-197
  - S-18C HW Level 1 criteria (stage > 2.8) revised, per below

- If the following conditions are met:
  - WCA-3A stage > Action Line (IOP Zone A)*;
  - S-18C Fully Open (Bottom of gates > S-18C HW);
  - S-178 TW > 2.5 feet NGVD (Column 2 S-18C HW criteria: 2.25/2.0);

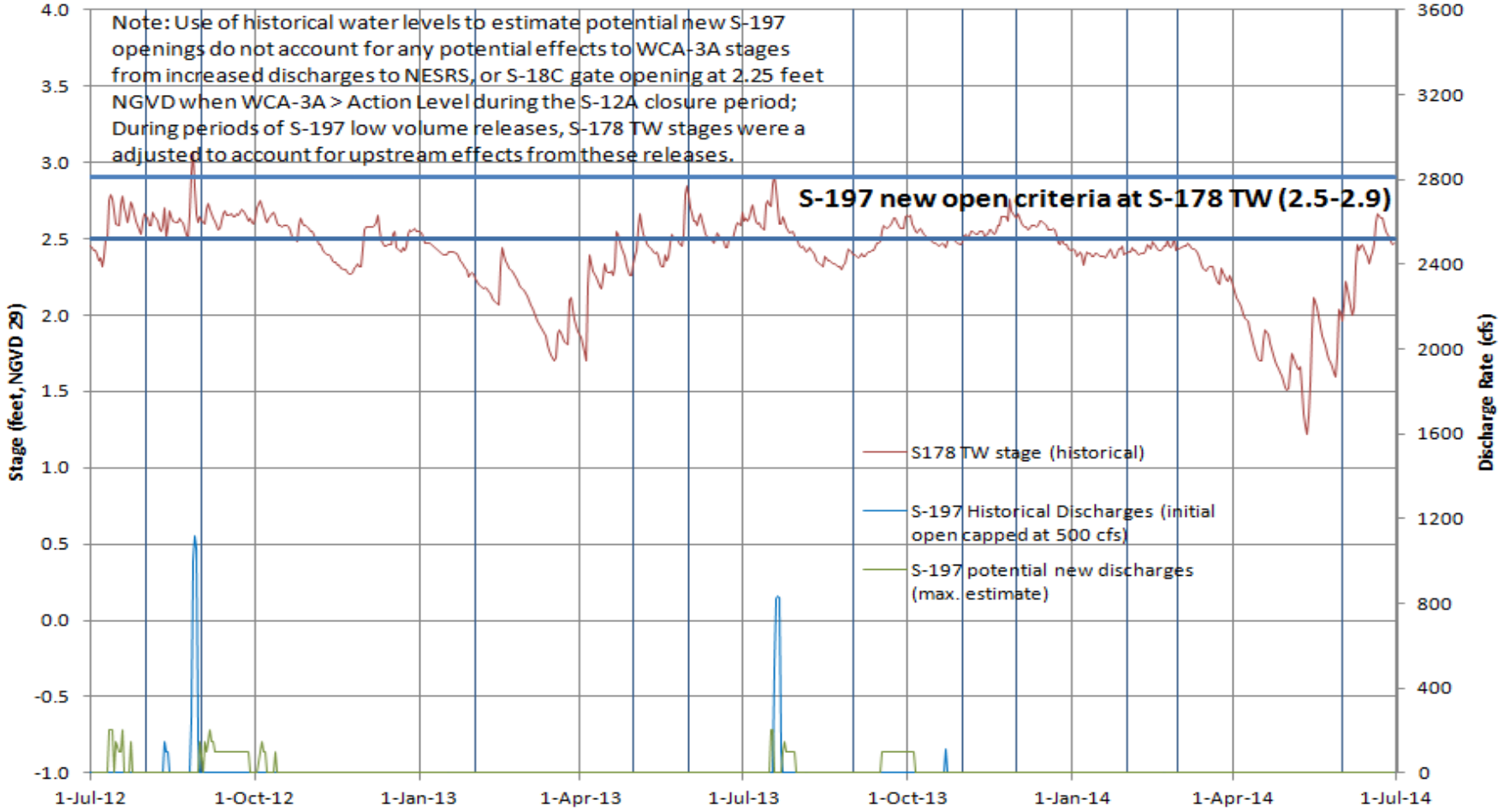
  Then, S-197 may be operated with target flows:
  - S-178 TW 2.5-2.6: S-197 up to 100 cfs (corresponds to S-18C HW stage ~2.4);
  - S-178 TW 2.61-2.7: S-197 up to 150 cfs;
  - S-178 TW 2.71-2.9: S-197 up to 200 cfs (corresponds to S-18C HW stage ~2.6);
  - S-178 TW >2.9: S-197 up to 500 cfs (IOP/ERTP Level 1 S-197 opening up to ~800 cfs)

*Column 2 Operational Criteria used for SDCS (S-356 off)

IOP/ERTP Hydrographs, Alternative E: Potential New S-197 Discharges based on WCA-3A3-Gage Avg and S-18C HW (July 2012- June 2014)



IOP/ERTP Hydrographs, Alternative G: Potential New S-197 Discharges based on WCA-3A3-Gage Avg and S-178 TW HW (July 2012- June 2014)



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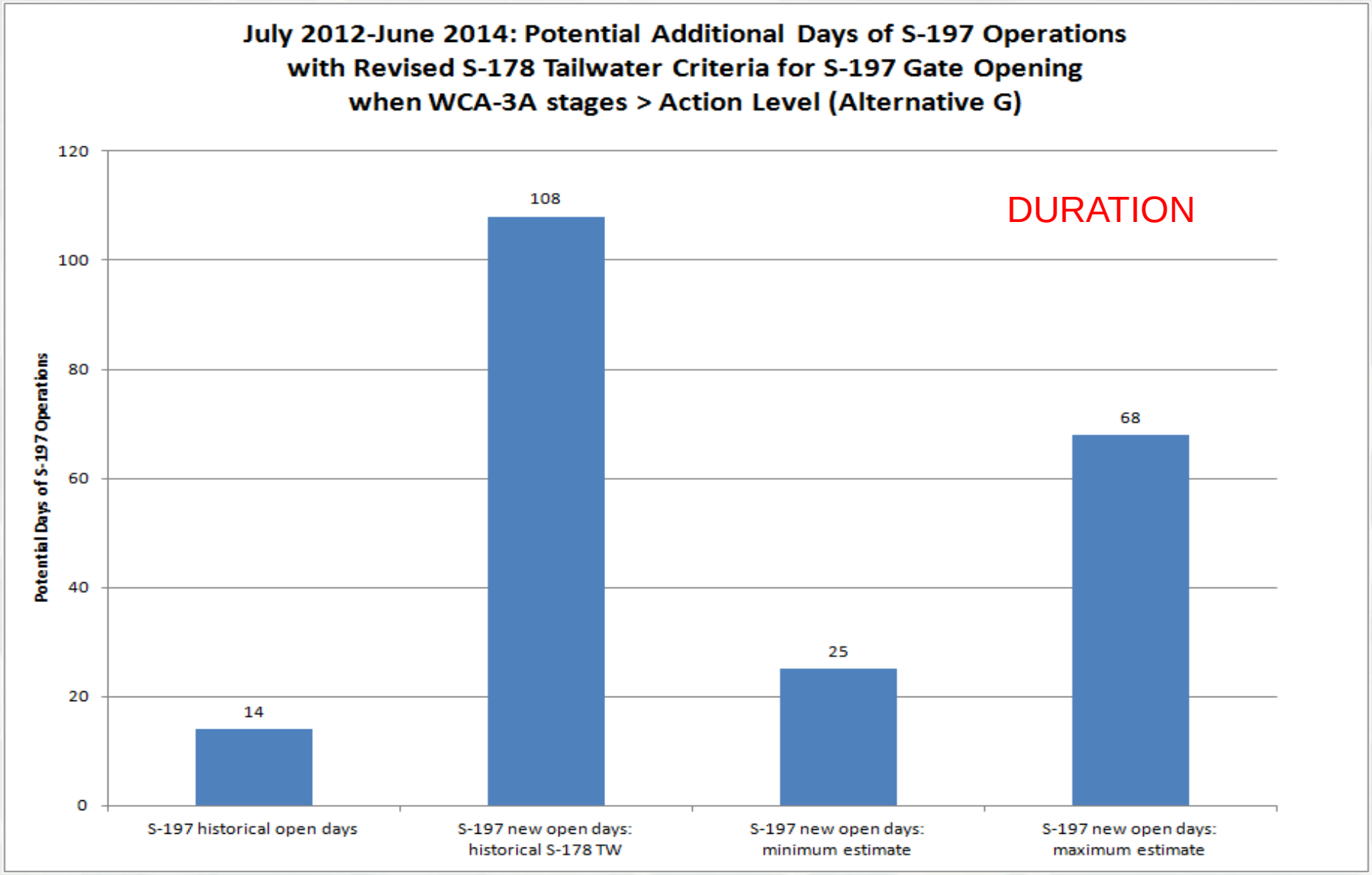
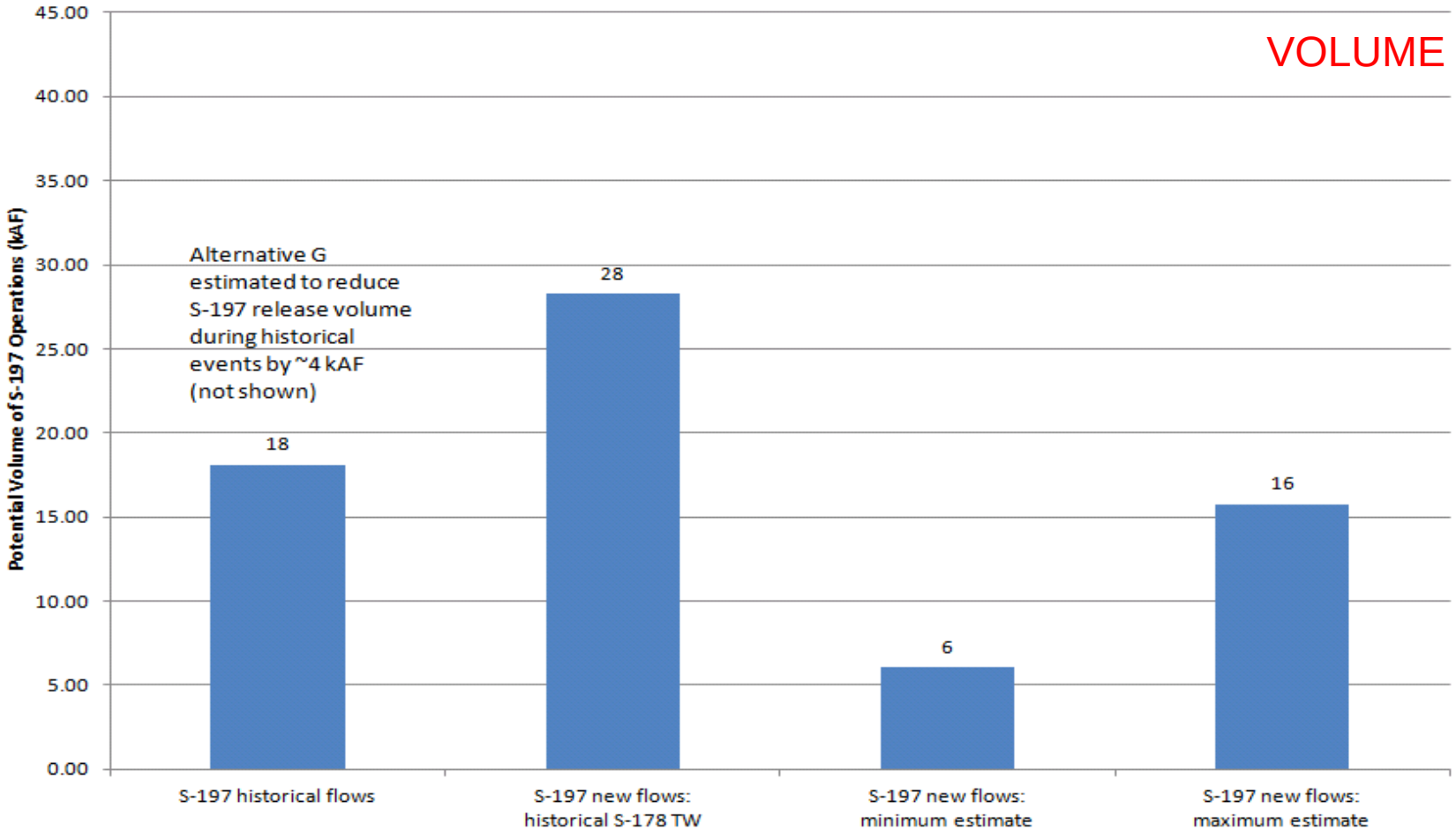
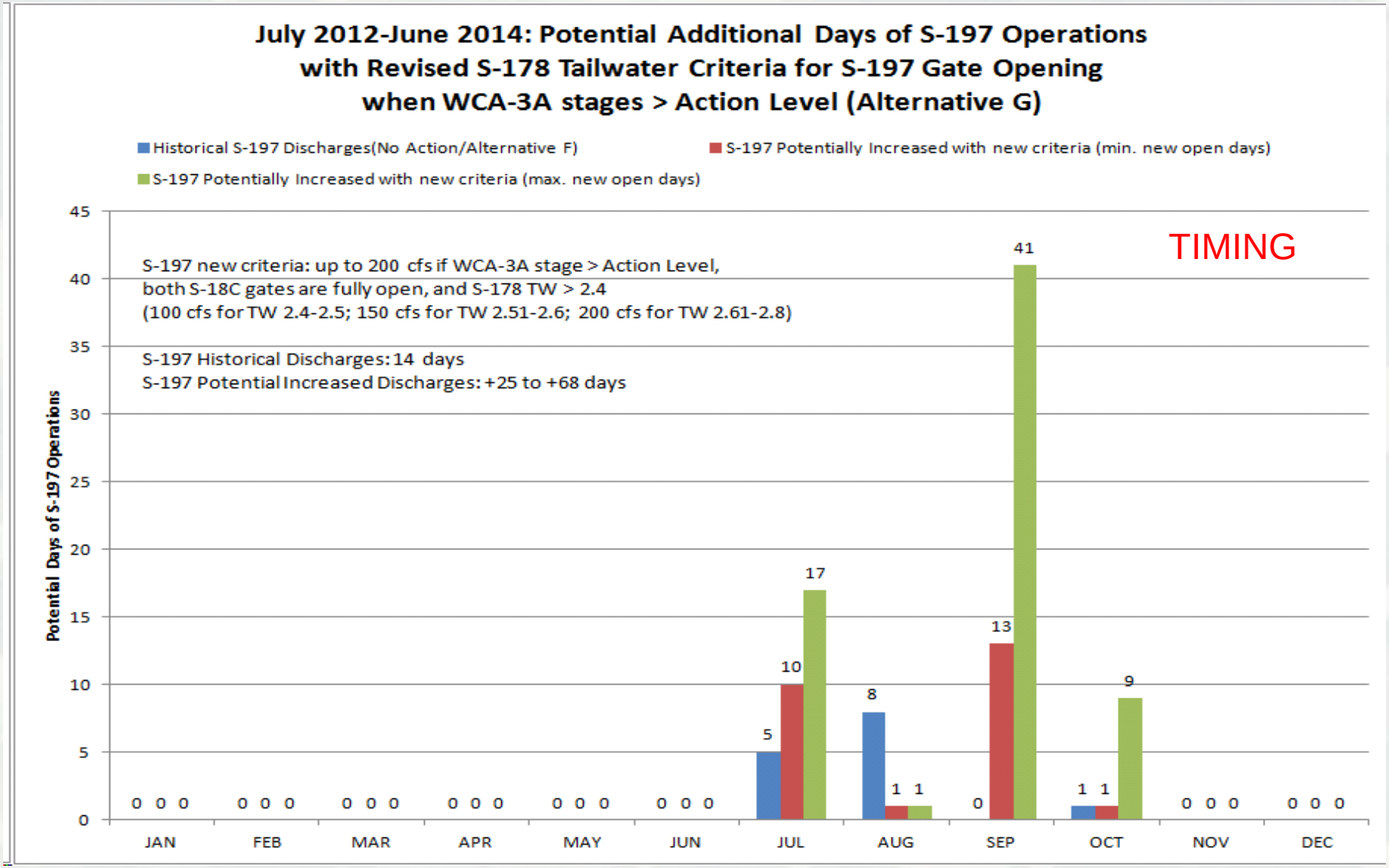

July 2012-June 2014: Potential Additional Days of S-197 Operations
with Revised S-178 Tailwater Criteria for S-197 Gate Opening
when WCA-3A stages > Action Level (Alternative G)
DURATION
Potential Days of S-197 Operations
120
100
80
60
40
20
0
14
108
25
68
S-197 historical open days
S-197 new open days: historical S-178 TW
S-197 new open days: minimum estimate
S-197 new open days: maximum estimate

July 2012-June 2014: Potential Additional Days of S-197 Operations with Revised S-178 Tailwater Criteria for S-197 Gate Opening when WCA-3A stages > Action Level (Alternative G)





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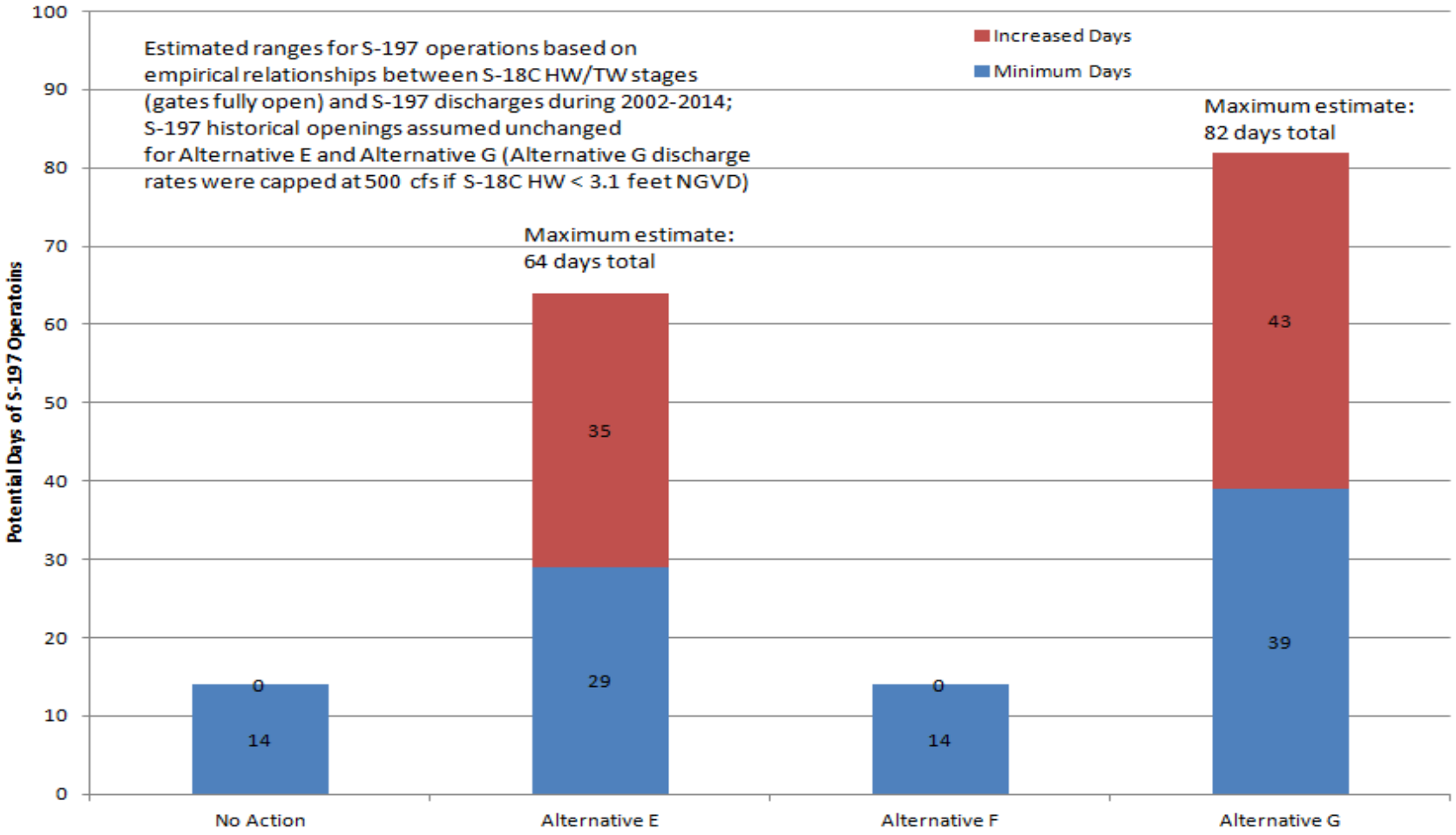
Comparison of Effects for Action Alternatives E/F/G

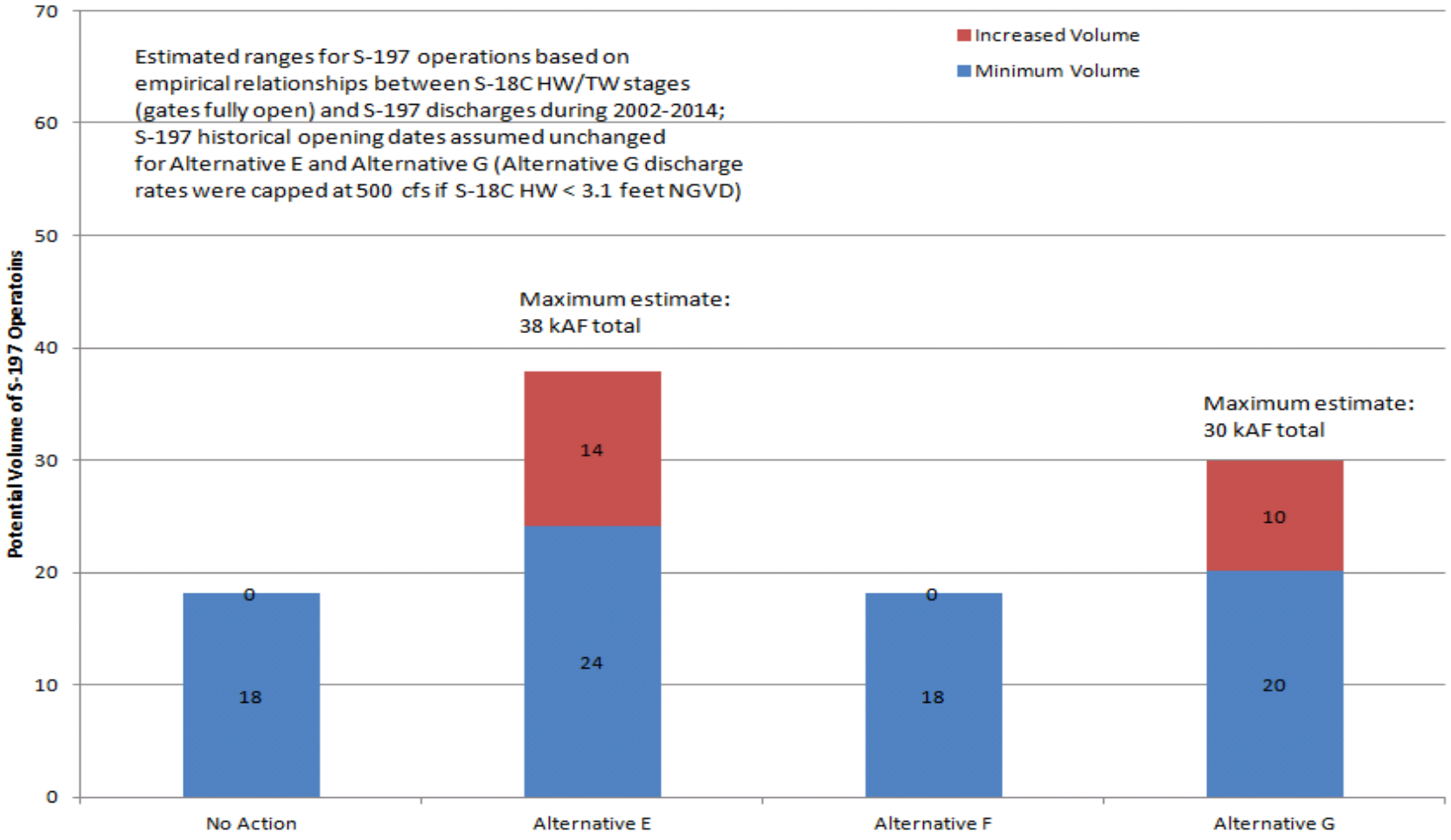
Potential Additional Days of S-197 Operations for Increment 1 Alternatives: July 2012-June 2014

DURATION

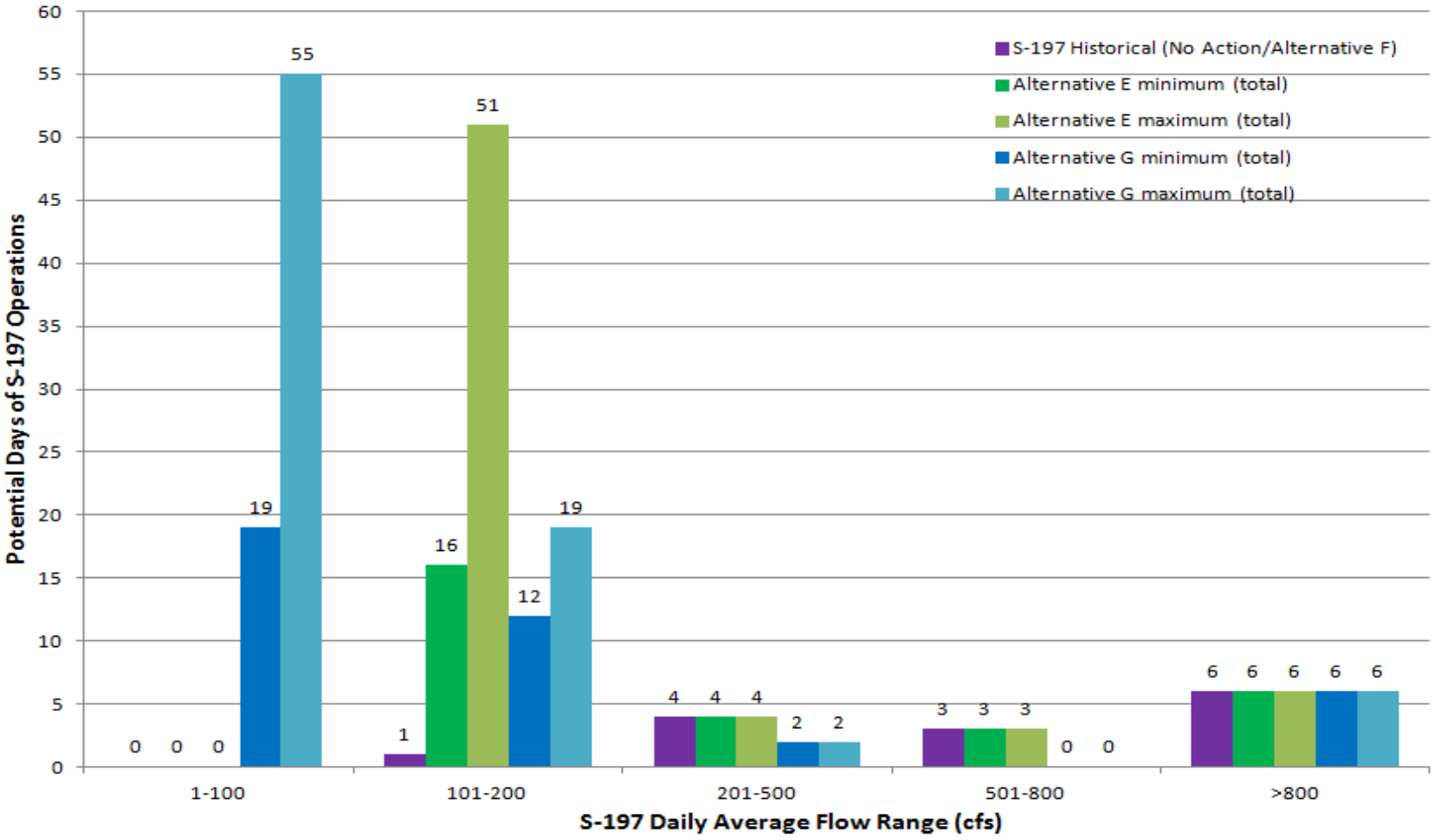


Potential Additional Discharges from S-197 Operations for Increment 1 Alternatives: July 2012-June 2014

VOLUME



Potential Additional Days of S-197 Operations for Increment 1 Alternatives: July 2012-June 2014



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Hydrologic Effects of Action Alternatives E/F/G

- Period of analysis limited to CERP C-111 Spreader Canal operational period by SFWMD (July 2012-June 2014)

- Compared to the No Action Alternative, **Alternative F** is not anticipated to change the frequency and duration of S-197 discharges or increase flood control releases from S-18C

Hydrologic Effects of Action Alternatives E/F/G

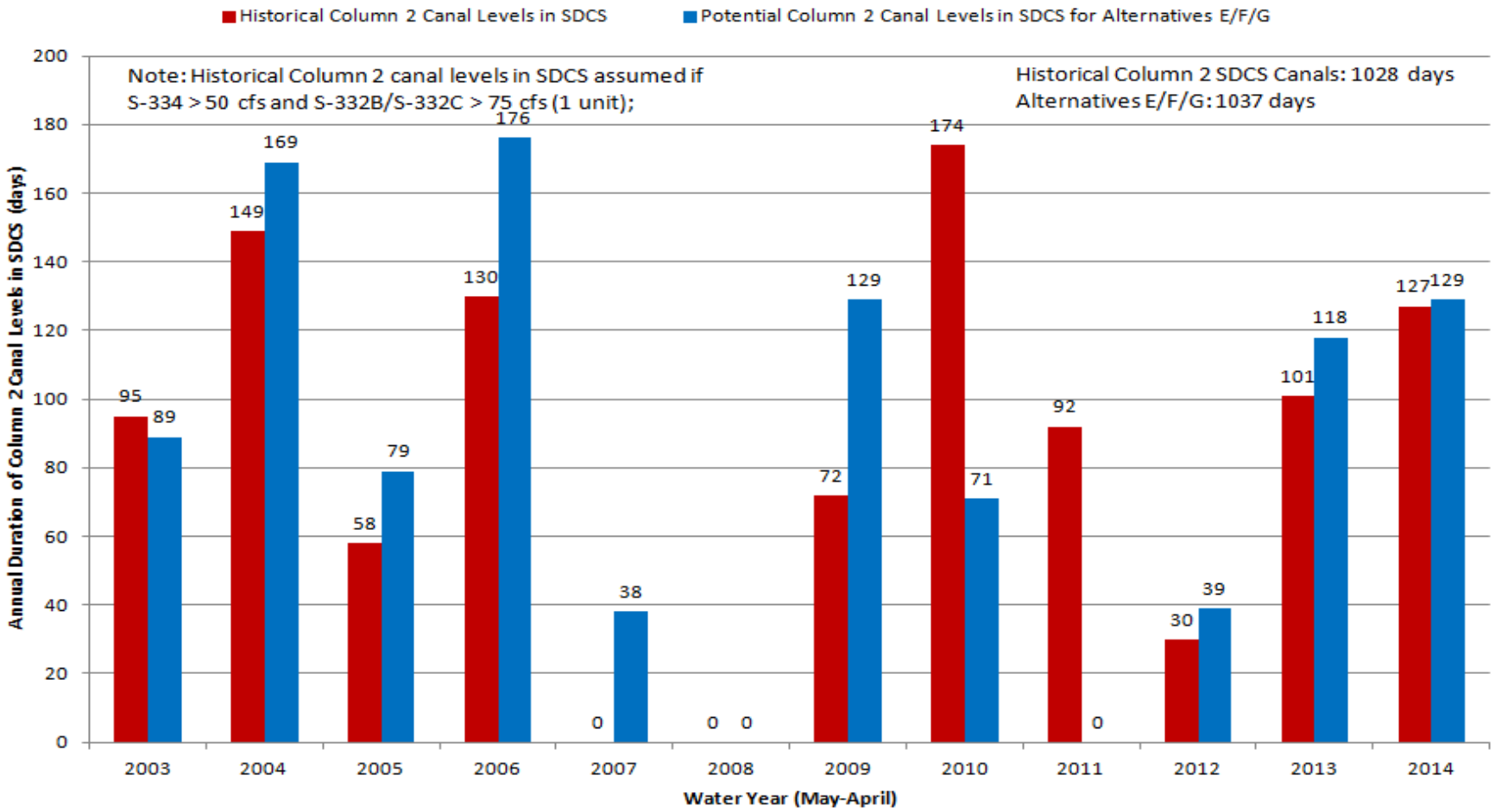
- Compared to No Action Alternative, given the hydrological conditions experienced during IOP/ERTP, **Alternative E** is anticipated to:
  - Increase the frequency and duration of S-197 discharges to Manatee Bay/Barnes Sound from 14 days to a range of 29-64 days (timing unchanged)
  - Increase the total volume of S-197 discharges by between 33-111% (18 kAF to a range between 24-38 kAF)
  - Increase flood control releases from S-18C and S-197 to mitigate for potential increased risk to flood protection for South Dade areas, which may be conditionally effected by operation of S-332D and/or the C-111 South Dade South Detention Area during the Increment 1 field test

Hydrologic Effects of Action Alternatives E/F/G

- Compared to No Action Alternative, given the hydrological conditions experienced during IOP/ERTP, **Alternative G** is anticipated to:
  - Increase the frequency and duration of S-197 discharges to Manatee Bay/Barnes Sound from 14 days to a range of 39-82 days (timing unchanged; durations are slightly higher than Alternative E since releases start at a lower discharge rate of 100 cfs)
  - Increase the total volume of S-197 discharges by between 11-67% (18 kAF to a range between 20-30 kAF)
  - Reduce the frequency and duration of S-197 discharges from 200-800 cfs (Level 1 S-197 gate opening range)
  - Increase flood control releases from S-18C and S-197 to mitigate for potential increased risk to flood protection for South Dade areas which may be conditionally affected by operation of S-332D and/or the C-111 South Dade South Detention Area during the Increment 1 field test

SDCS Column 2 Operational Criteria

G-3273 Relaxation: Duration of Alternative E/F/G Potential S-334 Column 2 Canal Levels in SDCS, compared to Historical Column 2 Operations (POR July 2002- June 2014)



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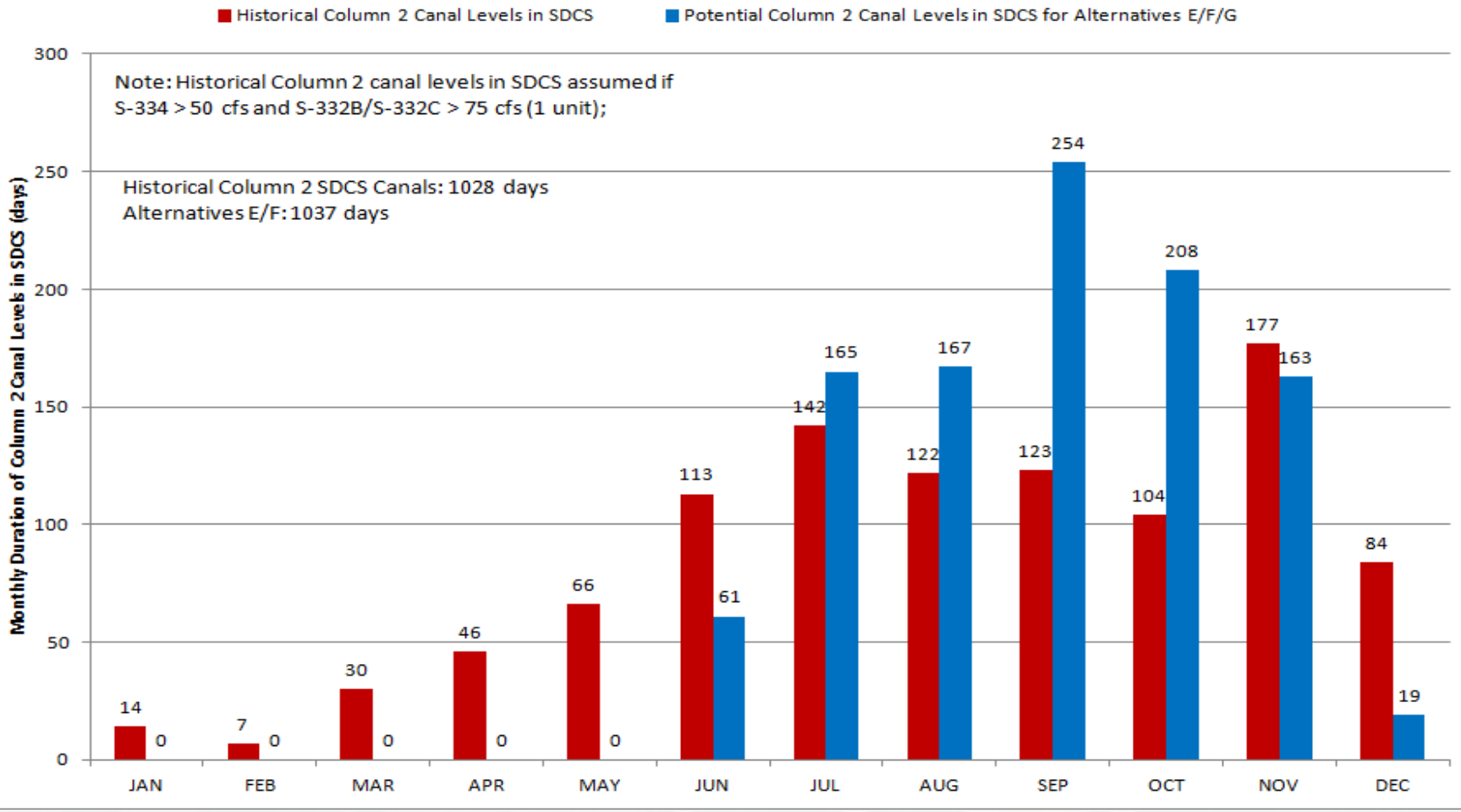
G-3273 Relaxation: Duration and Timing of Alternative E/F/G Potential S-334 Column 2 Canal Levels in SDCS, compared to Historical Column 2 Operations (POR July 2002- June 2014)



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Questions & Discussion