

**MWD G-3273 Constraint  
Relaxation: Potential Hydrologic  
Effects to NESRS and WCA-3A**

15 October 2014

MWD Increment 1 PDT mtg

Increment 1: L-29 Canal and  
G-3273 Historical Stages under IOP  
and ERTP (July 2002-June 2014)

# Pertinent Structures and G-3273



# Operations Background

## 2012 ERTP EIS (Table ES-1) / 2012 Water Control Plan (WCP):

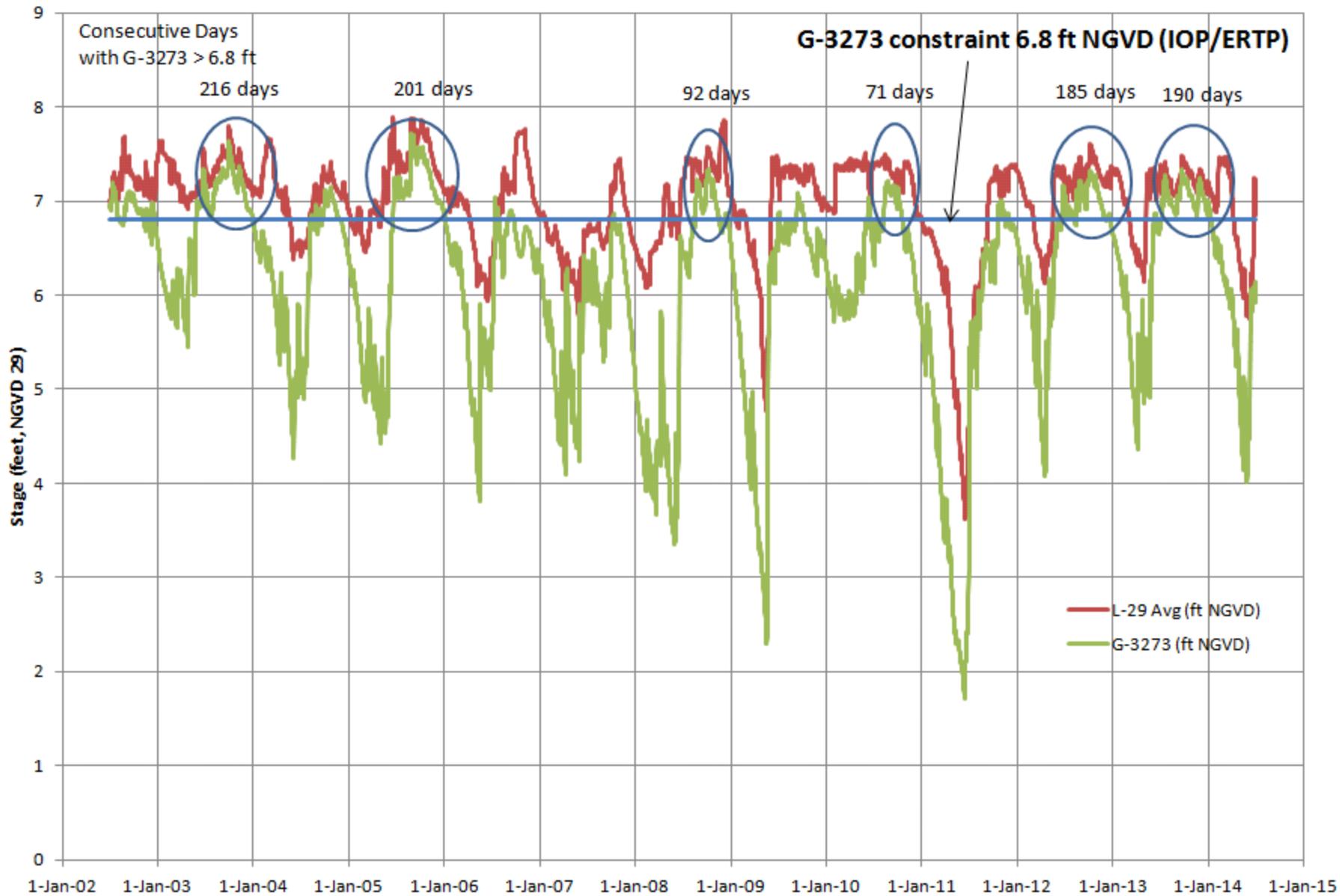
- WCA-3A Regulation Schedule is managed according to the Rainfall Plan
  - Rainfall-based Component + Regulatory Component = Target Regulatory Release volume
  - Generally, 55% of the regulatory release target is directed to NESRS (S-333)
  - Generally, 45% of the regulatory release target is directed to Western SRS (S-12A, S-12B, S-12C, S-12D)
  - Seasonal closures to protect CSSS-A: S-12A,S-343A/B, S-344 (01Nov-14Jul); S-12B (01Jan-14Jul)
  - Zone E1 allows “up to maximum” releases at all outlets during closure period & prior to wet season
  - 2 modes of operations: Column 1 and Column 2 (initially established under IOP 2002)
- Column 1 operations
  - Regulatory releases from WCA-3A met by normal operation of the regulatory outlets (S-12A, S-12B, S-12C, S-12D, and S-333)
- Column 2 operations
  - Regulatory releases from WCA-3A are made via S-333 to the L-29 Canal and via S-334 to the L-31N Canal and the SDCS
  - Column 2 operations generally require the use of pumping stations S-331, S-332B, S-332C, and S-332D
  - During Column 2 operations, the control stages along the L-31N Canal are also lowered to minimize potential flood impacts to the SDCS and also to provide the necessary downstream gradient for the S-334 releases to reach S-332B, S-332C, and S-332D pump stations

# Operations Background

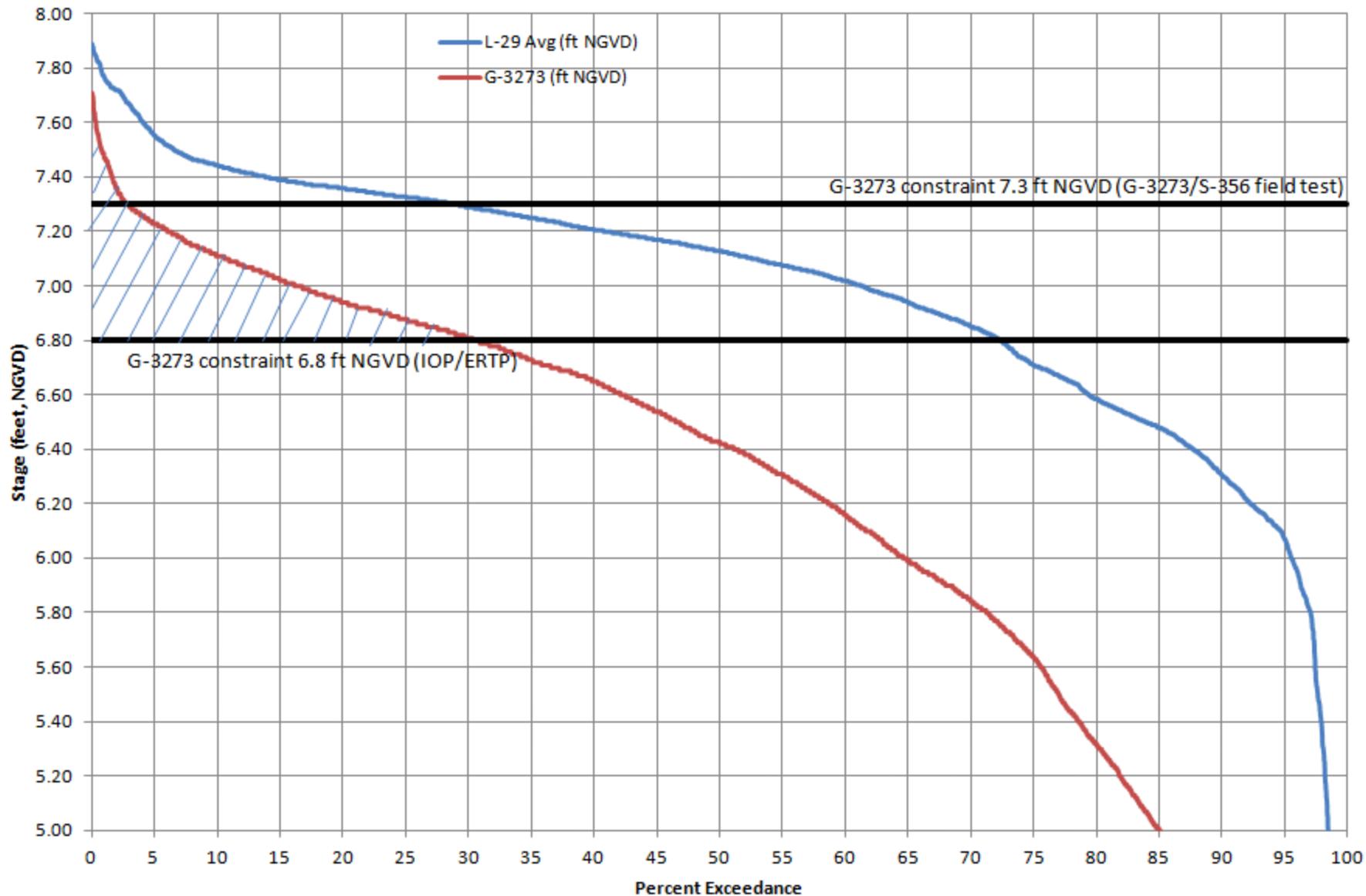
## 2012 E RTP EIS (Table ES-1) / 2012 Water Control Plan (WCP):

- S-333: If  $G-3273 < 6.8$  feet NGVD
  - Column 1: “Rainfall Plan target flow for S-333 (to NESRS)”
  - Column 2: “Rainfall Plan target flow for S-333 (to NESRS), plus as much of the remaining Rainfall Plan target flow that the S-12s cannot discharge to be passed through S-334 and subject to capacity constraints...”
  - When WCA 3A is in Zone E1 or Zone A, “maximum practicable through S-333 to NESRS” (Column 1 and 2 operations)
- S-333: If  $G-3273 > 6.8$  feet NGVD
  - Column 1: “Closed”
  - Column 2: “Match S-333 with S-334 flows”
- L-29 Borrow Canal: “In order to raise the L-29 Borrow Canal above 7.5 feet, NGVD additional NEPA would need to be completed.”
- S-356: “When conditions permit (i.e., G-3273 and L-29 constraints), discharges from S-356 will go into L 29. Pumping will be limited to the amount of seepage into L-31N in the reach between S-335 and G-211. A technical team will evaluate pumping limits and operations.” (Column 1);
  - Column 2 operations includes the additional condition of no S-334 releases

# IOP/ERTP Hydrographs: L-29 Borrow Canal and G-3273



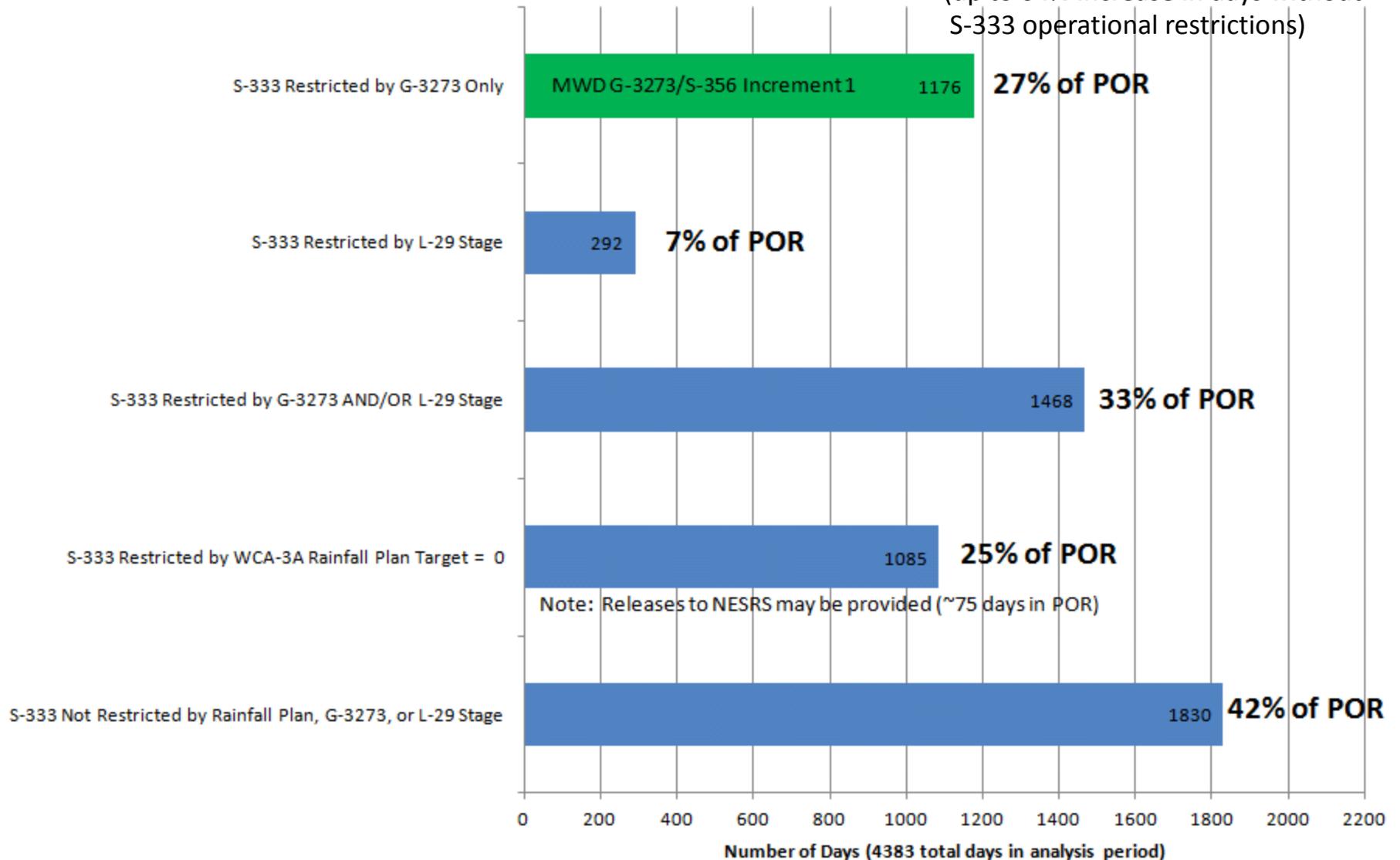
# IOP/ERTP Stage Duration Curve: L-29 Borrow Canal and G-3273 (07/2002-06/2014)



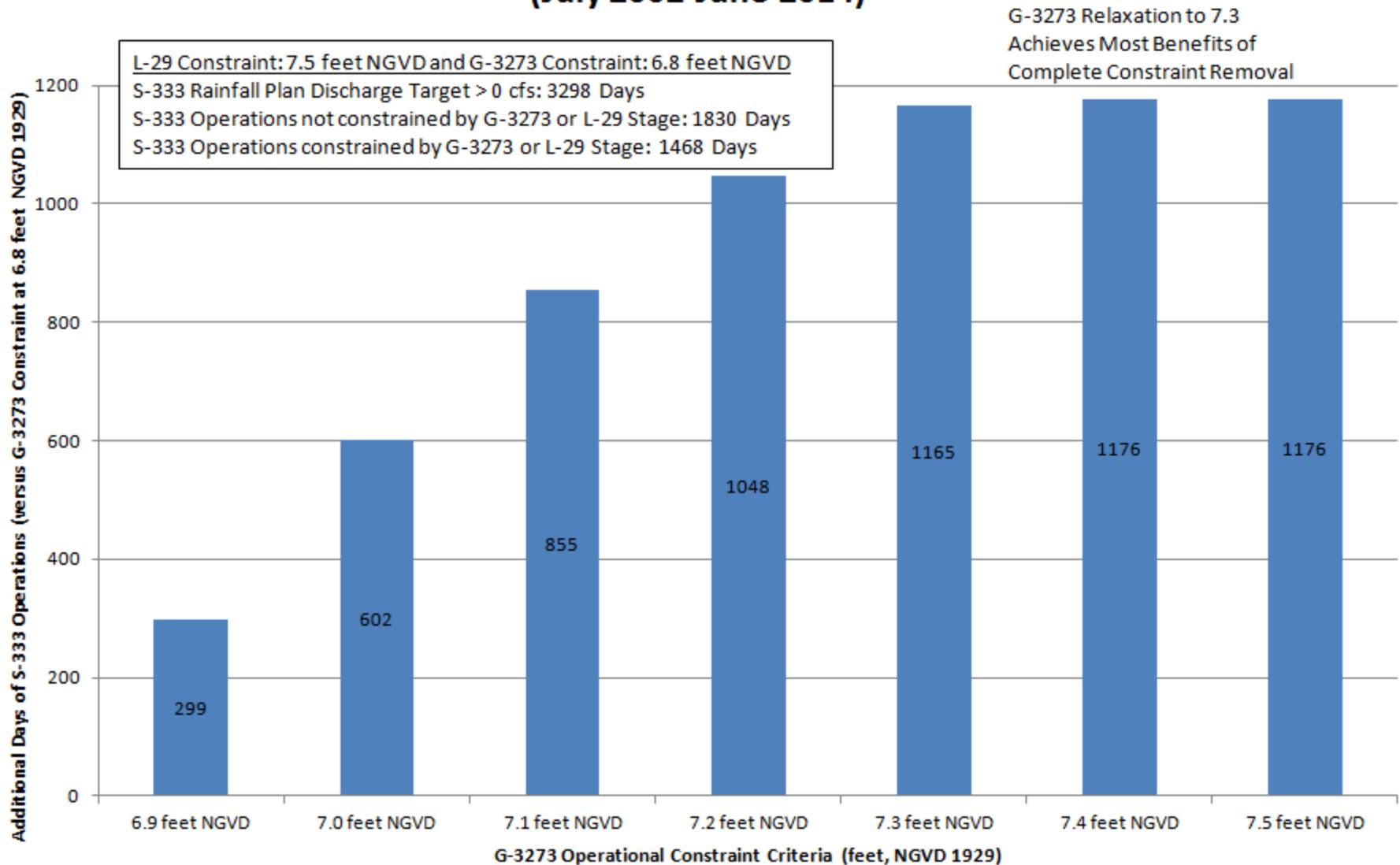
# Potential Hydrologic Benefits to NESRS with G-3273 Relaxation

# Frequency of S-333 Operational Constraint Triggers under IOP/ERTP (July 2002-June 2014)

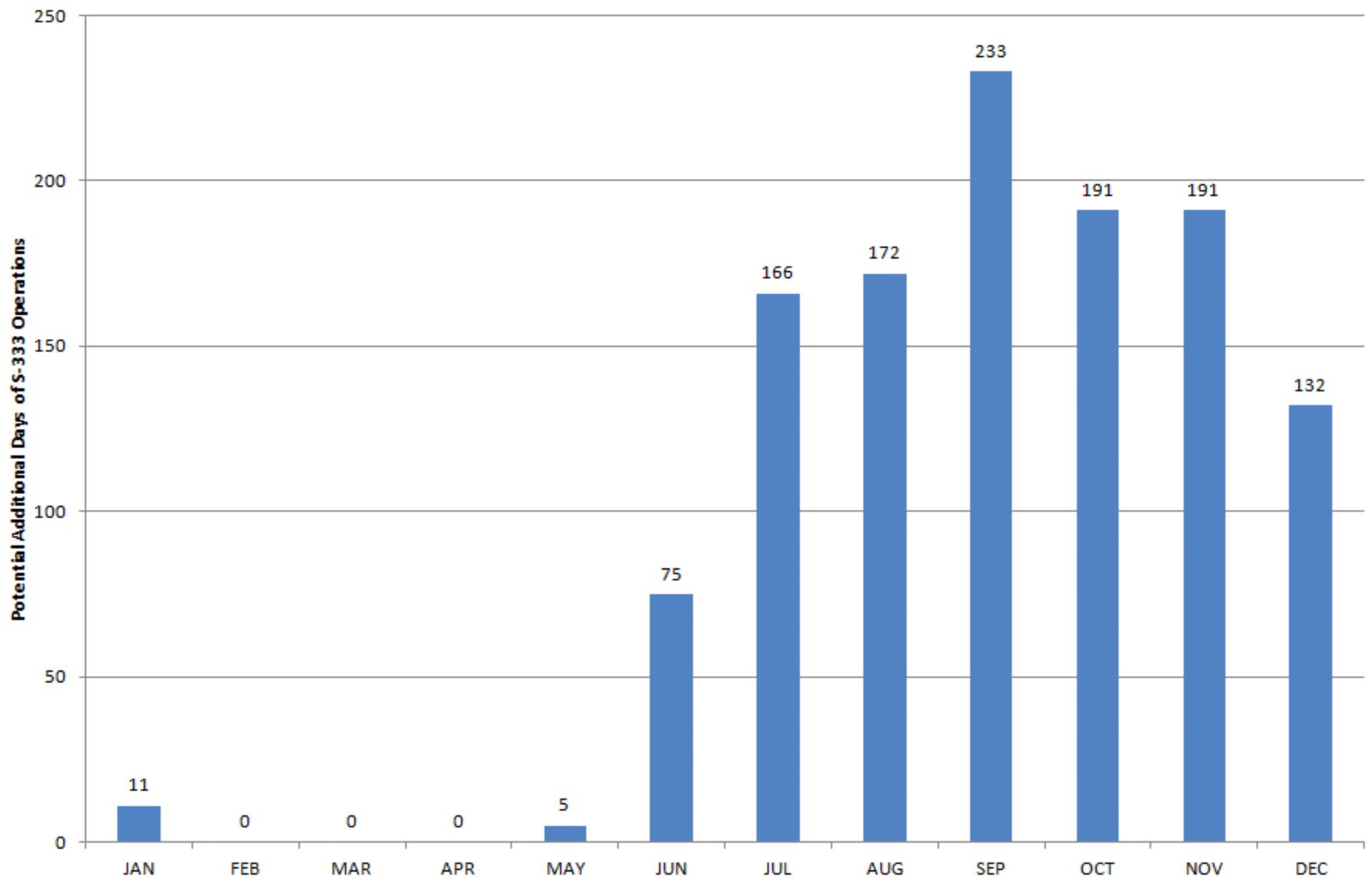
(up to 64% increase in days without S-333 operational restrictions)



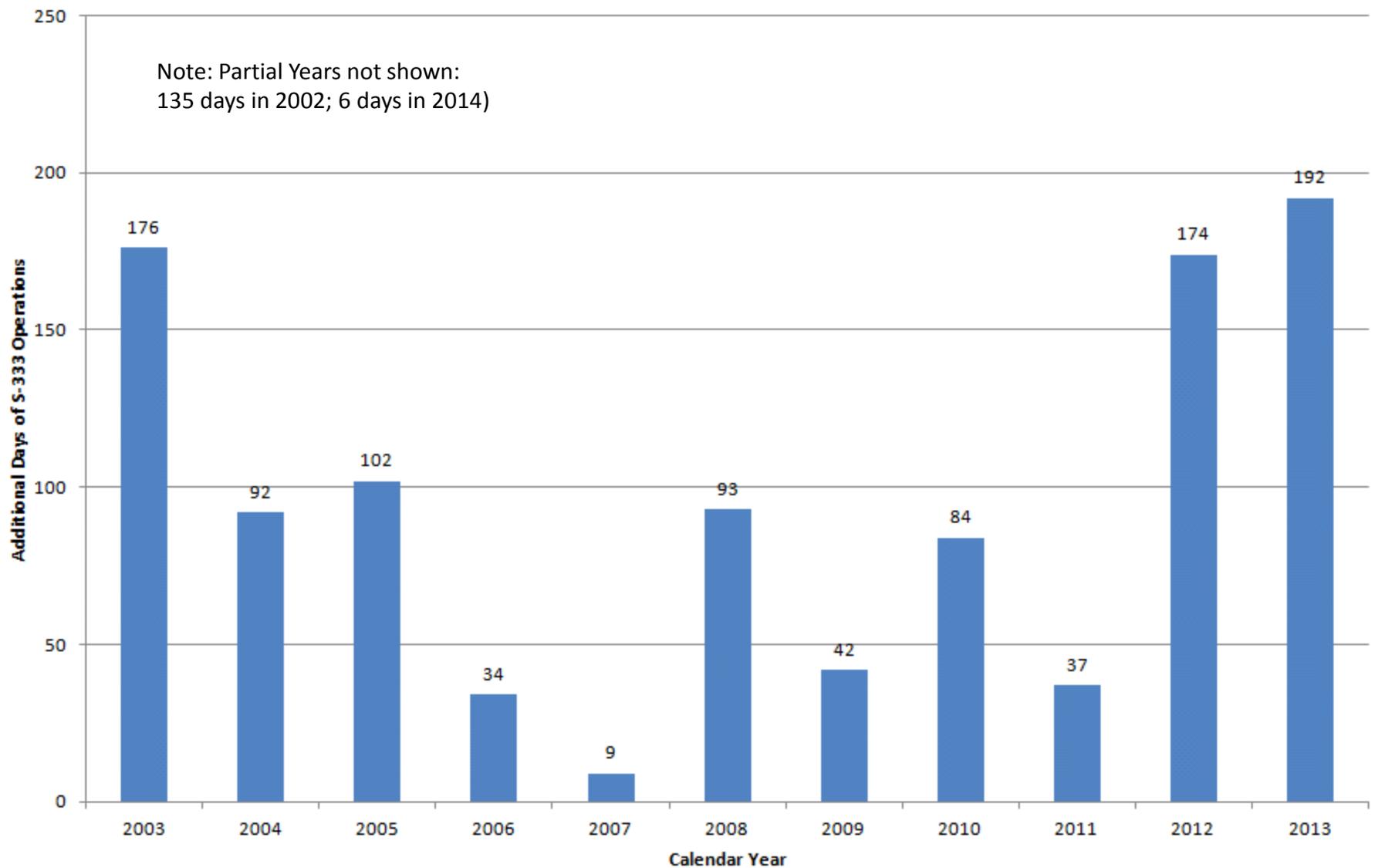
## G-3273 Relaxation: Potential Additional Days of S-333 Operations with L-29 Constraint of 7.5 feet NGVD under IOP (July 2002-June 2014)



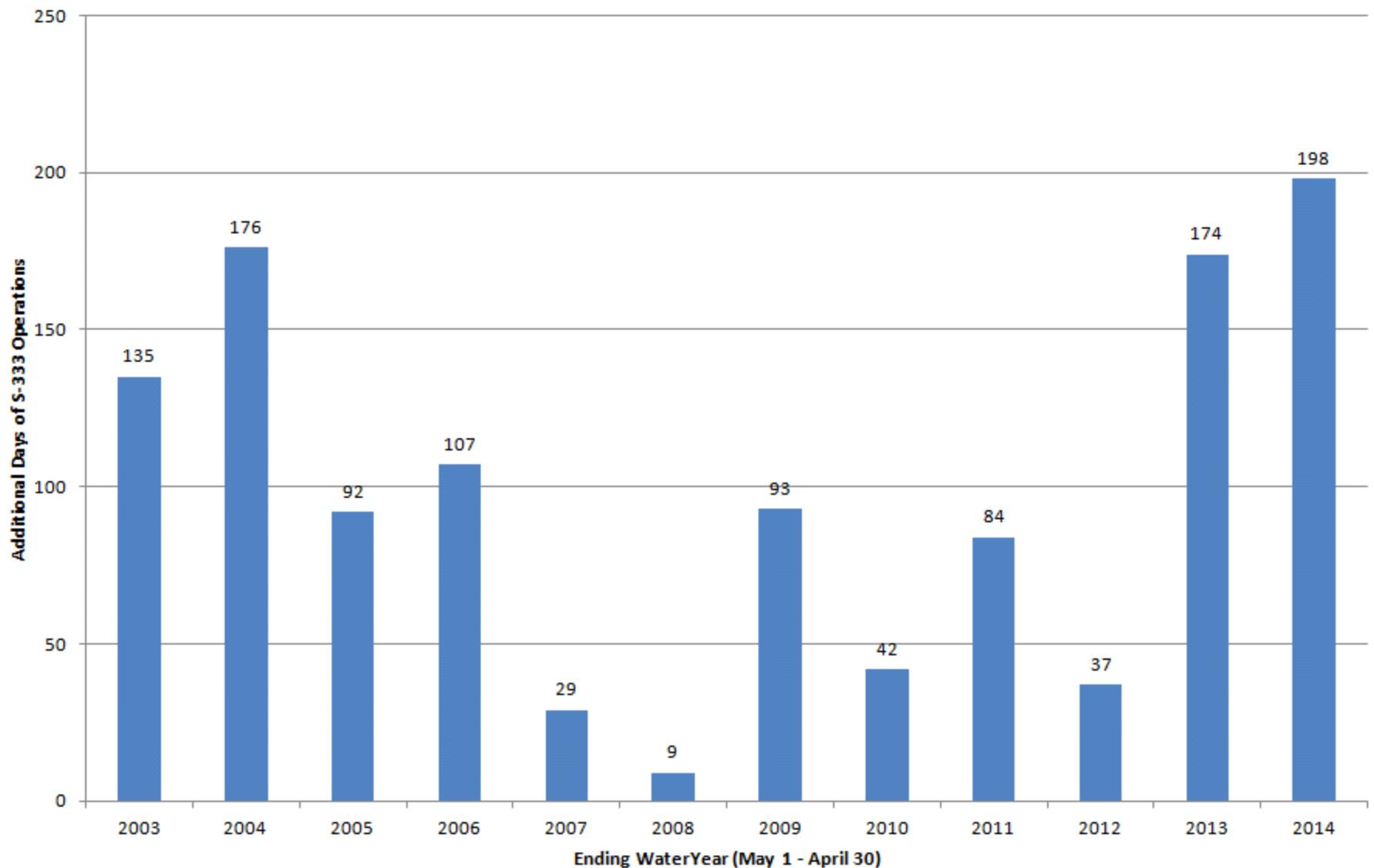
## G-3273 Relaxation: Potential Additional Days with L-29 Constraint of 7.5 feet NGVD under IOP (July 2002-June 2014)



## G-3273 Relaxation: Potential Additional Days of S-333 Operations with L-29 Constraint of 7.5 feet NGVD under IOP (July 2002- January 2014)



## G-3273 Relaxation: Potential Additional Days of S-333 Operations with L-29 Constraint of 7.5 feet NGVD under IOP (July 2002- January 2014)

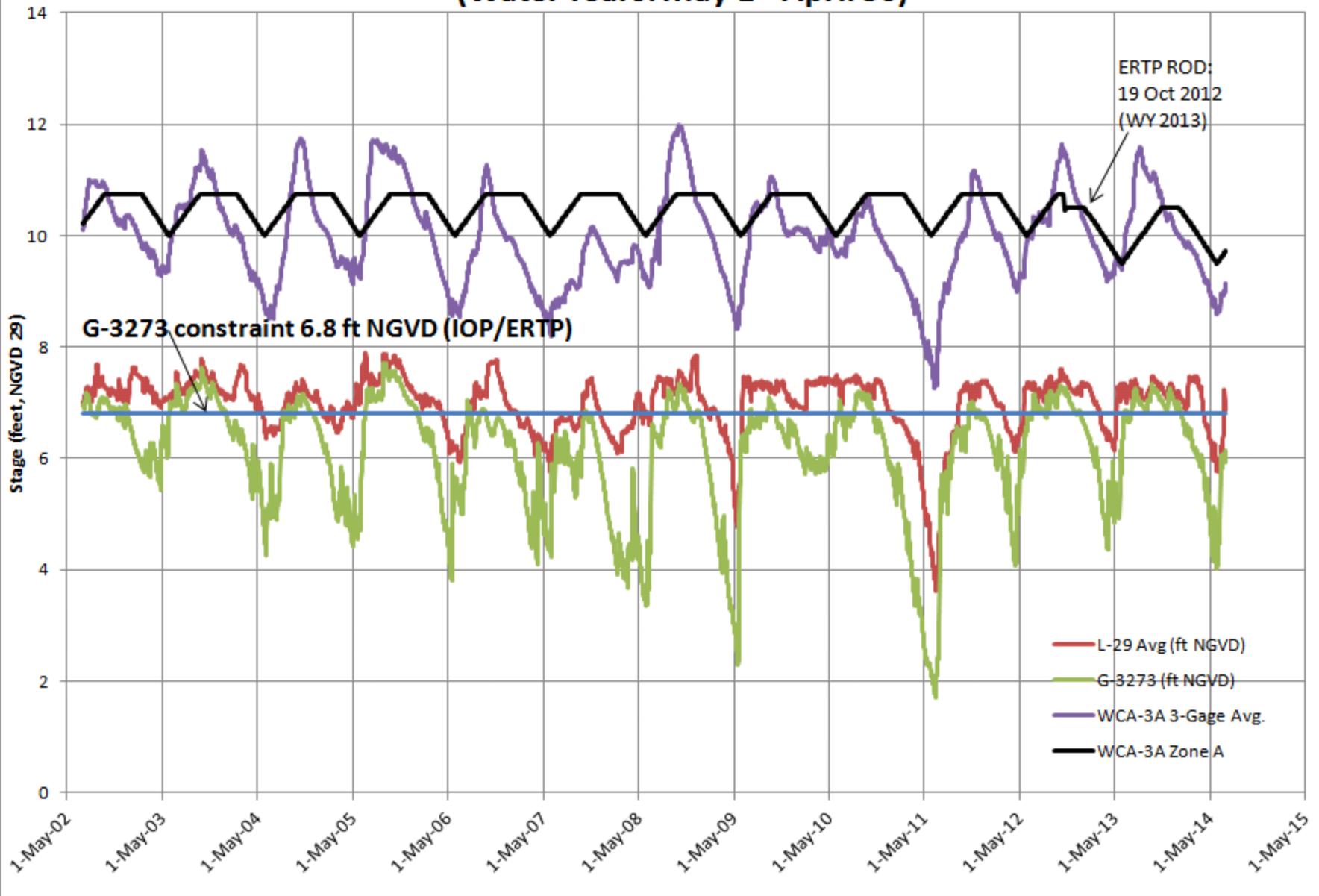


# Potential Hydrologic Effects to WCA-3A and SDCS with Proposed Operational Strategy

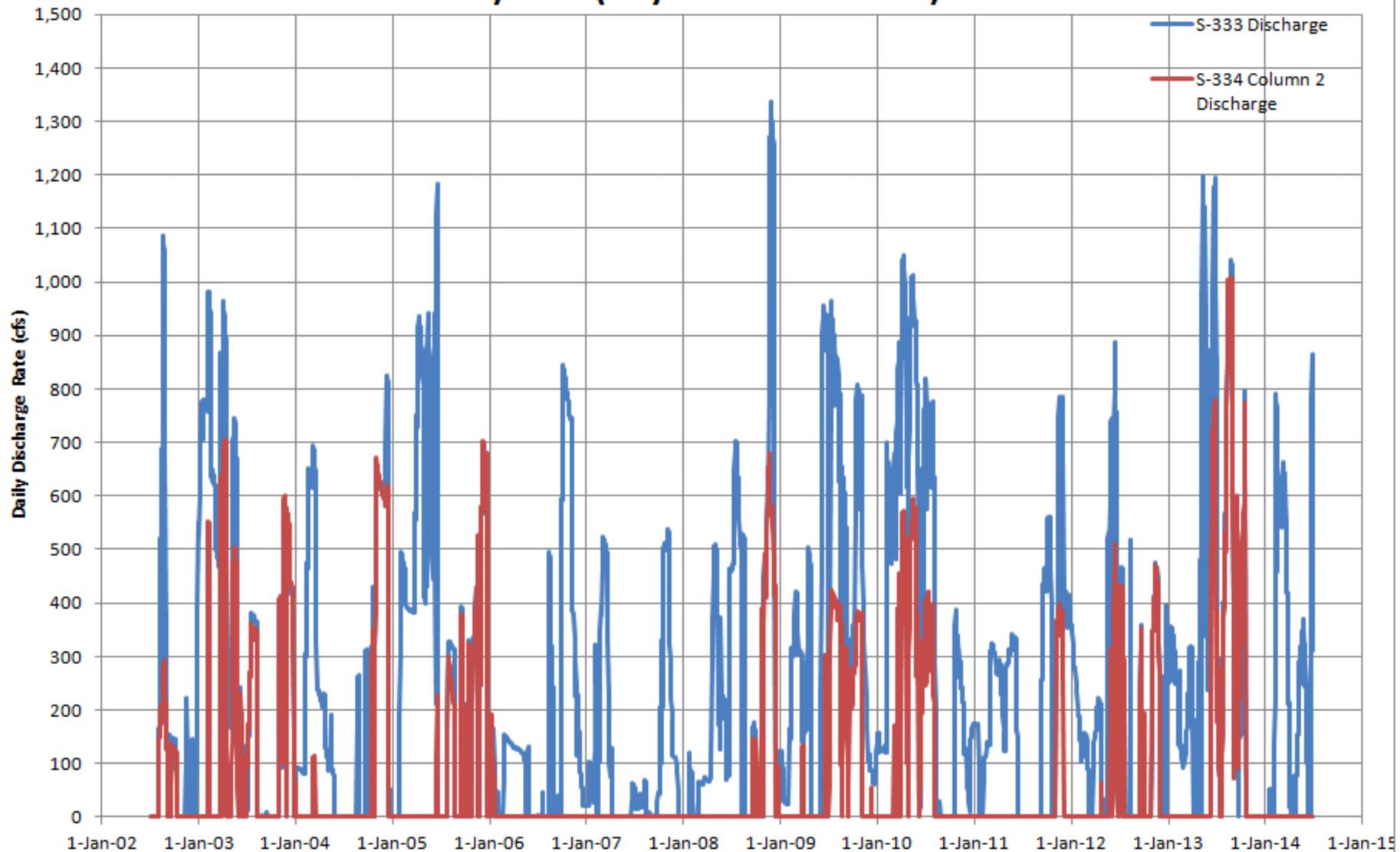
# S-12 Closure and Column 2 Operations:

- Raising G-3273 induces more seepage to L-31N (north of G-211);
- S-356 will be used to return seepage from L-31N to L-29 Canal;
- Column 2 releases from WCA-3A to the SDCS via S-334 cannot be conducted concurrently with S-356 pumping;
- Raising G-3273 will reduce Column 2 discharges from S-334/S-331, but may result in increased releases from S-331 for 8.5 SMA mitigation and increased seepage to L-31N south of S-331 (prior to completion of C-111 South Dade North Detention Area)
- Raising G-3273 increases the opportunity to discharge water out of WCA-3A under normal operations (Column 1), but reduced or eliminated Column 2 operations may reduce WCA-3A discharges under Column 2 operations
  - Average Column 1 release volume from S-333 when L-29 > 7.0: 340 cfs
  - Average Column 2 release volume from S-334: 360cfs
  - Average Column 1 release volumes from S-333 increase with 1-mi. bridge (MAR 2013)
- Column 2 operations under ERTTP expected primarily during the S-12 closure period (01 NOV – 15 July), with WCA-3A water budget accounting as 'normal' basis for Column 2 operations after 15 July;
- Column 2 operations have been historically used as a WCA-3A 'high water' tool under long-term IOP and ERTTP operations
- Increment 1 target: no net adverse effects to WCA-3A high water conditions, no net adverse effect to South Dade, and/or acceptable level of risk during this 1-2 year field test, with recognition that field test results are planned to be used to update the WCP post MWD G-3273/S-356 Increment 1

# IOP/ERTP Hydrographs: L-29 Borrow Canal, G-3273, WCA-3A 3-Gage Avg (Water Years: May 1 - April 30)



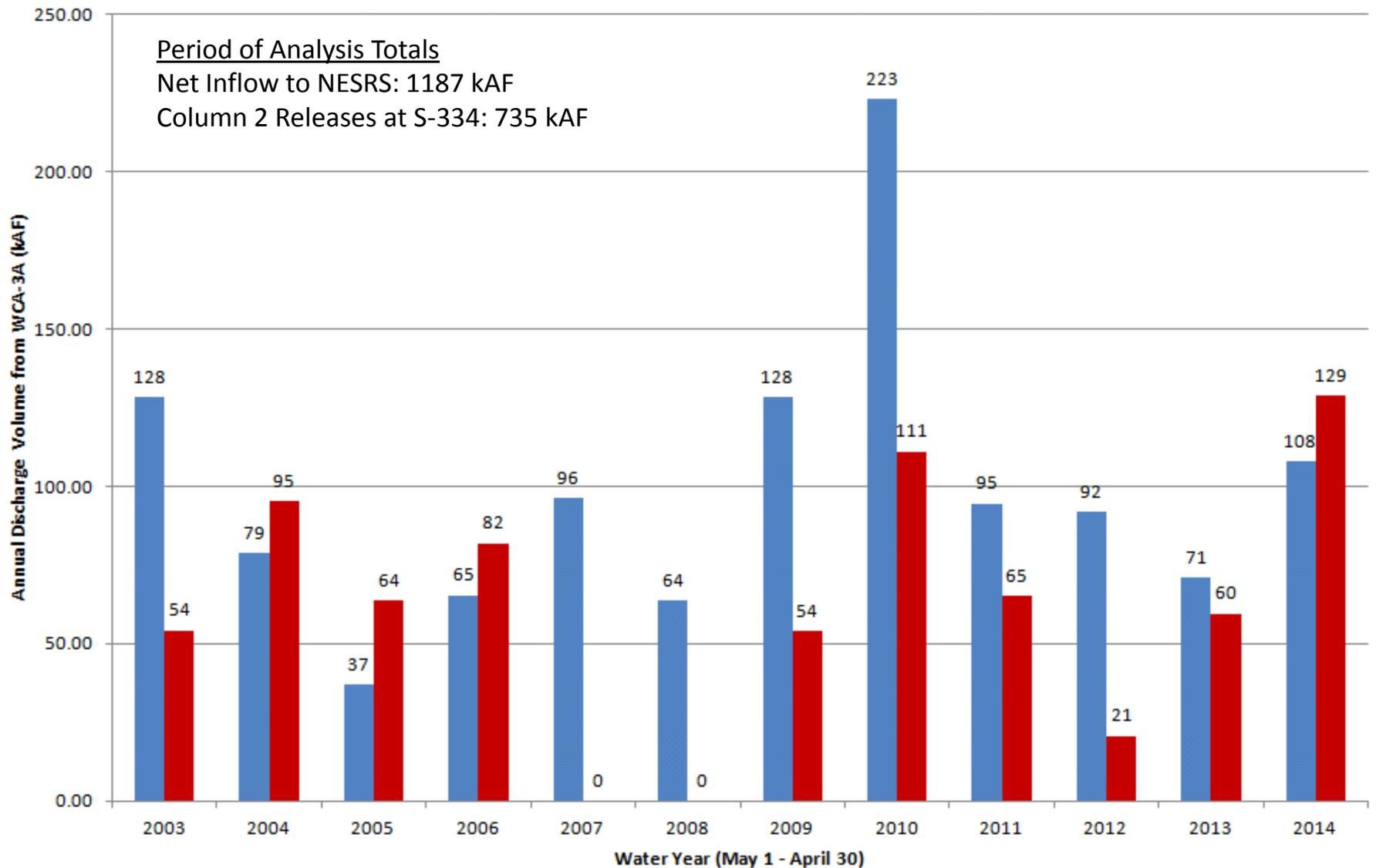
## L-29 Canal Structure Inflow and Outflow Time Series: IOP/ERTP (July 2002 - June 2014)



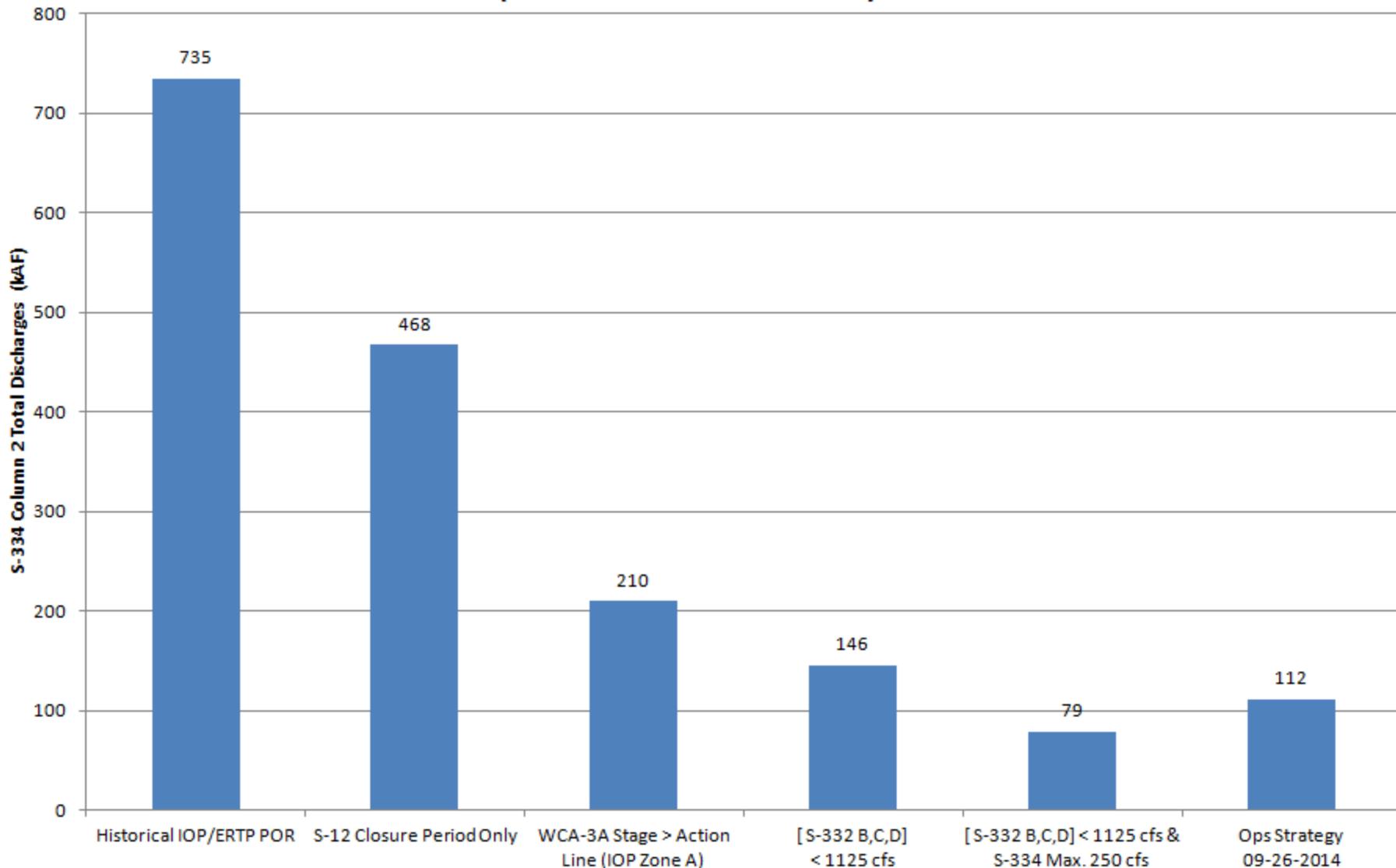
## WCA-3A Water Budget to NESRS and SDCS (July 2002- June 2014)

■ Historical Net Structural Inflow to NESRS (S333 - S334)

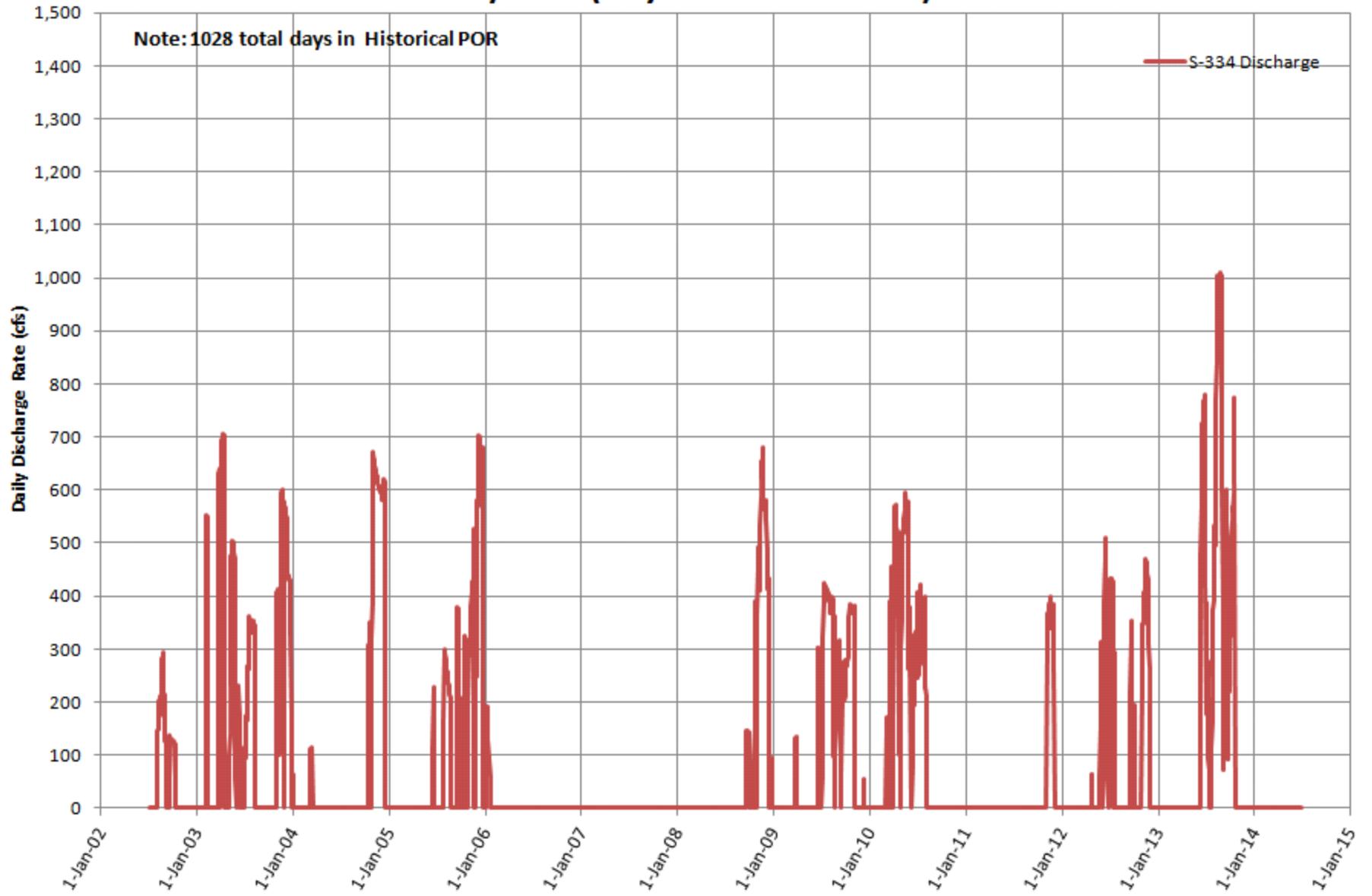
■ Historical Column 2 Releases from WCA-3A to SDCS (S-334)



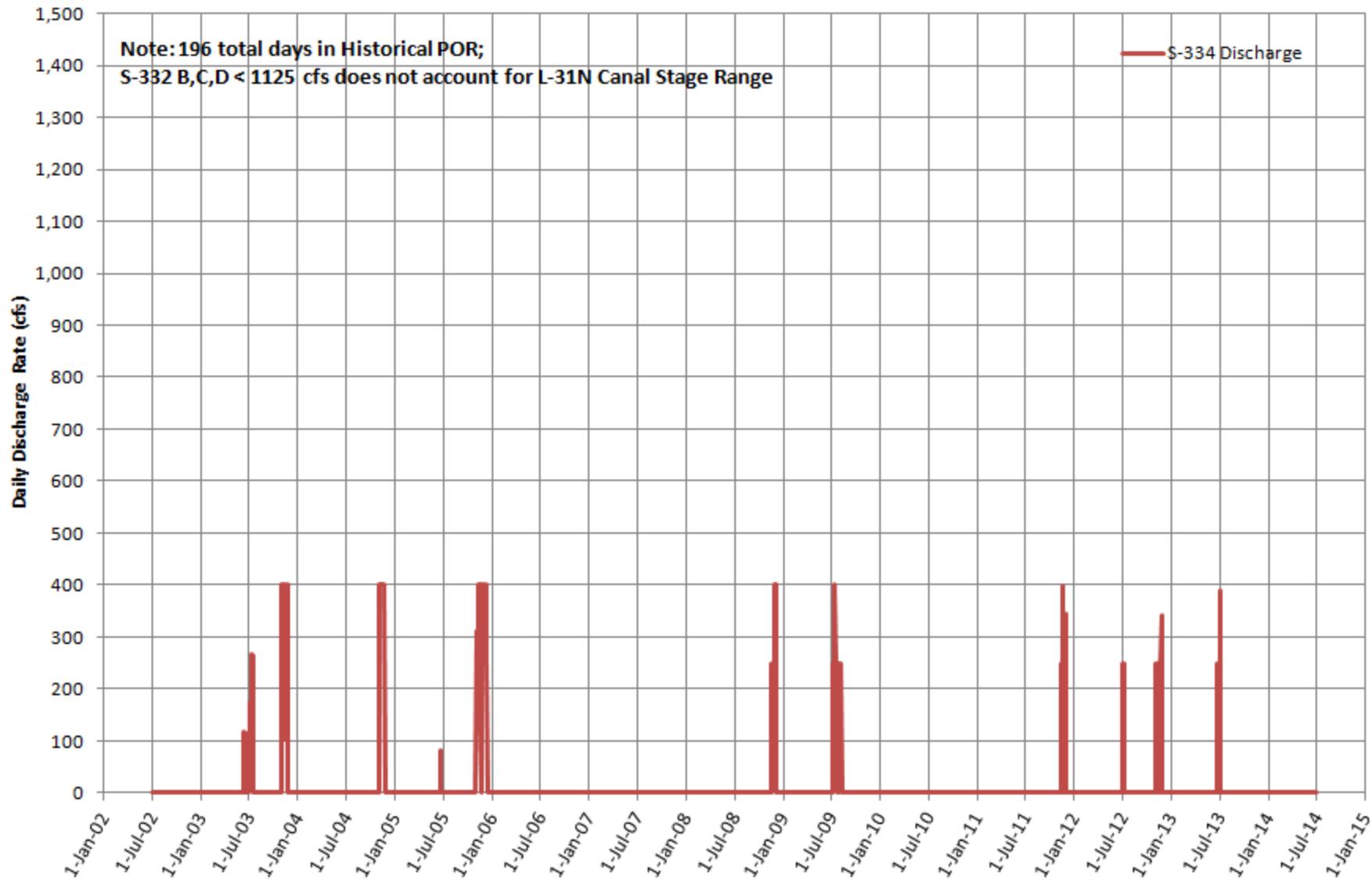
### MWD G-3273/S-356 Increment 1: Potential Operational Constraints for Column 2 Operations at S-334 and Effects on S-334 Discharge Volume (total for WY2003-WY2014)



# S-334 Column 2 Time Series (complete) : IOP/ERTP (July 2002 - June 2014)

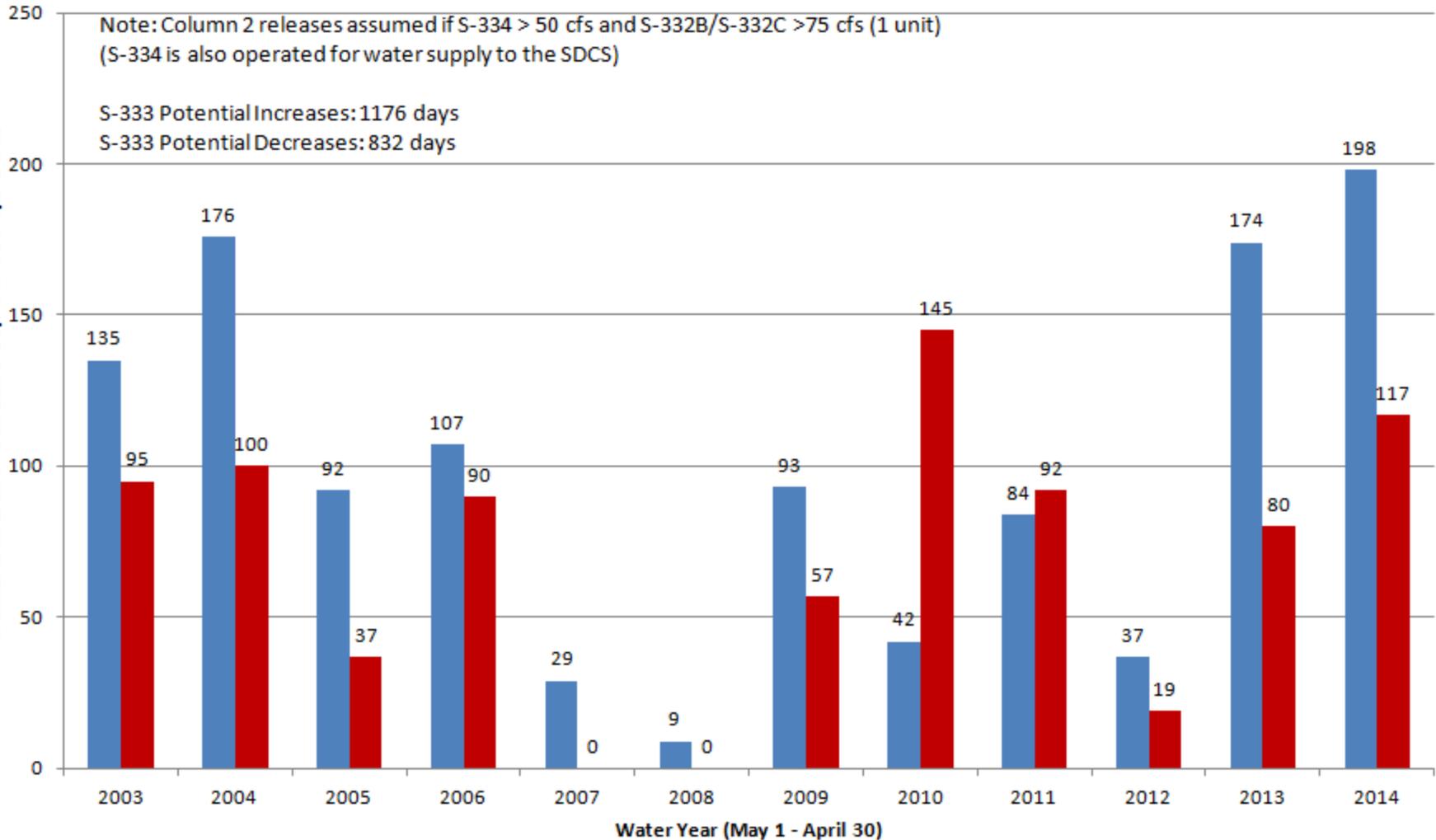


**S-334 Column 2 Time Series: S-12s Closed, WCA-3A > action line,  
 [S-332 BCD] < 1125/1000 cfs with S-334 Maximum 250/400 cfs, and  
 Conditional S-334 Column 2 after 14 July: IOP/ERTP (July 2002 - June 2014)**



## G-3273 Relaxation: Potential Additional Days of S-333 Operations with L-29 Constraint of 7.5 feet NGVD, with Reduced Opportunity for Column 2 Operations (July 2002- June 2014)

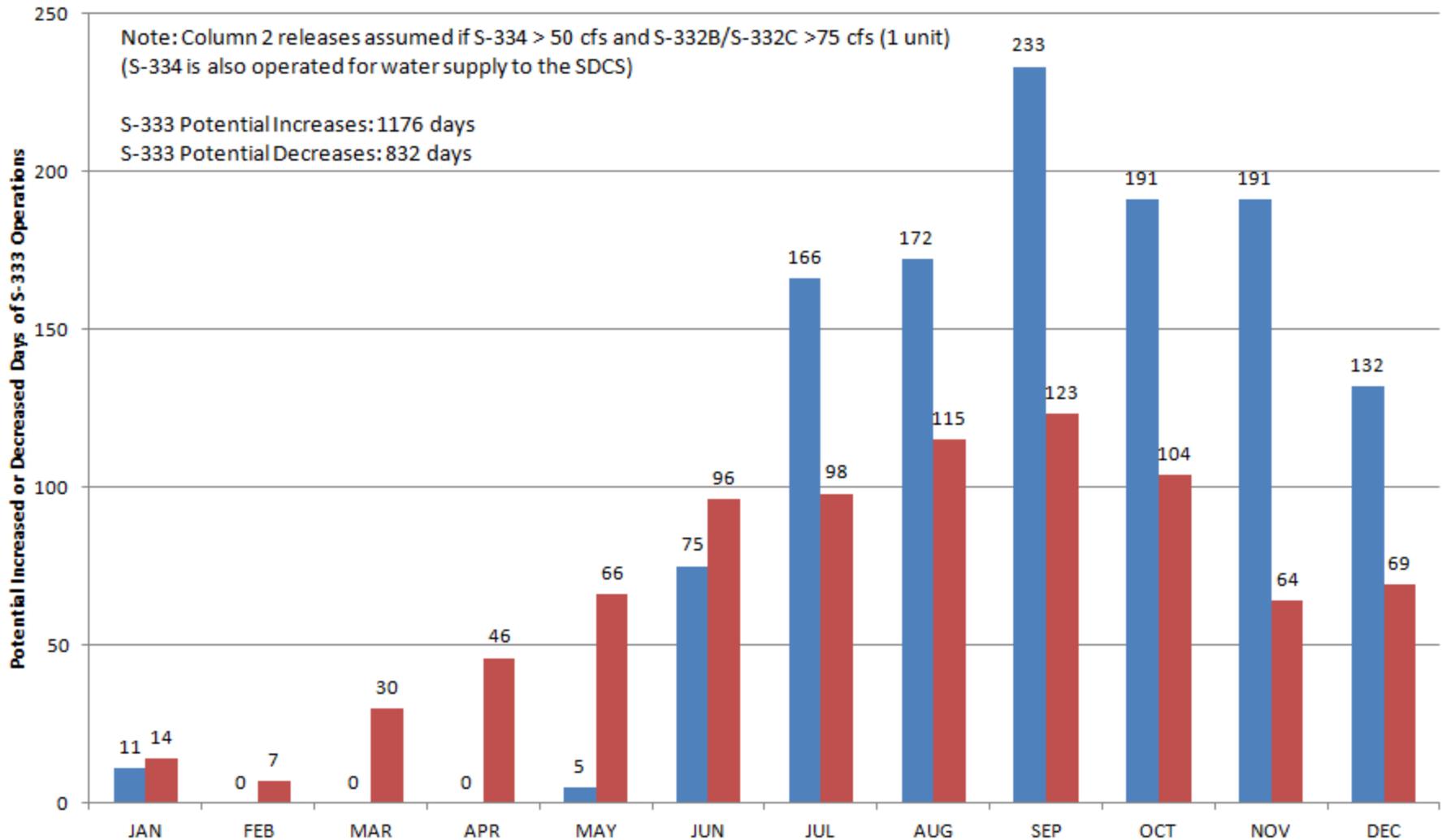
■ S-333 Potentially Increased with G-3273 Relaxation     
 ■ S-333 Potentially Decreased with new criteria for Column 2 Operations



## G-3273 Relaxation: Potential Additional Days of S-333 Operations with L-29 Constraint of 7.5 feet NGVD, with Reduced Opportunity for Column 2 Operations during S-12 Closure Period (July 2002-June 2014)

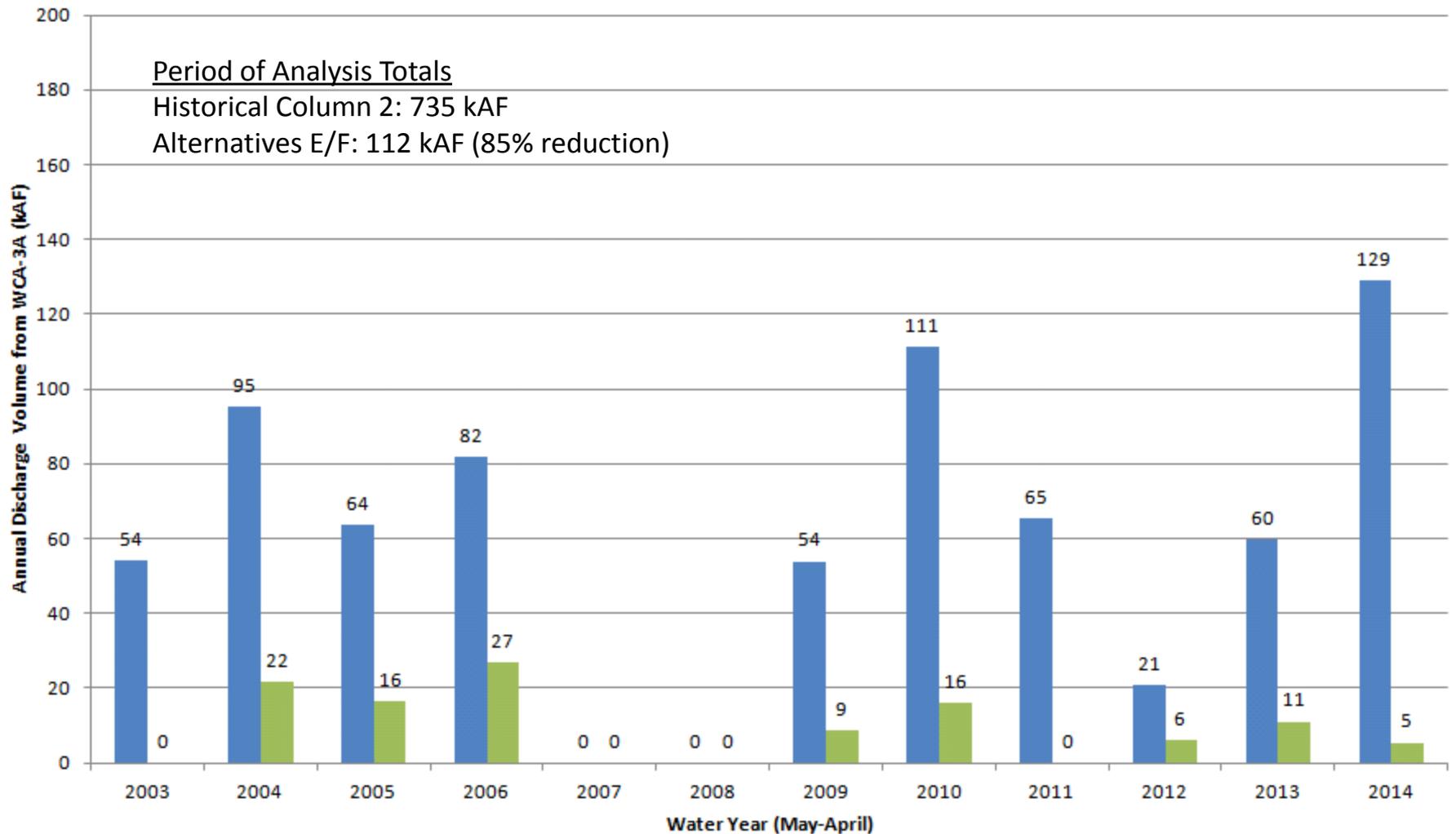
■ S-333 Potentially Increased with G-3273 Relaxation

■ S-333 Potentially Decreased with new criteria for Column 2 operations

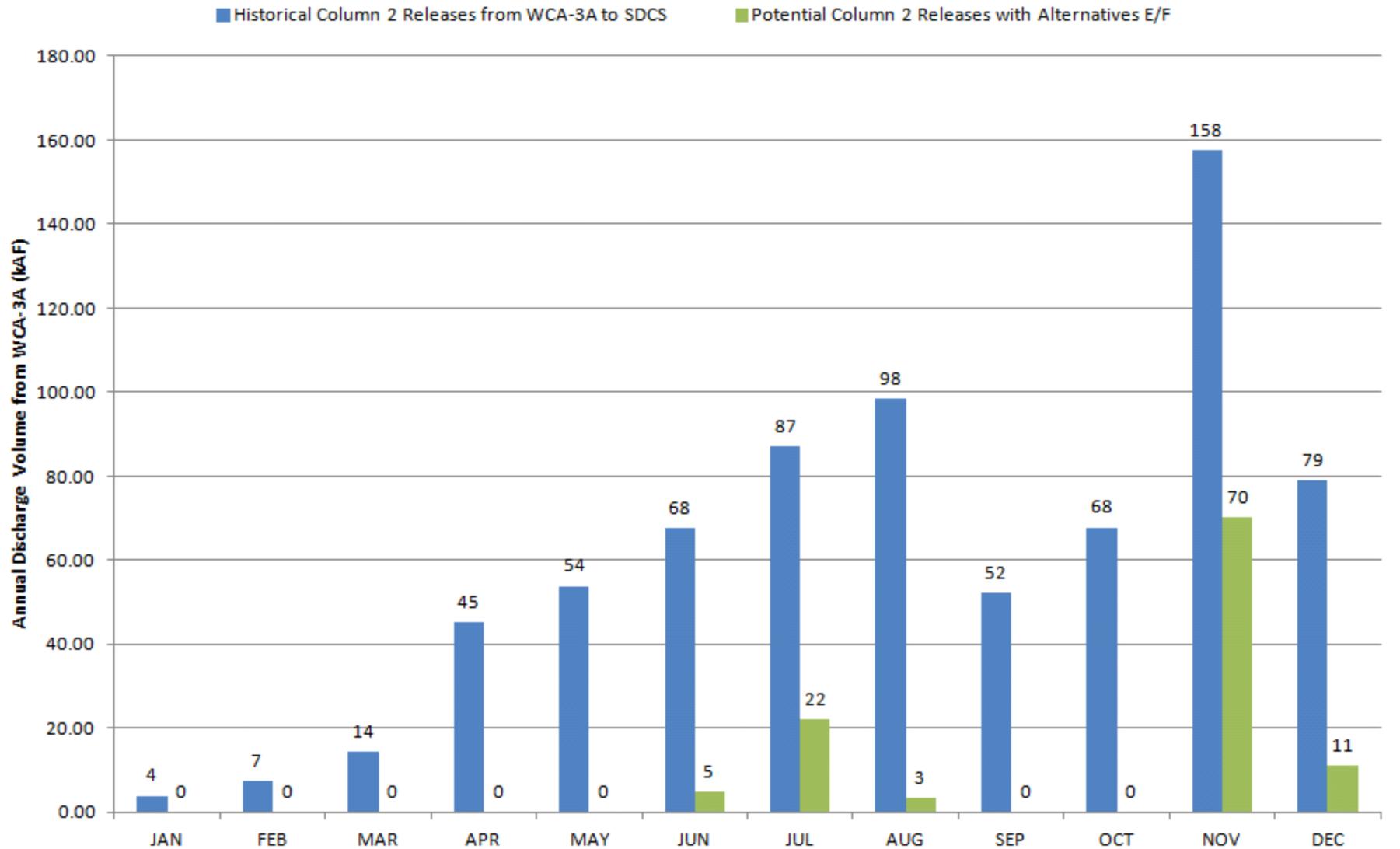


## G-3273 Relaxation: Magnitude of Alternative E/F Potential S-334 Column 2 Releases from WCA-3A, compared to Historical S-334 Column 2 Releases (POR July 2002- June 2014)

■ Historical Column 2 Releases from WCA-3A to SDCS (S-334)     
 ■ Potential Column 2 Releases for Alternatives E/F



# G-3273 Relaxation: Reduced Opportunity for Column 2 Operations during S-12 Closure Period with Alternative E/F Operational Constraints (July 2002-June 2014)



MWD G-3273 Constraint Relaxation:  
Potential Hydrologic Effects from  
proposed changes to  
S-197 operational criteria

# Alternative E: S-197 Criteria

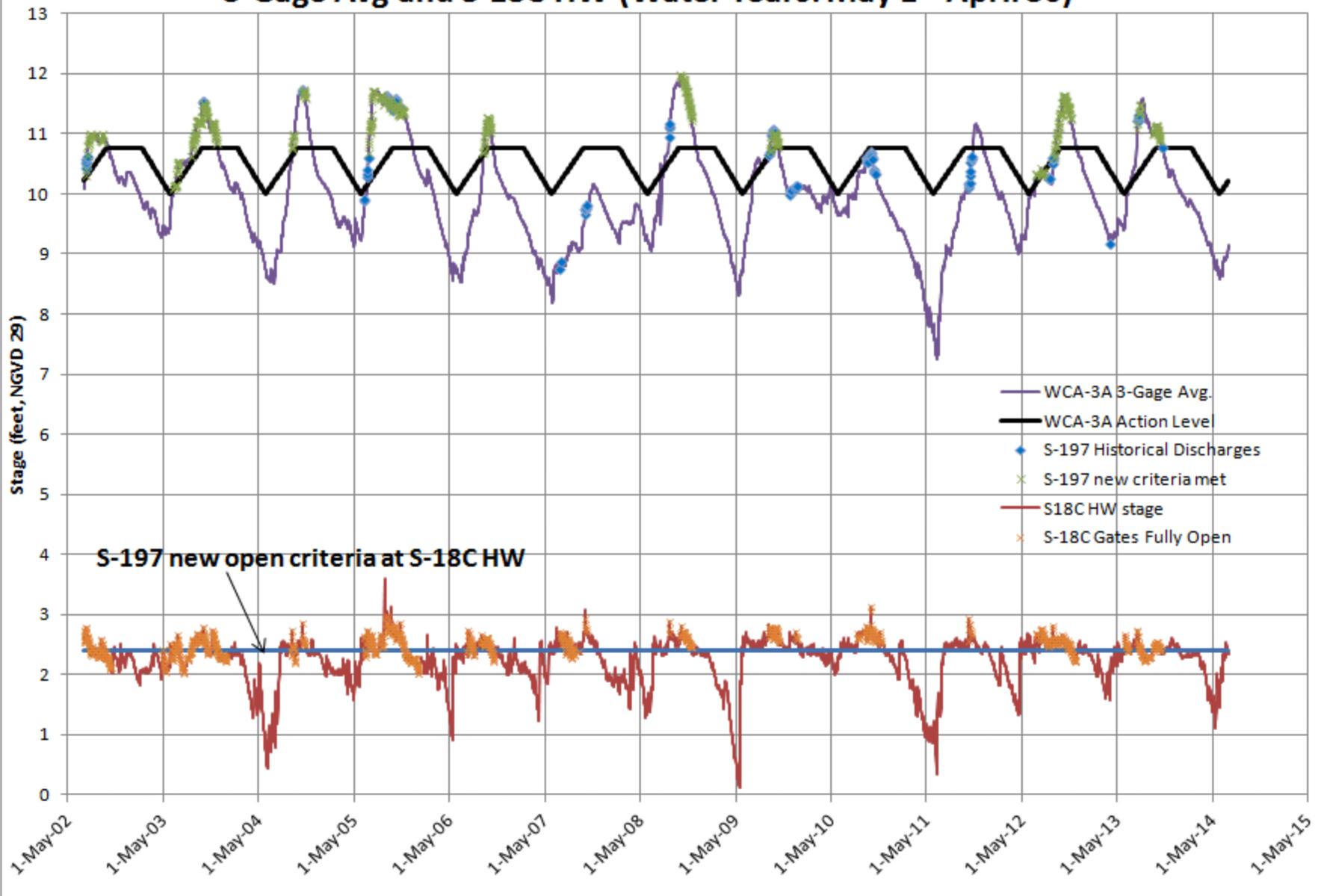
- Maintain IOP/ERTP Initial Gate Open Criteria
  - S-177 HW > 4.1 feet NGVD or S-18C HW > 2.8
- Additionally, if the following conditions are met:
  - WCA-3A stage > Action Line (IOP Zone A);
  - S-18C Fully Open (Bottom of gates > S-18C HW);
  - S-18C HW > 2.4 feet NGVD;

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

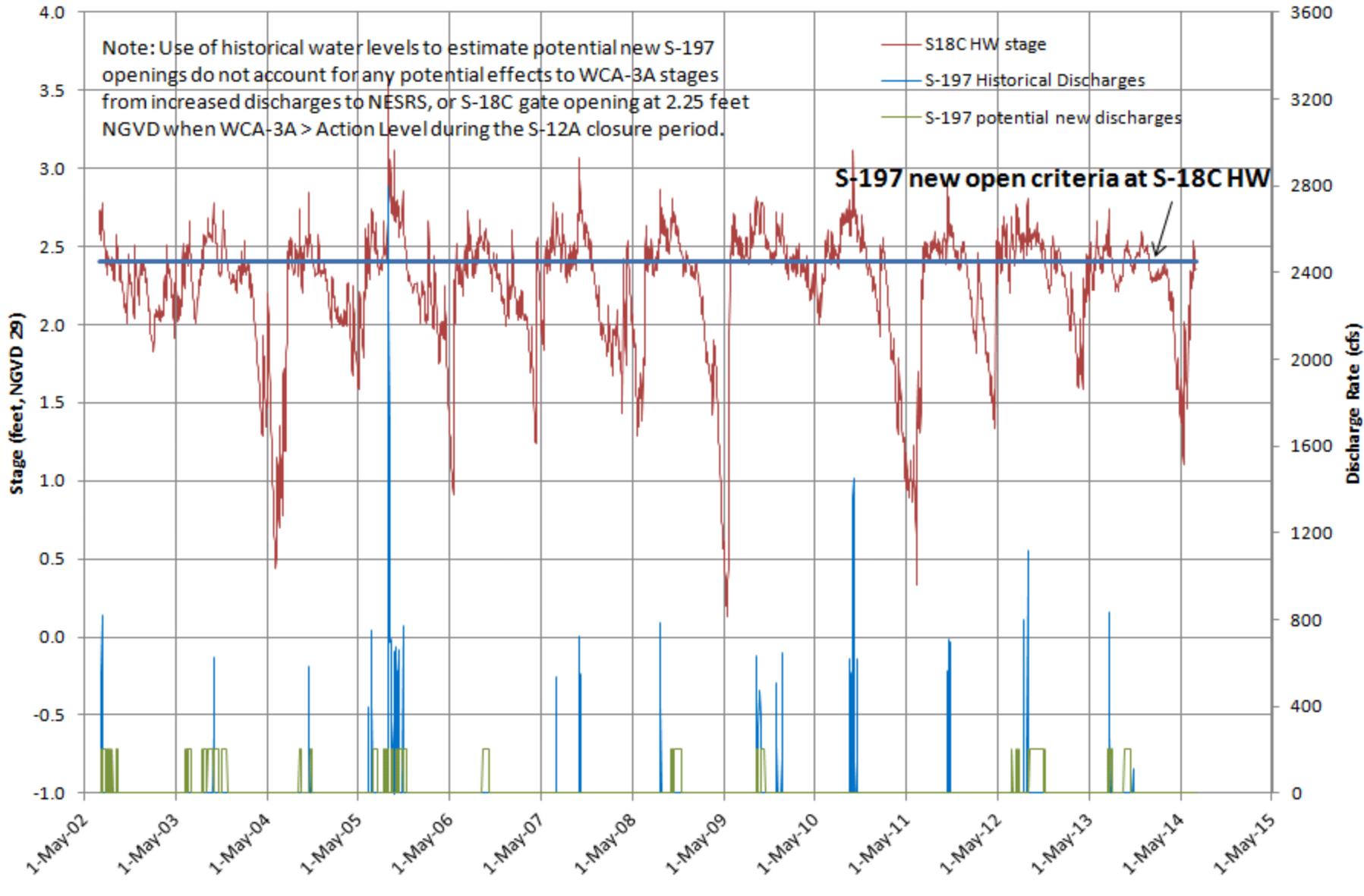
# Data Analysis Assumptions

- Used IOP/ERTP historical stages for WCA-3A 3-gauge average, S-18C HW, and S-18C gate openings from SFWMD DBHYDRO (July 2002-June 2014)
- Historical discharges from S-197 unchanged
- Potential effects not accounted for:
  - WCA-3A changes from ERTTP Regulation Schedule
    - ERTTP Implemented in October 2012
  - WCA-3A changes due to increased flows to NESRS
  - S-18C gate opening when S-18C HW > 2.25 when WCA-3A stage > Action Level during S-12A closure period and Column 2/S-334 discharges are being made to SDCS
  - Changes to S-18C HW stages due to additional S-197 gate openings
  - Additional S-197 gate openings if less than 200 cfs limit

# 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)

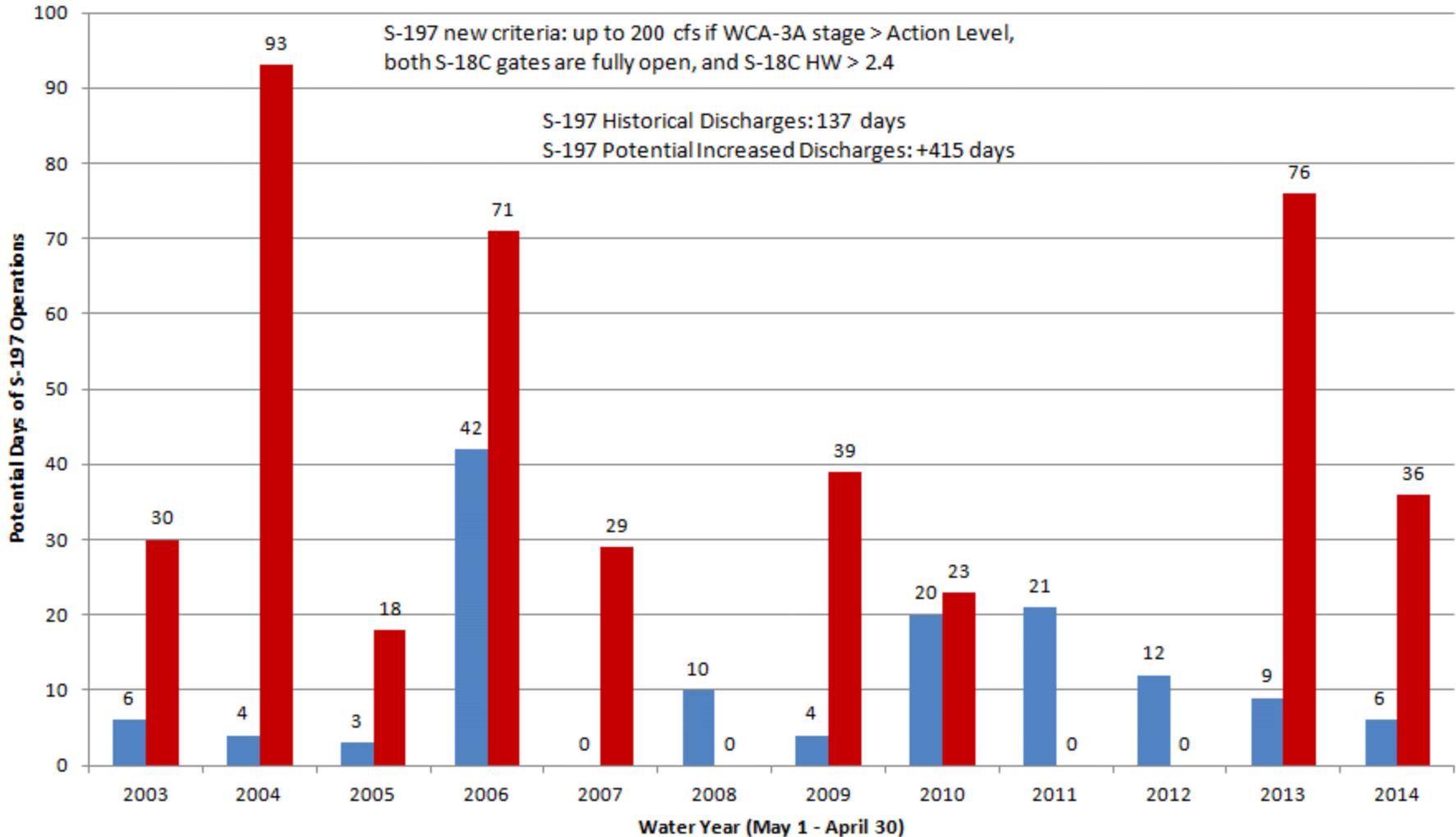


# IOP/ERTP Hydrographs: Potential New S-197 Discharges based on WCA-3A3-Gage Avg and S-18C HW (Water Years: May 1 - April 30)



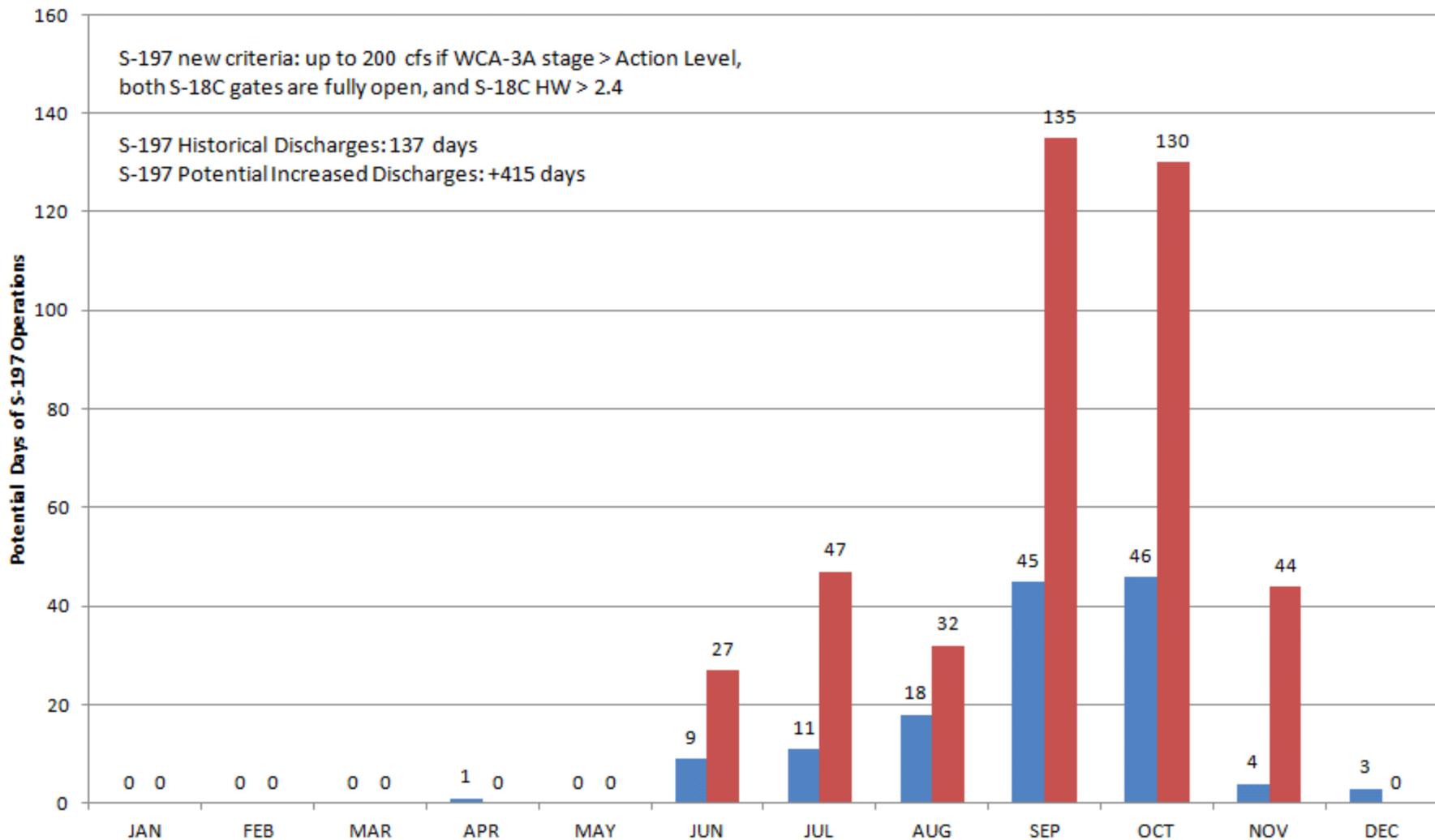
## G-3273 Relaxation: Potential Additional Days of S-197 Operations with Revised S-18C Headwater Criteria for S-197 Gate Opening when WCA-3A stages > Action Level

■ Historical S-197 Discharges      
 ■ S-197 Potentially Increased with new criteria (new open days)



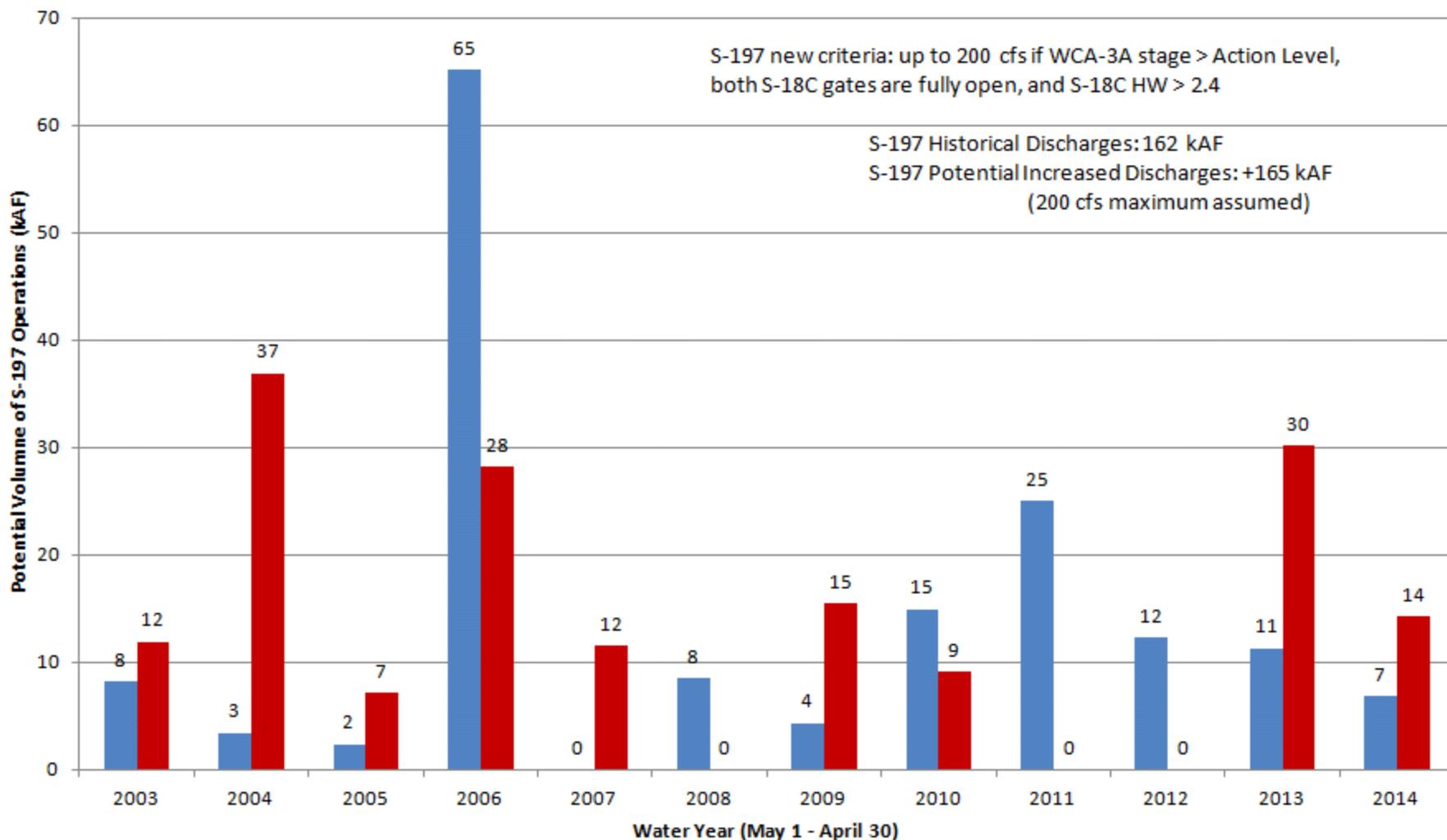
## G-3273 Relaxation: Potential Additional Days of S-197 Operations with Revised S-18C Headwater Criteria for S-197 Gate Opening when WCA-3A stages > Action Level

■ Historical S-197 Discharges     
 ■ S-197 Potentially Increased with new criteria (new open days)



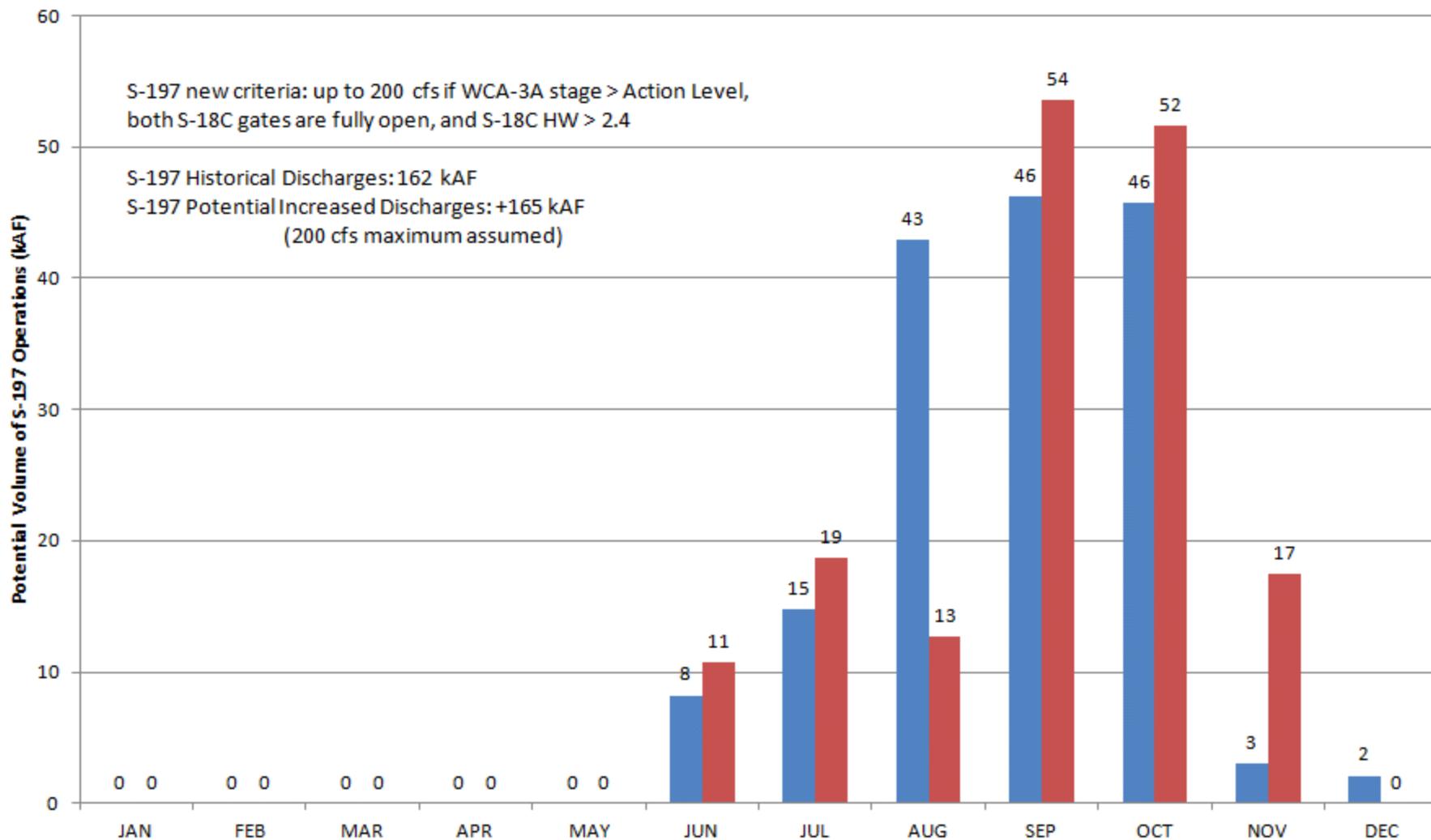
## G-3273 Relaxation: Potential Additional Volume of S-197 Discharges with Revised S-18C Headwater Criteria for S-197 Gate Opening when WCA-3A stages > Action Level

■ Historical S-197 Discharges     
 ■ S-197 Potentially Increased with new criteria (new open days)



## G-3273 Relaxation: Potential Additional Volume of S-197 Operations with Revised S-18C Headwater Criteria for S-197 Gate Opening when WCA-3A stages > Action Level

■ Historical S-197 Discharges     
 ■ S-197 Potentially Increased with new criteria (new open days)



# Hydrologic Effects of Action Alternatives E/F

- Compared to No Action Alternative, given the hydrological conditions experienced during IOP/ERTP, Alternatives E/F are anticipated to:
  - Increase number of days with WCA-3A unconstrained discharges to NESRS by up to 1176 days (up to 64% increase)
  - Increase the frequency and duration of L-29 Canal stages approaching the maximum operating limit of 7.5 feet NGVD (IOP/ERTP stage > 7.3 ~29%)
  - Reduce the total duration of WCA-3A regulatory releases to the SDCS by an estimated 832 days (81% reduction; frequency reduced from 23.5% to 4.5% of period of analysis), while also reducing seepage losses caused by lowered Column 2 canal operating levels (used if S-356 is closed)
  - Reduce the volume of WCA-3A regulatory releases to the SDCS by an estimated 85% (735 kAF under IOP/ERTP to 112 kAF)
  - Increase flood control releases from S-331 for 8.5 SMA mitigation and increase seepage to L-31N south of S-331, prior to completion of C-111 South Dade North Detention Area
    - Additional volume to L-31N Canal is expected to be primarily managed with the C-111 South Detention Area using S-332 B, S-332C, and S-332D, given the significant reduction in WCA-3A regulatory releases to the SDCS

# Hydrologic Effects of Action Alternatives E/F

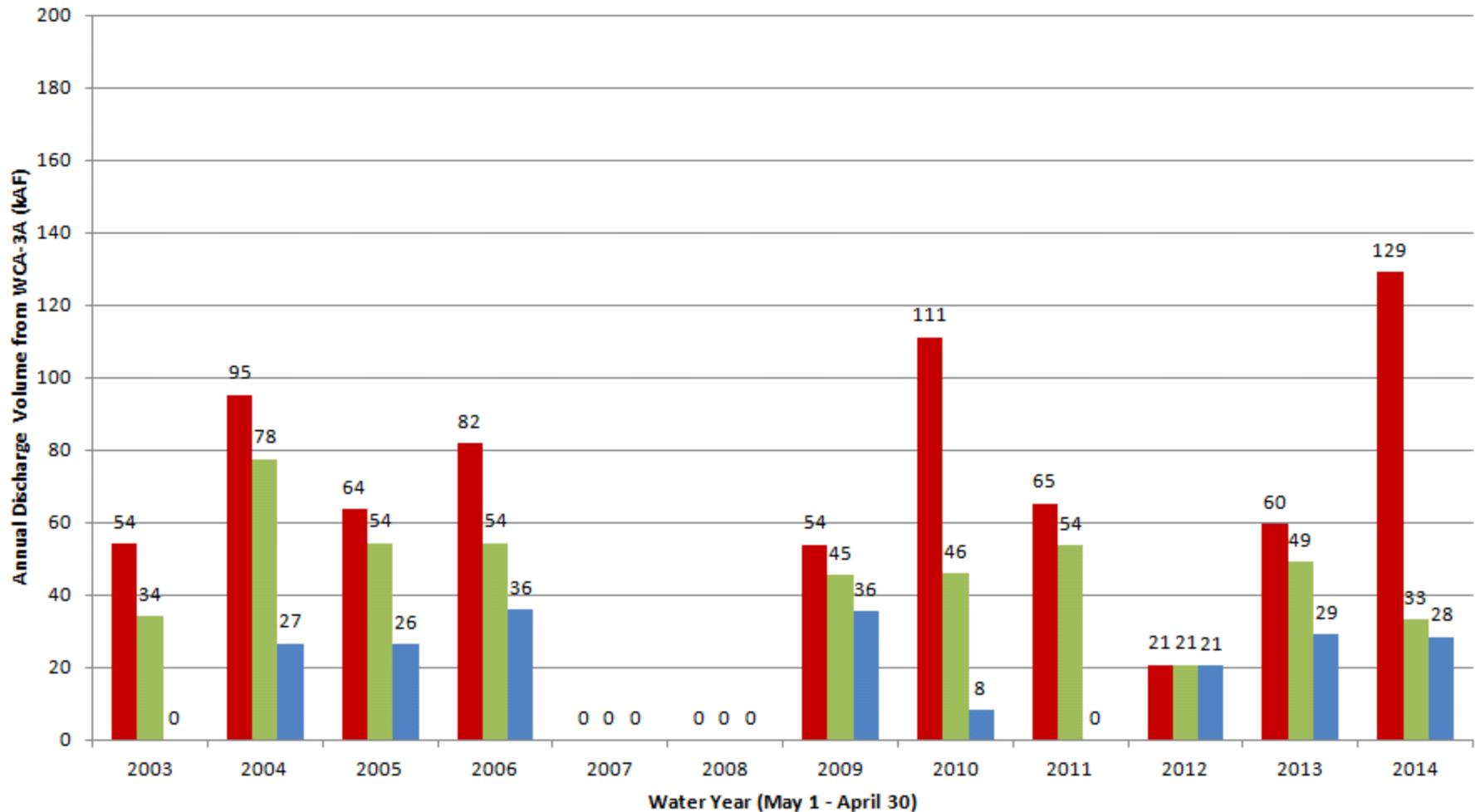
- Compared to No Action Alternative, given the hydrological conditions experienced during IOP/ERTP, Alternative E is anticipated to:
  - Increase the frequency and duration of S-197 discharges to Manatee Bay/Barnes Sound by up to 300% (137 days to a maximum 552 days)
  - Increase the total volume of S-197 discharges by up to 100% (162 kAF to a maximum of 327 kAF)
  - Increase flood control releases from S-18C and S-197 to provide additional flood protection for South Dade areas which may be conditionally effected by operation of S-332D and/or the C-111 South Detention Area during the Increment 1 field test
- 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

Questions/Comments

# Back-Up Slides

## G-3273 Relaxation: Magnitude of Historical S-334 Column 2 Releases from WCA-3A, including S-12 Closure Period and WCA-3A High Water (POR July 2002- June 2014)

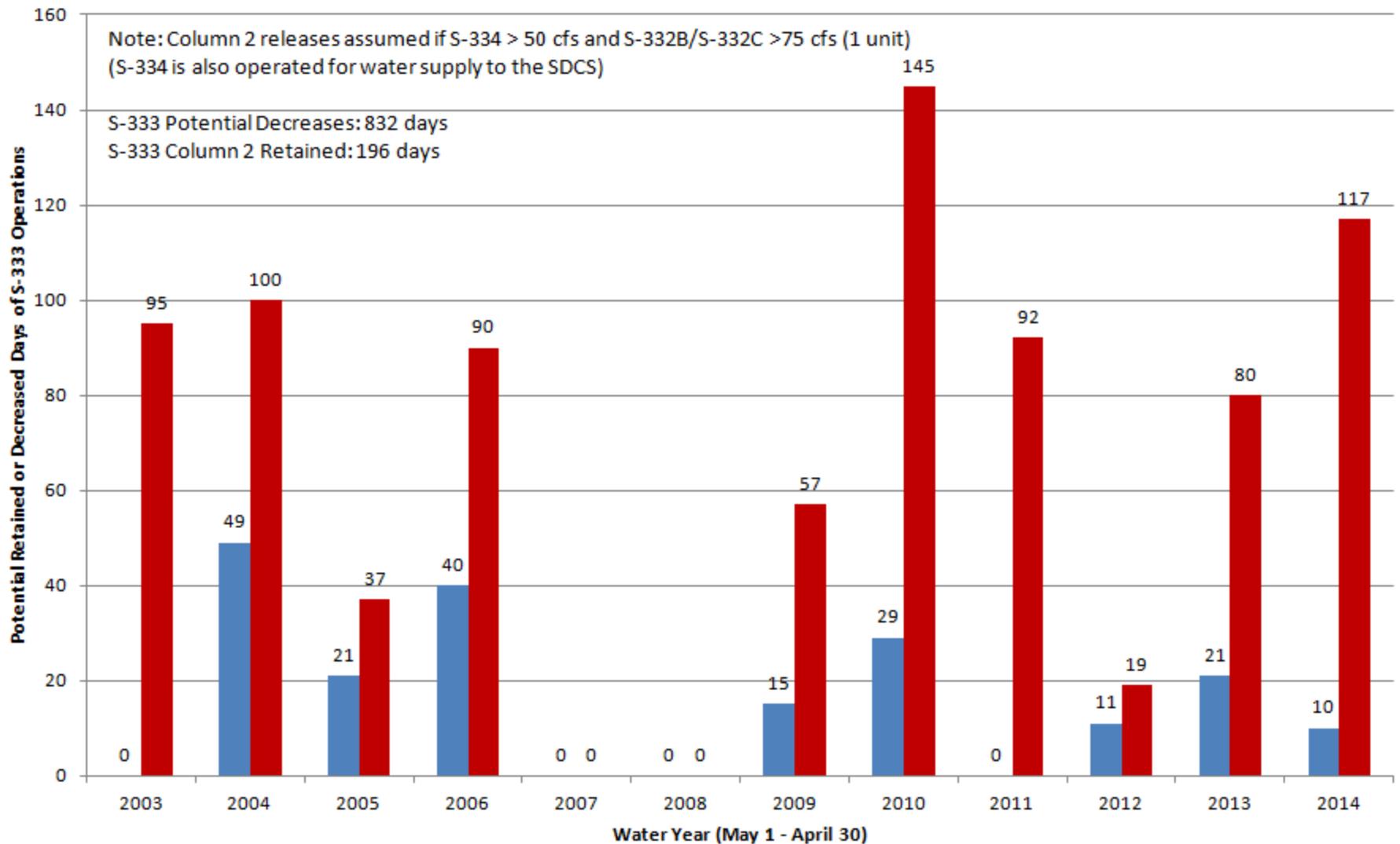
- Historical Column 2 Releases from WCA-3A to SDCS (S-334)
- Historical Column 2 Releases during S-12 Closure Period
- Historical C2 Releases during S-12 Closure & WCA-3A > IOP Zone A



## G-3273 Relaxation: Reduced Opportunity for Column 2 Operations During S-12 Closure Period with Operational Constraints (July 2002- June 2014)

■ S-333 Column 2 Operations Retained (capacity limited)

■ S-333 Potentially Decreased with new criteria for Column 2 Operations

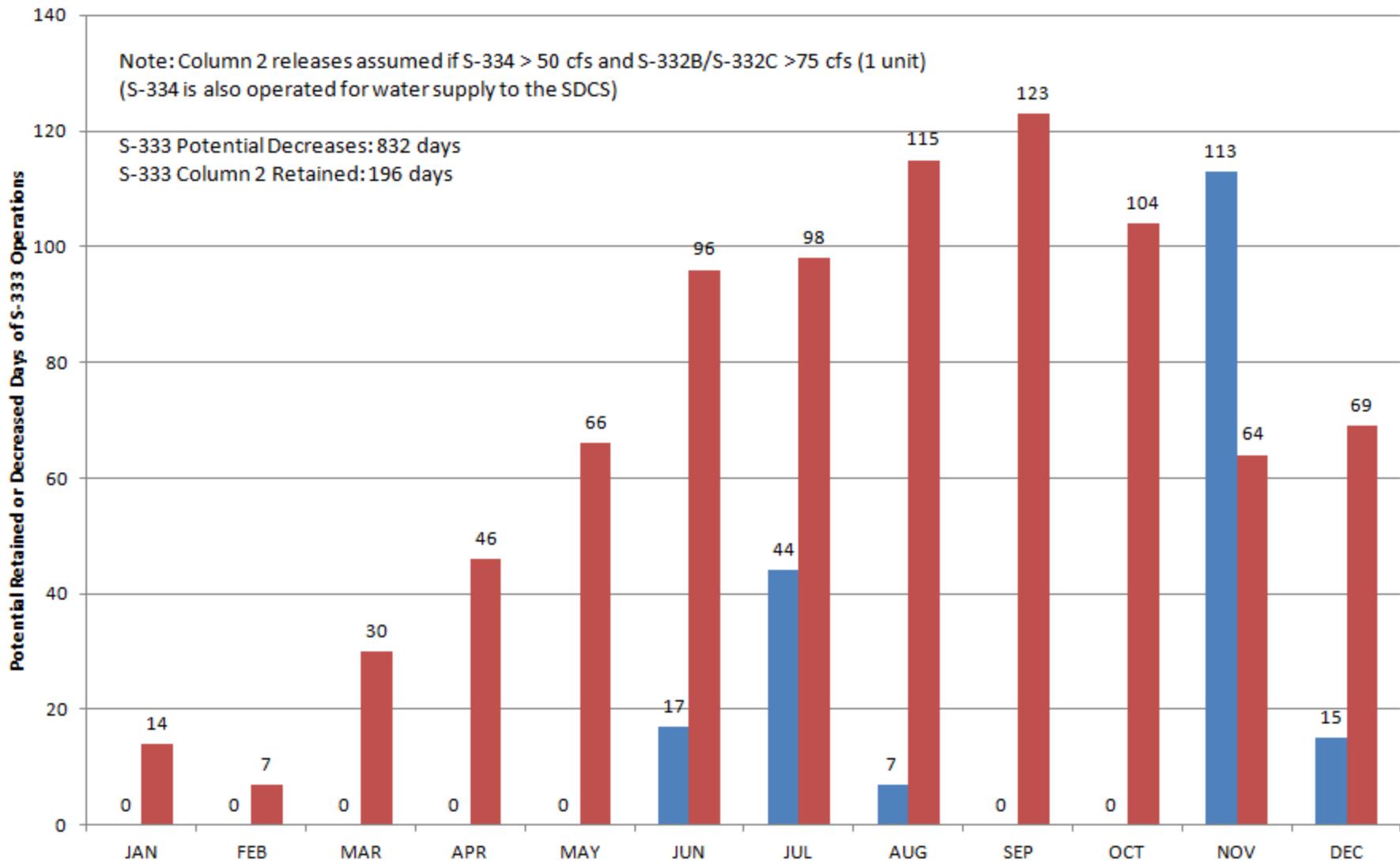


## G-3273 Relaxation: Reduced Opportunity for Column 2 Operations during S-12 Closure Period with Operational Constraints (July 2002-June 2014)

■ S-333 Column 2 operations retained (capacity limits)     
 ■ S-333 Potentially Decreased with new criteria for Column 2 operations

Note: Column 2 releases assumed if S-334 > 50 cfs and S-332B/S-332C >75 cfs (1 unit)  
 (S-334 is also operated for water supply to the SDCS)

S-333 Potential Decreases: 832 days  
 S-333 Column 2 Retained: 196 days



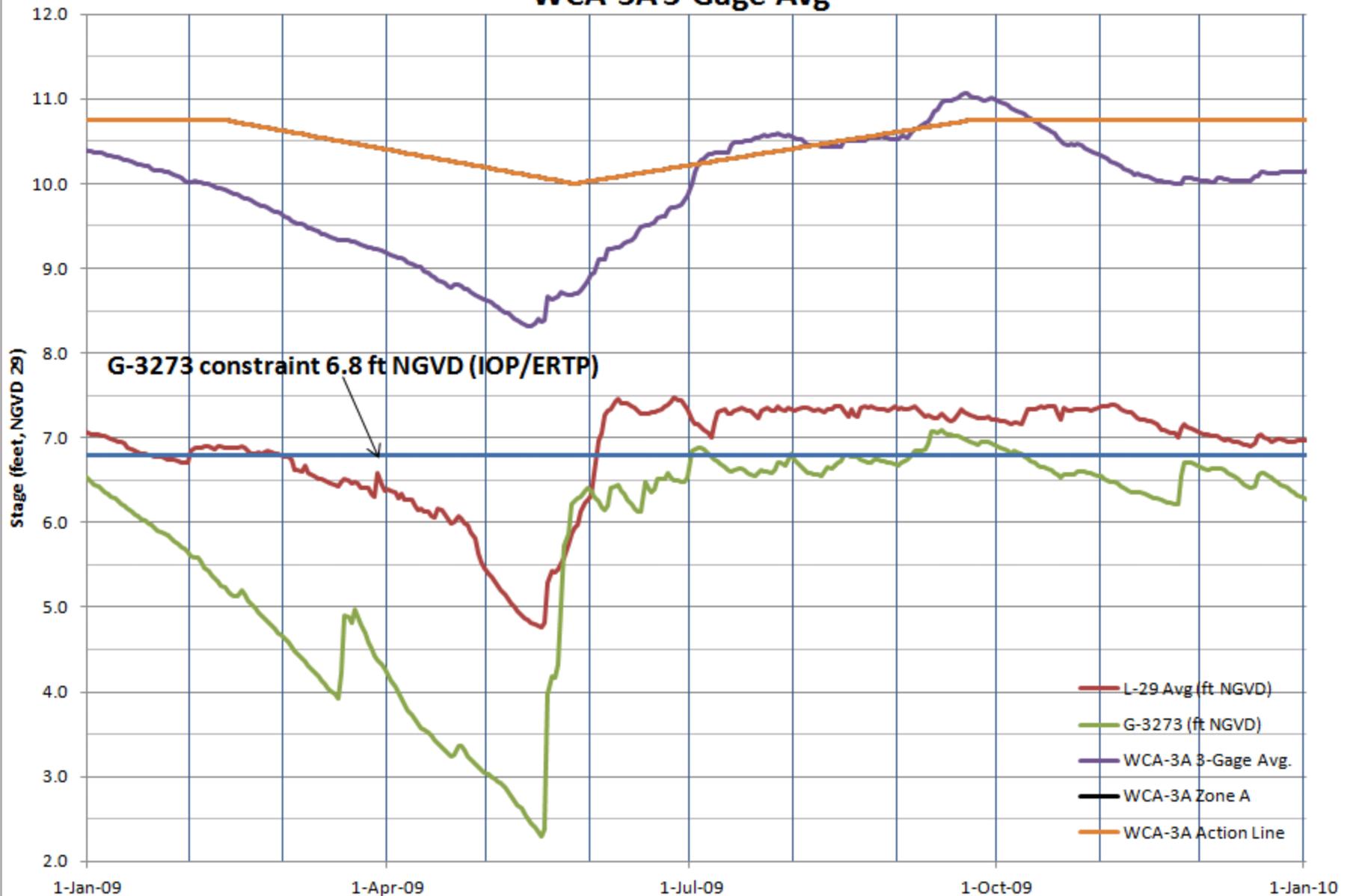
<b>WCA-3A Accounting Compared to pre-ISOP Regulation Schedule</b>		
<b>S-12 closure period</b>	<b>Storage Deficit Volume (kAF)</b>	<b>Storage Surplus Volume (kAF)</b>
01Nov2005-14July2006	--	0.6
01Nov2006-14July2007	--	3
01Nov2007-14July2008	--	10
01Nov2008-14July2009	25	--
01Nov2009-14July2010	--	82
01Nov2010-14July2011	--	5
01Nov2011-14July2012	31	--
01Nov2012-14July2013	--	118
01Nov2013-14July2014	--	144

NOTE: Table above is based on preliminary draft accounting spreadsheets provided by USACE Water Management Section (August 2014: All reported values should be considered as draft and subject to further revision based on USACE internal review.

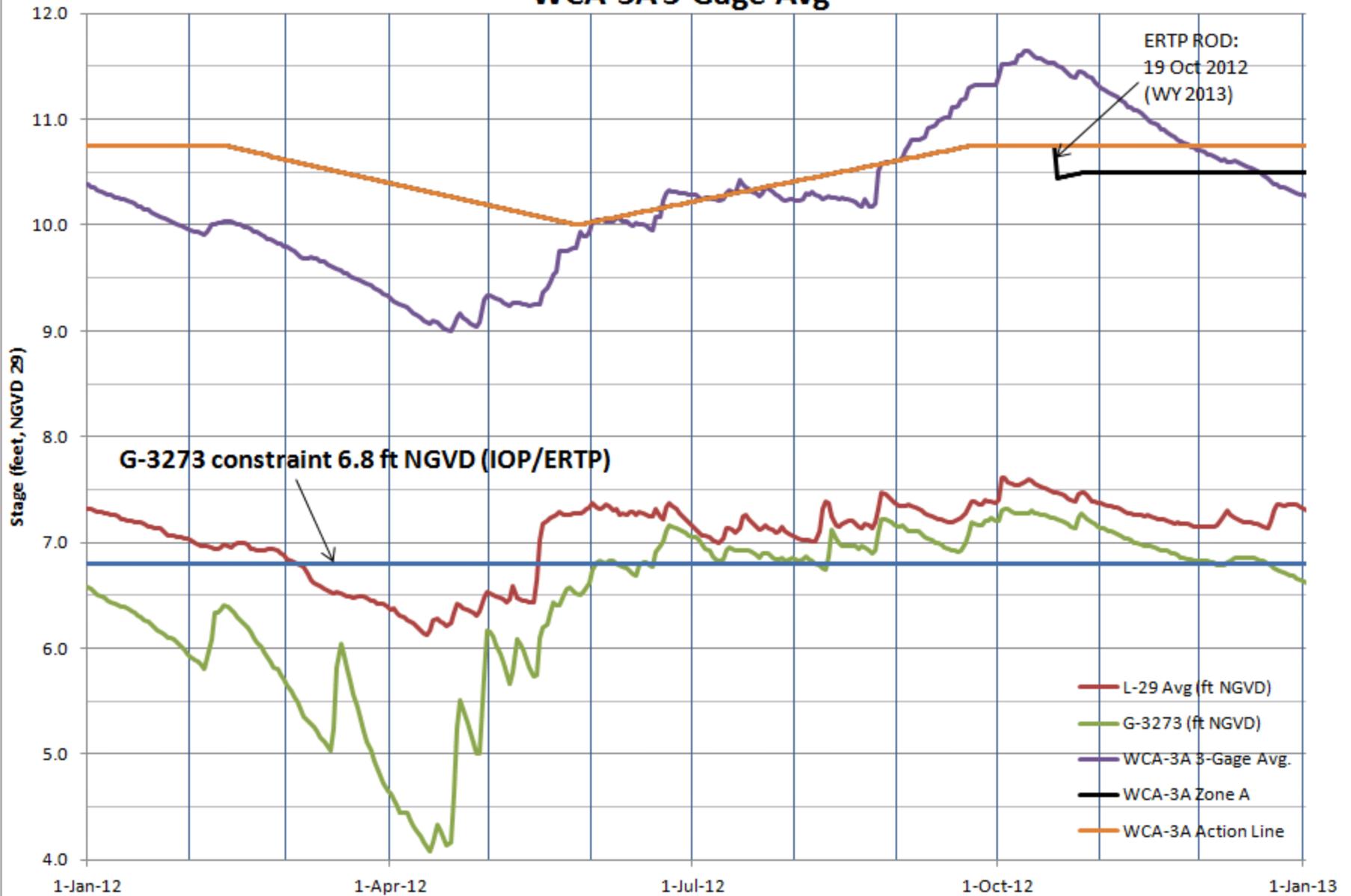
- WY2010 Historical Column 2 Usage\*:
  - 17June2009-03Nov2009
  - 19Mar2010-30Apr2010 (continued to 03Aug2009)
- WY2013 Historical Column 2 Usage\*:
  - 24May2012-20Jul2012
  - 14Sep2012-01Oct2012
  - 29Oct2012-30Nov2012

\*Periods include a small number of days under which Column 2 Ops not used

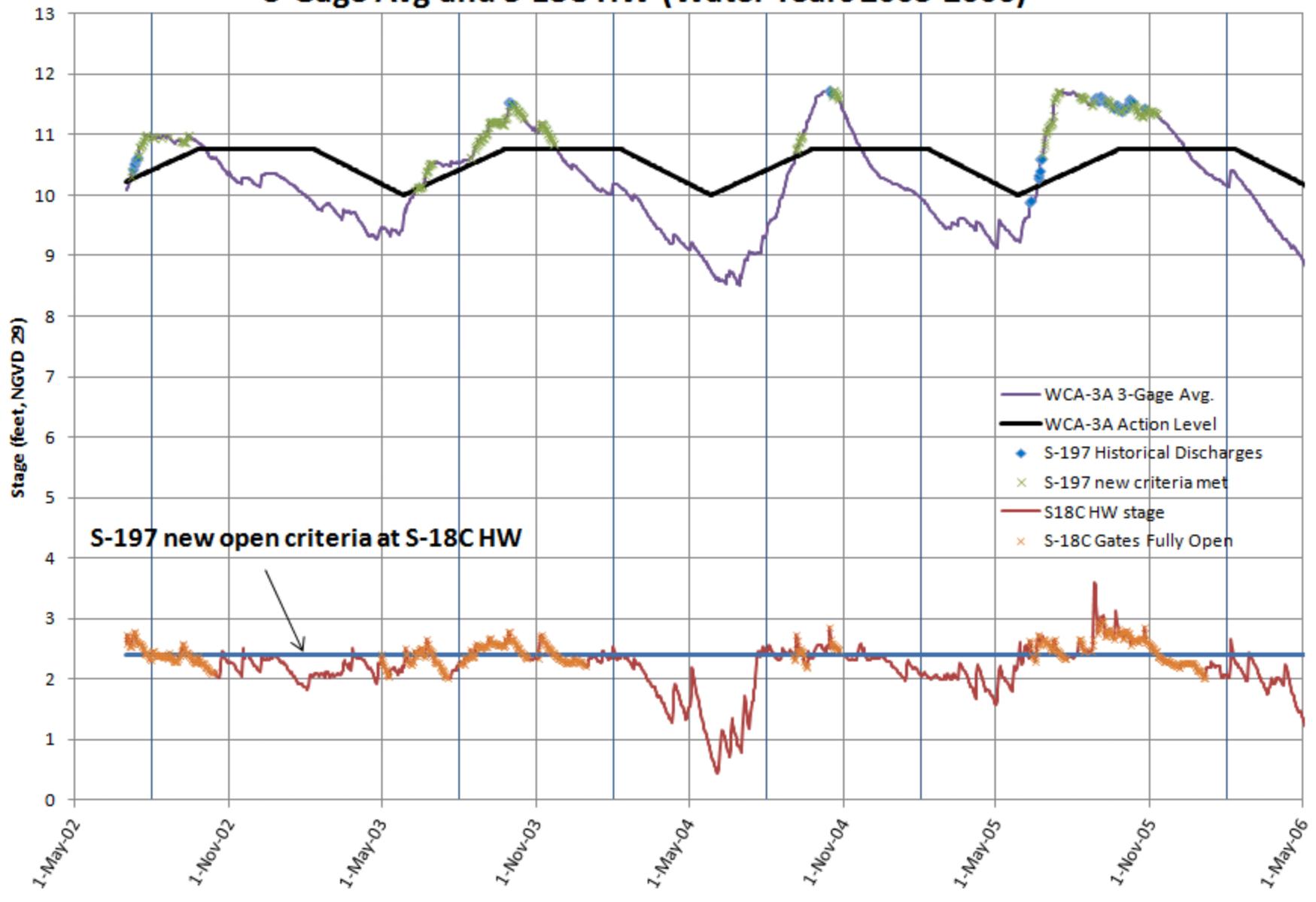
# 2009 IOP/ERTP Hydrographs: L-29 Borrow Canal, G-3273, WCA-3A 3-Gage Avg



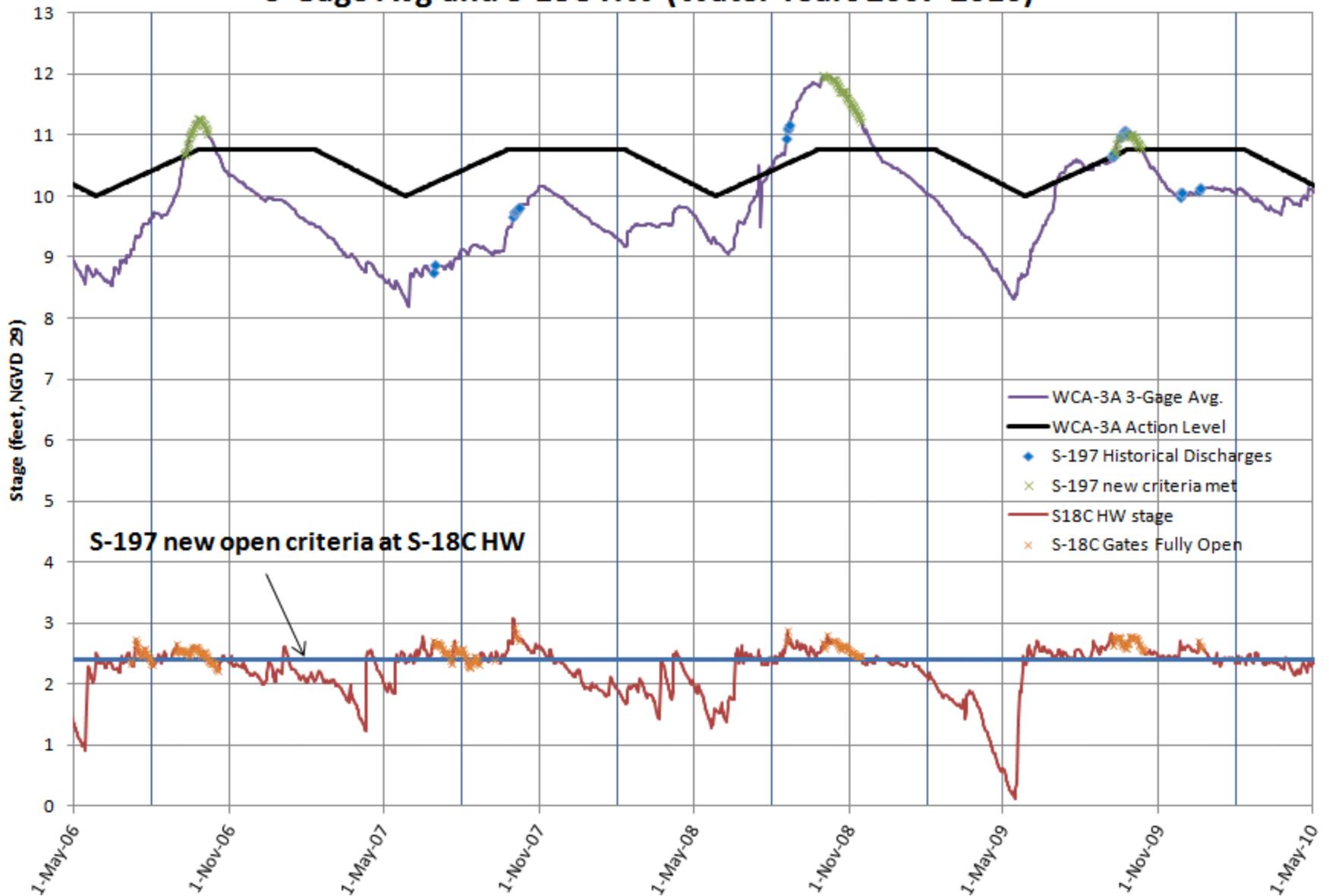
# 2012 IOP/ERTP Hydrographs: L-29 Borrow Canal, G-3273, WCA-3A 3-Gage Avg



# IOP/ERTP Hydrographs: New S-197 Open Criteria based on WCA-3A 3-Gage Avg and S-18C HW (Water Years 2003-2006)



# IOP/ERTP Hydrographs: New S-197 Open Criteria based on WCA-3A 3-Gage Avg and S-18C HW (Water Years 2007-2010)



# IOP/ERTP Hydrographs: New S-197 Open Criteria based on WCA-3A 3-Gage Avg and S-18C HW (Water Years 2011-2014)

