

**Delta Operations for Salmonids and Sturgeon (DOSS) Group**  
**Conference call: 4/3/12 at 9:00 a.m.**

**Objective:** Provide advice to the Water Operations Management Team (WOMT) and National Marine Fisheries Service (NMFS) on measures to reduce adverse effects from Delta operations of the Central Valley Project and the State Water Project on salmonids and green sturgeon. DOSS will coordinate the work of other technical teams. DOSS notes and advice can be found at: <http://www.swr.noaa.gov/ocap/doss.htm>

**DWR:** Mike Ford, Andy Chu, Edmund Yu, Kevin Reece, Angela Llaban, Tracy Pettit, James Gleim

**FWS:** Leigh Bartoo, Roger Guinee, Craig Anderson

**NMFS:** Barbara Rocco, Bruce Oppenheim, Barb Byrne, Jeff Stuart, Garwin Yip

**Reclamation:** John Hannon, Thuy Washburn

**DFG:** Bob Fujimura, Jason Roberts

**EPA, SWRCB, USGS:** not present

**Agenda**

1. Fish monitoring
2. Current operations
3. PTM results for OMR flows starting April 8 (attached)

**Action Item [1/3/12]:** Review the DOSS section of the annual review report and provide responses regarding implementation of recommendations. **Carry. See discussions below.**

**4/3/12:** No update because the group has not yet met. A meeting notice will be sent out.

**Action Item [1/17/12]:** DWR, Reclamation, NMFS, and DFG will meet to discuss how best to include CWT information in available salvage databases, both going forward and perhaps retrospectively. Bob Fujimura, DFG, agreed to lead this effort and provide a list of what needs to be revised. **Carry.**

**4/3/12:** Date was set for 4/13/12 at 9:30 a.m. at DWR offices. An agenda has been circulated.

**Fish Monitoring:** The following table presents fish monitoring data. Unless otherwise noted, reported sizes are fork length. No data were received before the conference call from Speegle at FWS. See: <http://www.water.ca.gov/swp/operationscontrol/calfed/calfedmonitoring.cfm>.

Location	Chippis Is. Midwater Trawl	Sacramento Kodiak Trawl	Mossdale Kodiak Trawl	Beach Seines	Knights Landing RST	Tisdale Weir RST
Sample Date	3/27, 30	3/26, 28, 30	3/26, 28, 30	3/27, 29	3/27-4/1	3/27-4/2
Total Catch	21	252	0	600	2076	1477

<b>FR</b>	1	140		289	1820	1349
<b>WR</b>	1	10		1	4	
<b>SR</b>	4	92		36	237	126
<b>LFR</b>						
<b>Ad-Clipped Chinook</b>	1	3				
<b>DS</b>	6 (1 w/eggs)	6		25 (6 w/eggs)		
<b>Splittail</b>	1			248		
<b>Longfin</b>	3					
<b>SH (ad-clip)</b>	1	1			11	
<b>SH (wild)</b>	3			1	4	2
<b>W. Temp. (avg. °F)</b>	54.9	63.1	60.1	54.9	54.0	51.0
<b>Flows (avg. cfs)</b>					16,891	18,271
<b>Turbidity (avg. NTU)</b>					84.6	84.4
<b>WR/LFR Avg. CPUE</b>					0.014	0
<b>FR/SR Avg. CPUE</b>					8.24	5.98

Key: FR = Fall run; LFR = Late-fall run; SR = Spring run; WR = Winter run; SH = Steelhead; DS = Delta smelt; LFS = Longfin smelt; SPTL = Splittail, CPUE = catch per unit of effort, ACT = acoustical tag

**Fish Salvage Data (3/26–4/2):** Reports are also posted at <ftp://ftp.delta.dfg.ca.gov/salvage>: and you can locate the table under folder “DOSS salvage tables” (you can also try <http://www.dfg.ca.gov/delta/apps/salvage/Default.aspx>) and click on “salvage FTP site”.

Salvage Report for 3/26–4/2/12										
Species	CVP				SWP				Total YTD Non-Clipped (since October 1)	
	Ad-Clipped Hatchery		Non-Clipped Wild		Ad-Clipped Hatchery		Non-Clipped Wild			
	Salvage	Loss	Salvage	Loss	Salvage	Loss	Salvage	Loss	Salvage	Loss
Winter run	8	8	52	47	16	69	79	339		
YTD winter run			444	369			364	1590	808	1,959
Spring run			71	54	4	17	124	513		
YTD spring run			123	91			129	533	252	624
Steelhead (SH)	85		18		35		118			
YTD total SH	344		57		124		174		231	

**Splittail:** Splittail were salvaged at the SWP (weekly expanded salvage = 28), but not at the CVP. The water-year (10/01/2011 to present) salvage total of splittail at the CVP is 243. The water-year salvage total of splittail at the SWP is 3,858.

White sturgeon: No white sturgeon were salvaged at either facility. The water-year salvage total of white sturgeon at the CVP is 64. No white sturgeon have been salvaged at the SWP this water year.

Green sturgeon: No green sturgeon have been salvaged at either facility this water year.

Daily loss density for wild winter run declined from 3/26 through 3/28/12 but increased from 3/29 through 4/1/12. The older juvenile loss-density trigger of 2.5 fish/TAF was exceeded on 3/29 and 3/30/12. Loss density peaked at 21.8 fish/TAF on 3/31/12 when pumping increased at the SWP and remained >5.0 fish/TAF on 4/1/12 despite a marked reduction in exports. Total year to date (YTD) (since October 1) winter run (non-clipped) is 808; total YTD combined loss is 1,959, which is about 60% of the incidental take limit, and increased 10% since last week.

Steelhead loss density over the past 3 days exceeded 12.0 fish/TAF. On Sunday, 4/1/12, steelhead loss density was 13.0 fish/TAF.

The preliminary salvage data for Monday, 4/2/12, are:

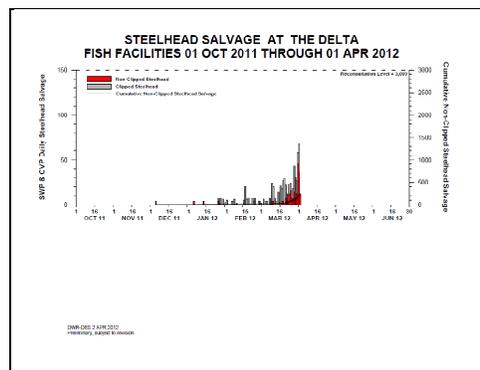
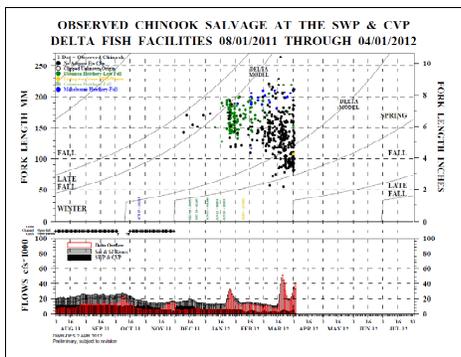
- Older juvenile Chinook salmon: an expanded salvage of 8.0 fish/TAF and an estimated loss of 34.64 at SWP. No older juveniles were observed at the CVP. The preliminary combined loss density is 9.12 fish/TAF for 4/2/12.
- Steelhead: 2 salvaged at SWP, expanded salvage of 8, loss of 34.64, and loss density of 9.12 fish/TAF.

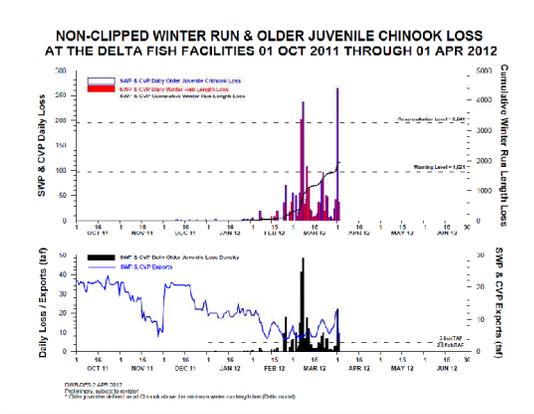
Just a note that although exports are controlled by an OMR of -1,800 cfs per the joint stipulation, flows under RPA Action IV.2.3 would have to target an OMR of no more negative than -2,500 cfs.

No larval delta smelt <20 mm FL were reported in larval fish samples through 4/1/2012 at the CVP and through 0300 hours on 3/30/2012 at the SWP. Larval longfin smelt were found in larval fish samples at the CVP from 3/26/2012 to 4/1/2012 and at the SWP from 1500 hours on 3/22/2012 to 0300 hours on 3/30/2012.

Below are the salvage and loss graphs for Chinook and steelhead from Llaban (DWR) as of 4/2/12. For additional salvage and loss graphs, please visit the DWR website at:

<http://www.water.ca.gov/swp/operationscontrol/calfed/calfedmonitoring.cfm>.





**Coded Wire Tagged (CWT) Salvage and Loss (see table below):** CWT: Late-fall run from Coleman were salvaged from both the first and second releases at SWP on 3/31. There was salvage of the third spring-run group at CVP on 3/29. The first hatchery winter-run was salvaged at SWP on 3/31, for a .018% loss. Fall run continue to be salvaged from the October Mokelumne River Hatchery release at both facilities. FWS trawls caught their first hatchery winter run with 10 at Sherwood Harbor and 5 at Chipps Island.

**Coleman Hatchery Late-Fall Run and Livingston Stone Winter-Run Chinook Loss at the Delta Fish Facilities, 2011/2012**

Release Date	CWT Race	Release Site	Release Type	Confirmed Loss	Number Released	Total Entering Delta	% Loss <sup>1</sup>	First Concern Level	Second Concern Level	Date of First Loss	Date of Last Loss
12/16/2011	LF	Battle Creek	Production	134.66	394,700	n/a	0.034	n/a	n/a	1/11/2012	3/31/2012
12/23/2011	LF	Battle Creek	Spring Surrogate	2.92	62,400	n/a	0.005	0.5%	1.0%	1/18/2012	1/31/2012
1/3/2012	LF	Battle Creek	Production	598.54	448,600	n/a	0.133	n/a	n/a	1/19/2012	3/31/2012
1/13/2012	LF	Battle Creek	Spring Surrogate	52.17	80,800	n/a	0.065	0.5%	1.0%	1/31/2012	2/18/2012
1/20/2012	LF	Battle Creek	Spring Surrogate <sup>2</sup>	101.04	20,000	n/a	0.505	n/a	n/a	1/30/2012	3/29/2012
2/9/2012	W	Redding	Production	16.96	194,000	96,525	0.018	0.5%	1.0%	3/31/2012	3/31/2012

For Chinook lost 10/1/2011 through 4/1/2012

SWP coded-wire tags read 10/1/2011 through 4/1/2012

CVP coded-wire tags read 10/1/2011 through 4/1/2012

<sup>1</sup>LF % Loss = (Confirmed Loss/Number Released)\*100; W % Loss = (Confirmed Loss/Total Entering Delta)\*100

<sup>2</sup>Because of the equipment malfunction that stranded a large proportion of the release in the gravel, this 3<sup>rd</sup> surrogate release is tracked for monitoring and information only and not for compliance with Action IV.2.3.

DWR-DES Revised 4/2/2012

Preliminary, subject to revision

**Operations (4/3/12)**

SWP		CVP	
<b>Exports (cfs)</b>			
Clifton Court Forebay	1,000	Jones Pumping Plant	800
<b>Reservoir Releases (cfs)</b>			
Feather - Oroville	1,750	American - Nimbus	1,100 (holding for now)
		Sacramento - Keswick	3,250
		Stanislaus - Goodwin	1,000 (4/7 to 2,000)
<b>Reservoir Storage (in TAF, % of capacity)</b>			
San Luis (SWP)	1,008	San Luis (CVP)	762
Oroville	2,978	Shasta	3,945
New Melones		Folsom	687
<b>Delta Operations</b>			
DCC	Closed as of 12/1/11	Sacramento River at Freeport (cfs)	32,544
Outflow Index (cfs)	33,800	San Joaquin River (cfs) at Vernalis	1,596
Total Delta Inflow (cfs)	36,294	OMR (daily) (cfs)	
Water Temperature (°F)		OMR 5 day (cfs)	-2,585
X2 (km)	62 (west of Port Chicago)	OMR 14 day (cfs)	-2,533
E/I (%)	5.0 (3-d avg.)		

<sup>1</sup>N/A means that the USGS data were not available; preliminary estimates based on Hutton equation to fill in the gaps.

**X2:** Did not trigger Port Chicago for April. Operations will need 30 days at Chipps Island for April; they have close to 26 days for March and that will carry over into April. The first 2 days in April have already been met; it is projected that the outflow requirement for today and tomorrow will be >40,000 cfs. The next requirement will be at Collinsville for the rest of April.

**Flood control:** Because of last week's storms, Oroville Reservoir is slightly encroached. DWR has been discussing releases with the U.S. Army Corps of Engineers, but there is no plan to evacuate this slight encroachment given the current low flood risk.

**OMR:** The projects are currently operating to -1,800 cfs per the joint stipulation (see DOSS advice from 3/27/12 and the NMFS determination). Currently, both the 5-day and 14-day averages are approximately -2,500 cfs. On 3/31/12, the projects were operating to an OMR flow limit of -5,000 cfs per RPA Action IV.2.3. Daily OMR flows went from -2,000 cfs to -6,000 cfs and down to nearly -1,000 cfs within only 1 or 2 days. This fluctuation was largely a result of the recent storms combined with the OMR requirements. The pumping at SWP was increased on 3/30 and 3/31 and salvage did increase during that time. The Head of Old River barrier installation was completed as of 4/1/12.

**Delta Conditions Team (DCT):** The DCT met on Monday, 4/2/12. The PTM results were sent out to team members; however, because they had just been completed, there was limited time to review them before the meeting. The team had no new information to provide to DOSS.

**Smelt Working Group (SWG) update:** SWG recommended that there was no need to change operations. Environmental conditions, expected operations, and survey data indicate that delta smelt presently are appropriately protected from entrainment.

**Joint Stipulation OMR Technical Memo:** Byrne (NMFS) forwarded two emails to DOSS members yesterday that provided the PTM results in support of OMR management per the joint stipulation. Last week, DOSS discussed possible adjustments to the PTM screening criterion; specifically, calculating the PTM screening criterion based on a simulation length other than 28 days. DWR provided PTM summaries this week based on PTM screening criteria calculated using particle fates measured at 28 and 84 days, and at the time it took for 50% of the particles to resolve their fates, which ranged from 38 to 55 days. DWR also provided summaries based on PTM screening criteria calculated using particle fates measured at 50 and 55 days, which represent the time in took for 50% of the particles to resolve their fates in the slowest operational alternative scenario (Scenario B) and the slowest scenario overall (baseline scenario, Scenario A), respectively. Byrne suggested a hybrid approach in which particle fates across all scenarios would be measured on the same day (to allow the screening criterion to be sensitive to difference in timing dynamics of particle movement), with that day selected to be the time by which at least 50% of particles had been resolved in all scenarios (intended to provide a more robust comparison between scenarios). It was again acknowledged that the PTM simulation period underlying the PTM screening criterion (28 days or more) was not intended to represent the expected travel time through the delta for outmigration juvenile steelhead. Comparing trends in particle fates from PTM results are a way to compare hydrodynamics of the Delta under different operational scenarios.

After some discussion, it was agreed to apply the “hybrid approach” described above, which corresponds to the 55-day scenario in this week’s PTM results. The OMR management target associated with the calculations based on a 55-day simulation period is -2,500 cfs.

It was noted that the stipulation OMR and the RPA Action IV.2.3 OMR are two separate RPA actions, the first for protecting steelhead in the San Joaquin River basin and the second for protecting Chinook and steelhead from the Sacramento River system. During April and May, DOSS will provide OMR management advice specific to each RPA Action. For this week, an OMR of no more negative than -1,800 cfs (the OMR level specified in the 3/29 NMFS determination based on PTM modeling) is more protective even though the OMR under Action IV.2.3 would be no more negative than -2,500 cfs for this same time period.

Experimental period under joint stipulation: It was noted that according to the Joint Stipulation Technical Memo dated March 16, 2012<sup>1</sup> (tech memo), OMR will change to no more negative than -3,500 cfs after 4/15/12. The group discussed the rationale behind the ordering of experimental OMR levels, and NMFS noted that the tech memo allows DOSS to adjust the ordering of the experimental levels opportunistically. DOSS should discuss next week whether to go with or adjust the -3,500 cfs level for the rest of April. It was stressed that all DOSS members provide input into this process and the advice given to NMFS and WOMT so that it is clear that it is DOSS advice and not NMFS’ advice.

It was also noted that there was a concern on the part of some operators over the -1,250 and

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<sup>1</sup> The tech memo is available at: [http://swr.nmfs.noaa.gov/ocap/2012\\_stipulation.htm](http://swr.nmfs.noaa.gov/ocap/2012_stipulation.htm)

-5,000 cfs suggested for the first and second half of May, respectively. DWR and Reclamation included consideration of delta smelt and its associated risk; there may be more risk to delta smelt in the latter half of May. They requested consideration of switching the experimental design for May so that it's -5,000 cfs the first half of May and -1,250 cfs the second half. DOSS raises this issue today for consideration and also to discuss on the WOMT call.

DOSS also agreed that the projects should continue to report loss densities under Action IV.2.3 so that DWR knows when the flows “would have” been relaxed if not for the joint stipulation.

Based on preliminary discussion on the March 27, 2012, DOSS call, and further discussion during today's DOSS call, DOSS agreed to advise amending the calculation of the PTM screening criterion as described in the Advice below. Measuring the fraction of particles reaching some fate on the same day for all scenarios allows the PTM screening criteria to capture differences in the timing dynamics between scenarios. Measuring the fraction of particles reaching some fate on the day on which 50% of particles have reached a fate in the slowest scenario means that scenarios will be compared based on results from *at least* 50% of particles. This approach thus captures timing dynamic differences and makes comparisons based on a substantive (at least 50%) fraction of inserted particles.

#### **Other business:**

According to the joint stipulation (para 7): “This stipulated agreement for operations does not address or include RPA Action IV.2.3, which provides for OMR Flow Management from January through June 15. However, the parties commit in 2012 to continue discussions to develop a monitoring-based trigger, or other real-time operations approach, that would modify in 2013 the January 1 onset of Action IV.2.3.” DOSS could include this in the annual review for fall; however, if we wait until fall, we may not get consensus and the first OMR criterion begins on January 1. DOSS was not certain whether this was a DOSS task or an Interagency Management Team (IMT) task. It was agreed to discuss this at the next IMT meeting next week.

**Shifting exports to CVP:** The question was raised about whether there were any plans to shift exports from the SWP to the CVP. Pettit (DWR) had a discussion with Reclamation about this and reported that it might be possible to set it up with a wheeling agreement and some contractual agreements. DWR needs to assess how soon it can implement a shift in exports and what paperwork between Reclamation and DWR is needed and can they be compiled now so that there would be no delay on making the shift after a decision is made. Both projects are working on this. This should also be brought up at WOMT.

#### **DOSS advice to WOMT and NMFS:**

Adjustment to the simulation period used to calculate the PTM screening criterion:

Advice: The tech memo (pages 6–8) describes the calculation of the PTM screening criterion as based on particle fates measured 28 days after particle insertion, but notes (footnote 3 on page 6) that “...under forecasted hydrology, the fates of a significant number of particles may not be resolved within 28 days. If DWR submits PTM information based on a simulation period longer than 28 days, DOSS will consider that information and may advise that the PTM screening criterion be amended.” DOSS advises that the calculation of the PTM screening

criterion be amended such that, for each scenario, the fraction of particles exiting the Delta system past Chipps Island, at the SWP, and at the CVP, be measured after a simulation period within which at least 50% of particles have been resolved in all scenarios. This simulation period will be determined as the number of days in which 50% of inserted particles have reached some fate in the scenario (either the baseline scenario or any of the three operational scenarios) with the slowest dynamics.

The PTM results submitted on April 2, 2012 (page 15 of Attachment 1), show that 50% of inserted particles were resolved at 55 days in Scenario A (compared to 50, 49, and 38 days in Scenarios B, C, and D, respectively). DOSS thus advises that the PTM screening criterion for these scenarios be calculated based on particle fates measured at 55 days.

**Advice for OMR level:**

Per the process described in the tech memo, the adjusted calculation for the PTM screening criterion advised above, the adjusted rounding process as advised last week, and the data for Scenarios A–D provided by DWR in Attachment 1, DOSS advises that, from April 8 to April 14, 2012, the projects be managed to an OMR level of -2,500 cfs. The 5-day running average of OMR flow during this period shall be no more than 25% more negative than -2,500 cfs (*i.e.*, -3,125 cfs).

**Advice for RPA Action IV.2.3:**

The DOSS advice for this week based on RPA Action IV.2.3 is to continue targeting OMR flow of no more negative than -2,500 cfs until 3 consecutive days of loss density less than the trigger of 12.0 wild steelhead/TAF or 5.0 older juvenile Chinook/TAF. The minimum 5-day action response for both second-stage triggers began on April 1, 2012; however, DOSS advises continuing with an OMR flow target of no more negative than -1,800 cfs this week because this flow level was more restrictive than RPA Action IV.2.3.

**Next meeting:** The next regular DOSS conference call will be on 4/10/12 at 9:00 a.m.

**Supplemental information:**

After the DOSS call on April 3, 2012, NMFS was asked why the OMR management target advised for the second week of April differed from the OMR management target advised for the first week of April. In response to those questions, NMFS provides in the table below a rough approximation of how individual factors (changes in Vernalis flow, other changes in hydrology from the first to the second week in April, and procedural changes in calculation of the PTM screening criterion) contribute to changes in the OMR management target. Note that while this table was shared with the DOSS group, it is a NMFS-prepared summary and was not part of the discussion on the April 3, 2012, DOSS call.

Row ID	PTM Scenarios	Forecasted hydrology for week of:	PTM screening criterion calculated based on simulation length of:	Modeled Vernalis flow	Target OMR, rounded to nearest positive 100 cfs ( <i>precise OMR calculated by linear interpolation</i> )	Used as basis for DOSS advice?	Change in assumptions relative to scenario in previous row	Change in target OMR associated with change in scenario
1	A-D of March 26 results	April 1-7	28 days	1500 cfs	-1,800 (-1,846)	Basis for April 1-7 advice	“starting” scenario	NA
2	E-H of March 26 results	April 1-7	28 days	2500 cfs	-2,100 (-2,180)	No	Increase of 1,000 cfs in modeled Vernalis flow	-300
3	A-D of April 2 results	April 8-14	28 days	2500 cfs	-2,300 (-2,364)	No	Changes other than Vernalis flow (e.g. Sacramento River inflow) associated with modeled hydrology for April 8-14 compared to April 1-7	-200
4	A-D of April 2 results	April 8-14	55 days	2500 cfs	-2,500 (-2,578)	Basis for April 8-14 advice	Change in simulation length from 28 days to 55 days	-200

Barbara Byrne &lt;barbara.byrne@noaa.gov&gt;

**NMFS PTM Results for April 8-14 OMR Determination**

1 message

Yamanaka, Dan &lt;dany@water.ca.gov&gt;

Mon, Apr 2, 2012 at 12:26 PM

To: Barbara Byrne &lt;barbara.byrne@noaa.gov&gt;, "Ford, John M (Mike)" &lt;jmford@water.ca.gov&gt;

Cc: "Leahigh, John" &lt;leahigh@water.ca.gov&gt;, "Hinojosa, Tracy" &lt;tracyh@water.ca.gov&gt;, "Pettit, Tracy" &lt;pettit@water.ca.gov&gt;, "EKiteck@usbr.gov" &lt;EKiteck@usbr.gov&gt;, "Washburn, Thuy T" &lt;TWashburn@usbr.gov&gt;

Barb, Mike,

Attached is our report of the PTM results performed for NMFS per the "Technical Memorandum to Guide Adaptive Management of OMR during April and May 2012...". The results are to support NMFS' determination of the OMR to be imposed for April 8 through 14.

## Modeling info:

1. 10,000 particles injected over a 24-hour period at both Nodes 40 and 21.
2. Although not required, forecast period was extended from 28 days to 84 days.
3. Based on our best estimate of April 8 hydrology, San Joaquin flows were assumed to be 2500 cfs.
4. Delta hydrology was kept static using the estimated April 8 hydrology for the remainder of the forecast period.

In addition, the typical DSM2 assumptions consistent with recent modeling efforts were used as follows:

1. CCFB Gates operate on a Priority 3 schedule for the entire forecast period.
2. The Delta Cross Channel gates were closed December 1, 2011.
3. Suisun Marsh salinity control flashboards and boatlock were installed October 21, 2011. Three Suisun Marsh Salinity Control Gates are tied open as of February 14, 2012
4. Sacramento River flow at Freeport is around 15,000 cfs near the beginning of the forecast period and decreases to 11,100 cfs by the end of the forecast period.

PTM-1

The barriers were not installed for scenario A. For scenarios B, C, and D, the following assumptions were made:

1. The Middle River ag. barrier was installed on March 16, 2012 with all culvert flap-gates tied open. The Old River at Tracy ag barrier was installed on April 1, 2012.
2. The physical Head of Old River Barrier (including 8 culverts-all tied open) was installed on April 1, 2012.

If you would like the dss file, please let me know. If you have any questions regarding the results, please contact me at [dany@water.ca.gov](mailto:dany@water.ca.gov) or at (916) 574-0456.

Thanks!

Dan

## Dan Yamanaka

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**PTM\_Week\_2.pdf**  
297K

**PRELIMINARY RESULTS, SUBJECT TO REVISIONS**

# **PTM Simulation Results Using DSM2**

Prepared by:  
Delta Compliance & Modeling Section  
Operations Control Office  
Division of Operations & Maintenance

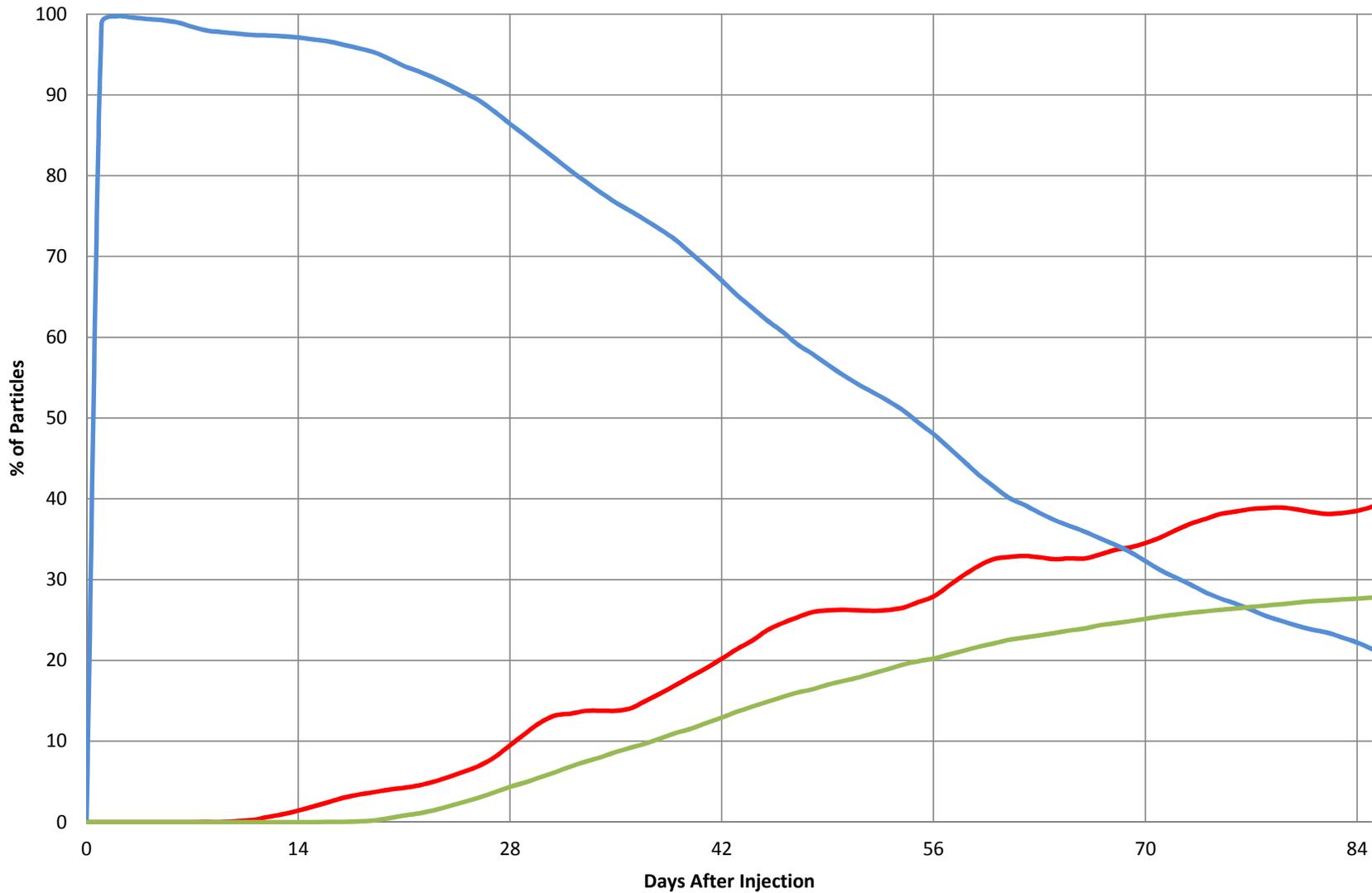
Prepared for:  
DOSS in regards to the “Technical Memorandum to Guide  
Adaptive Management of OMR during April and May 2012 for the  
Protection of listed San Joaquin Basin Steelhead”

March 30, 2012

Scenario Summary Table

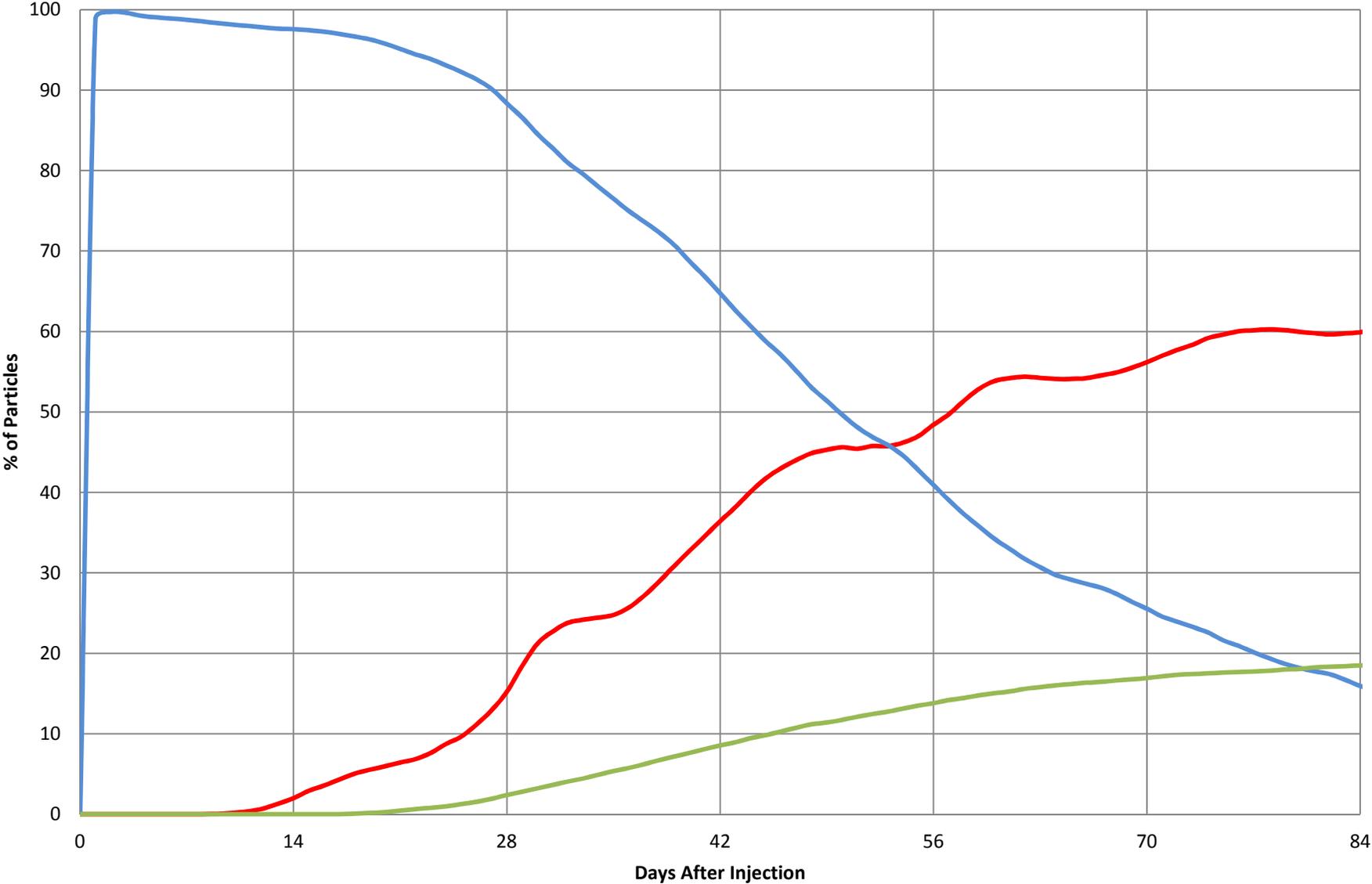
Scenario ID	Control	SJR at Vernalis	Combined Exports	OMR (Index)	OMR (DSM2)	HOR Barrier
A	1 to 1	2500	2500	-1438	-1588	Out
B	Min Exports	2500	1500	-1591	-1434	In
C	-2000	2500	1900	-1954	-1800	In
D	-3500	2500	3450	-3457	-3257	In

### Scenario A - Vernalis 1 to 1



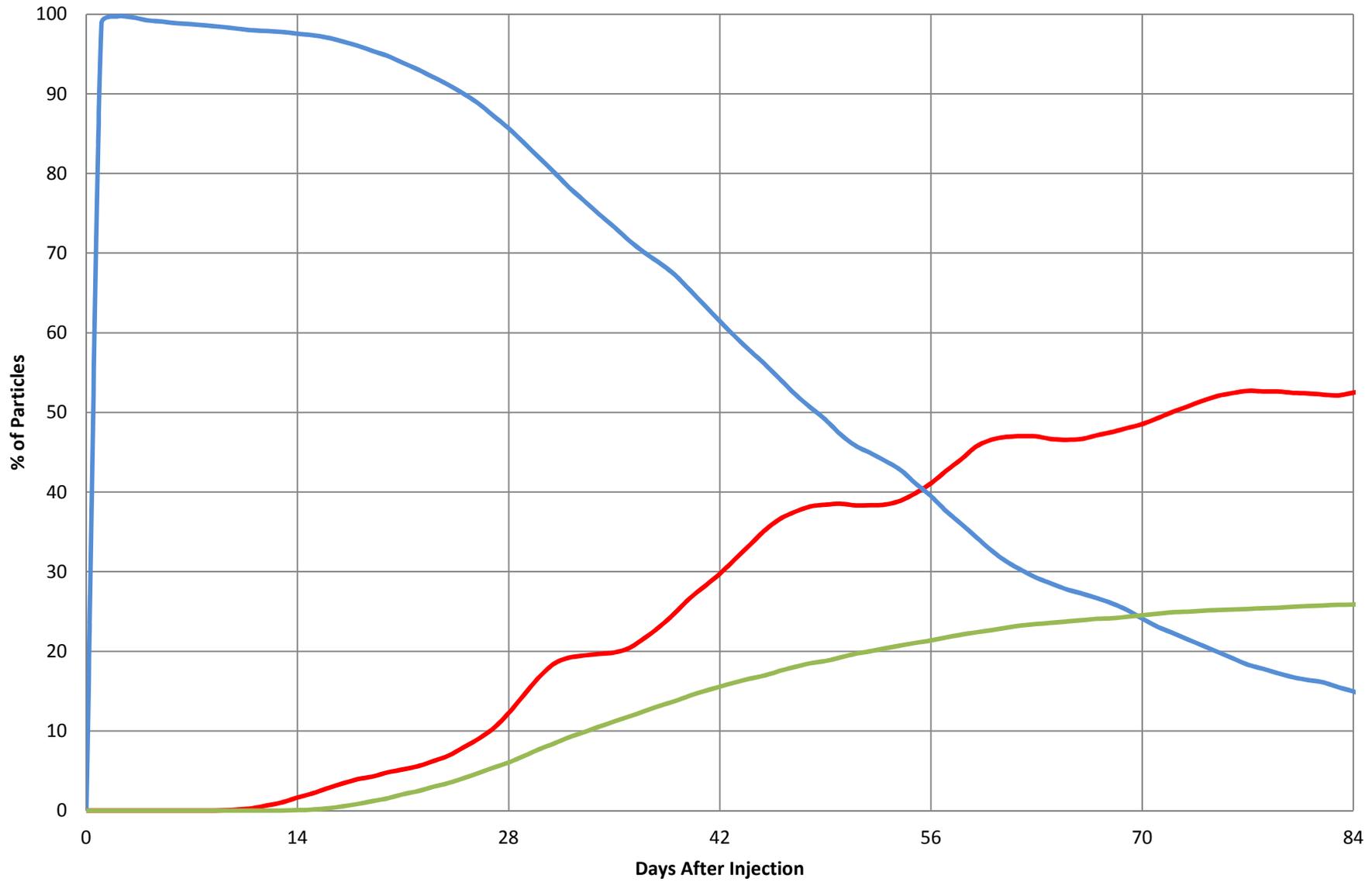
— Past Chipps — In Delta — At Projects

# Scenario B - Combined 1500 cfs Exports



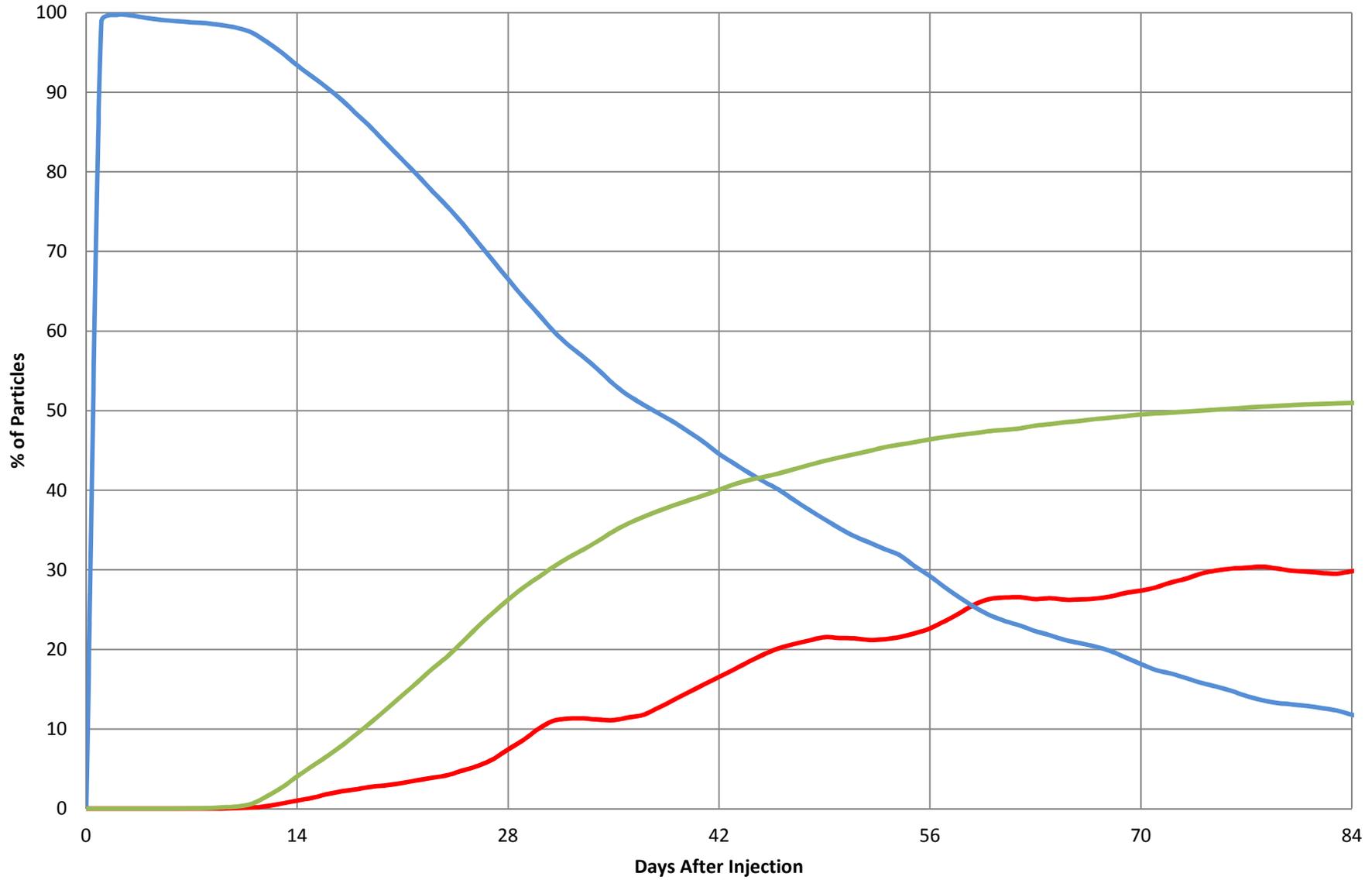
— Past Chinns — In Delta — At Proiects

### Scenario C - OMR -2000 cfs



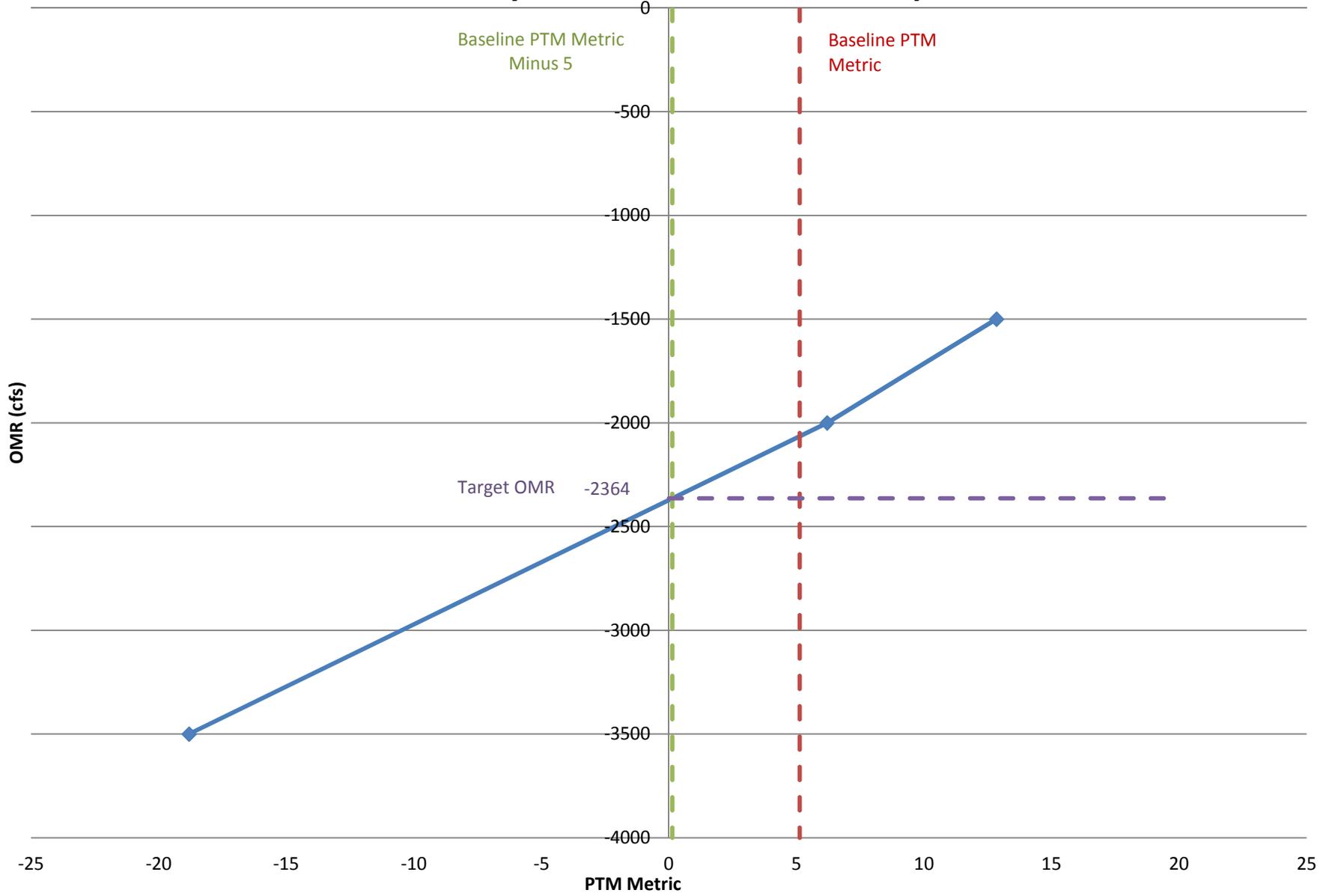
— Past Chinns — In Delta — At Proiects

### Scenario D - OMR -3500 cfs

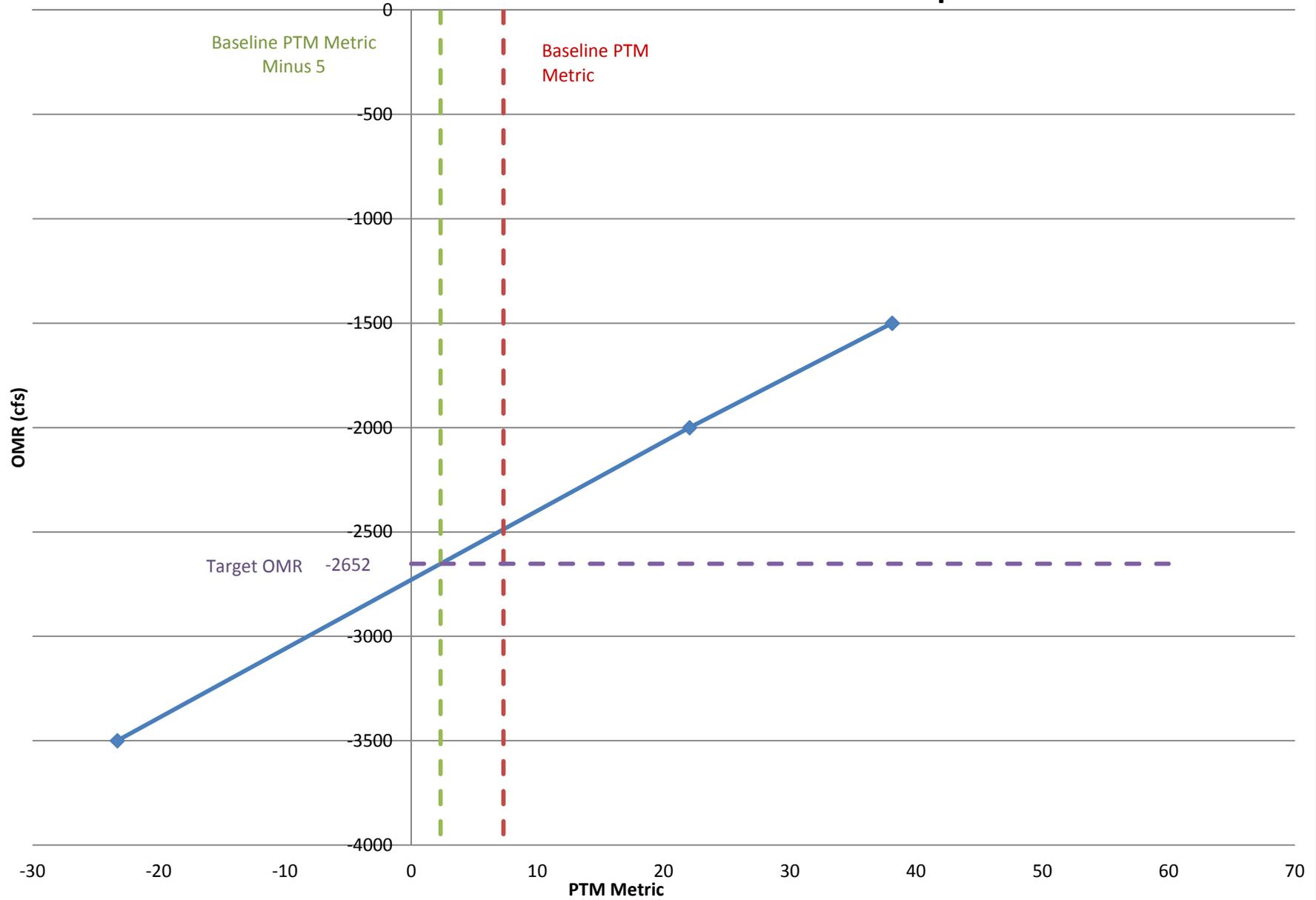


— Past Chinns — In Delta — At Proiects

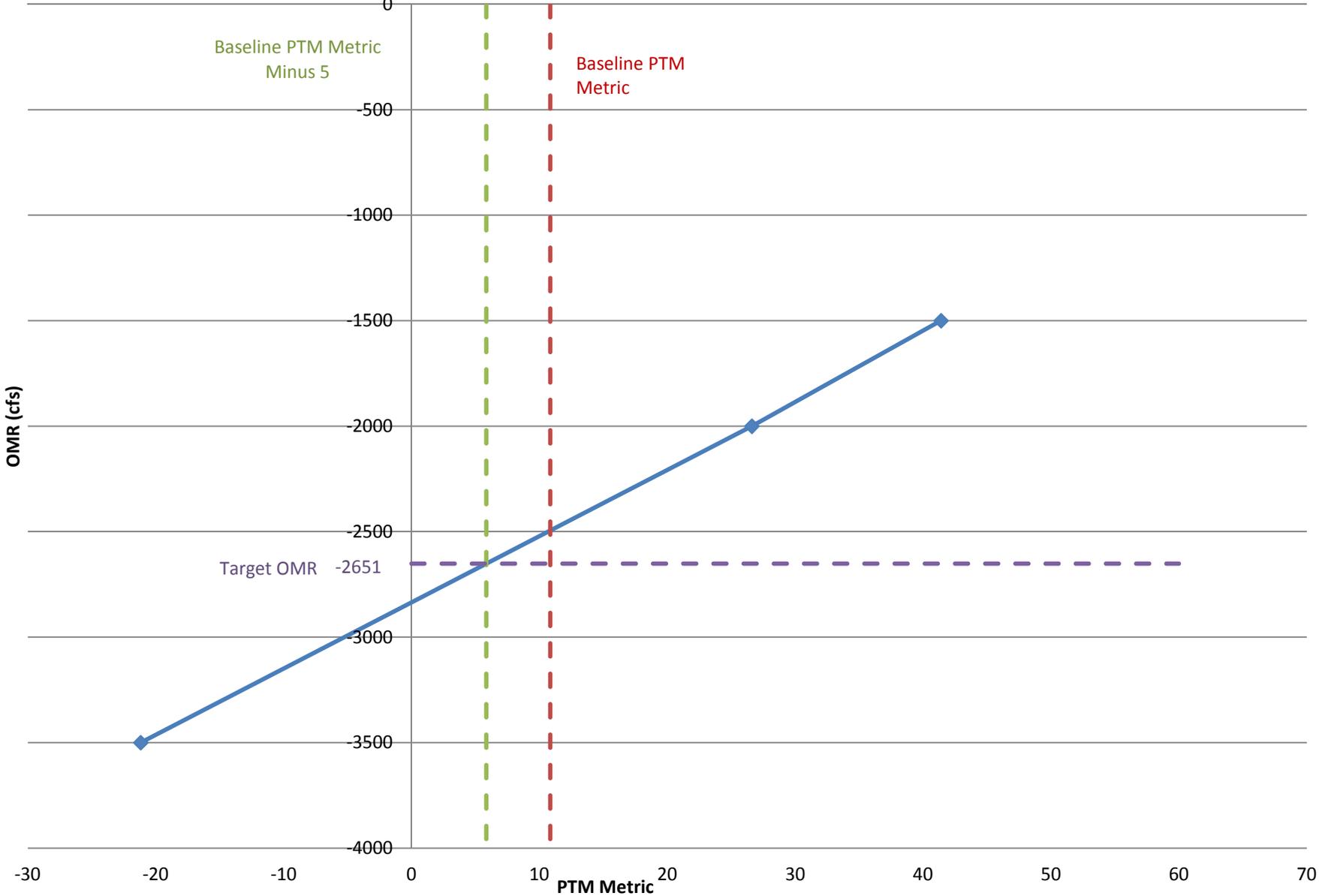
# OMR Flows and 28 Day PTM Metric with San Joaquin River at 2500 cfs



# OMR Flows and 50% Fate PTM Metric with San Joaquin River at 2500 cfs



# OMR Flows and 84 Day PTM Metric with San Joaquin River at 2500 cfs



28 Days

Scenario ID	% to CVP at 28 days	% Chipps at 28 days	% SWP at 28 days	PTM Metric at 28 days
A	1.2	9.5	3.2	5.1
B	1.6	15.2	0.8	12.8
C	3.3	12.2	2.8	6.2
D	13.4	7.4	12.8	-18.8

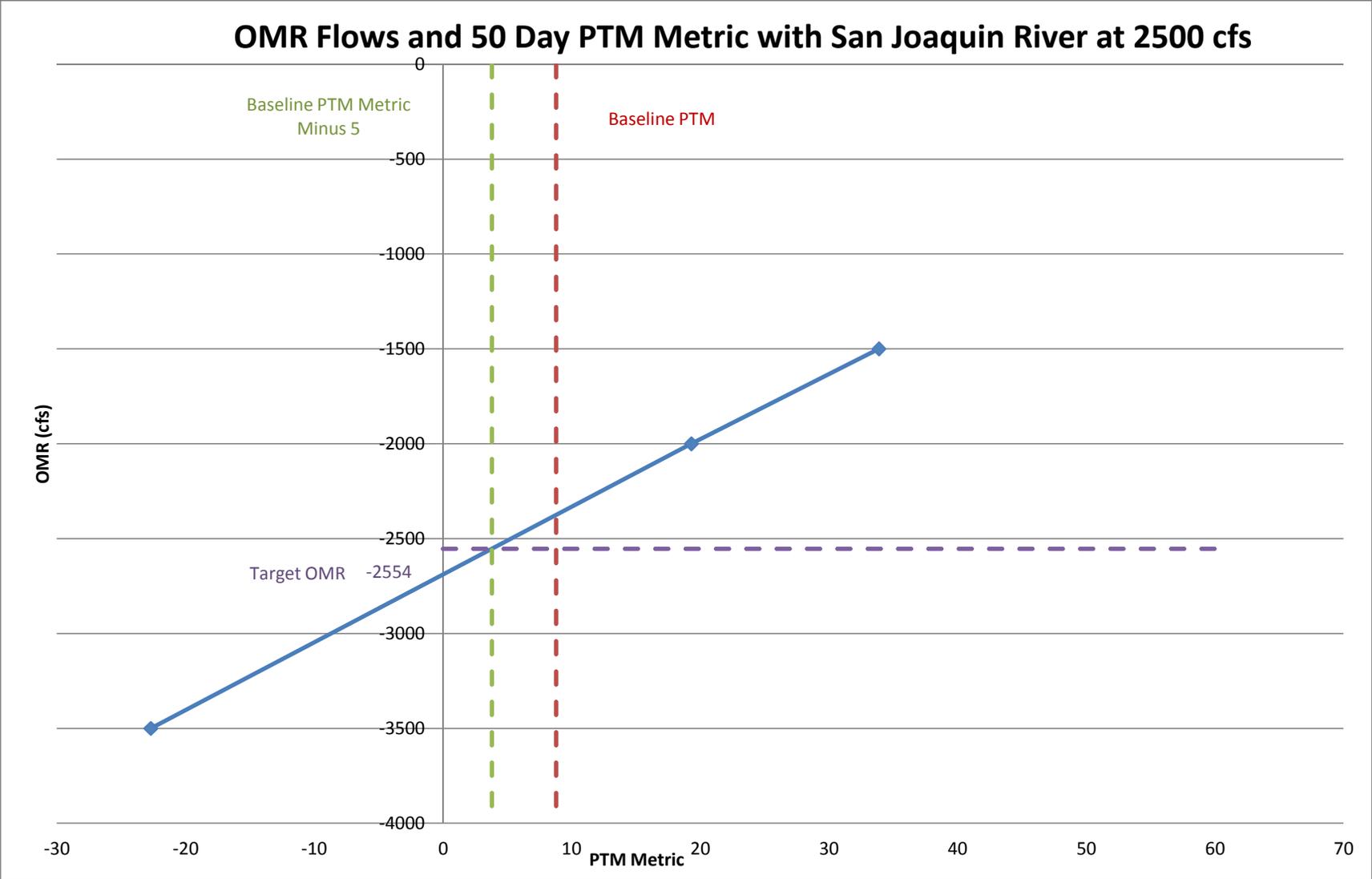
84 Days

Scenario ID	% to CVP at 84 days	% Chipps at 84 days	% SWP at 84 days	PTM Metric at 84 days
A	5.1	38.5	22.6	10.9
B	7.4	59.9	11.1	41.4
C	10.1	52.5	15.8	26.6
D	23.3	29.8	27.6	-21.2

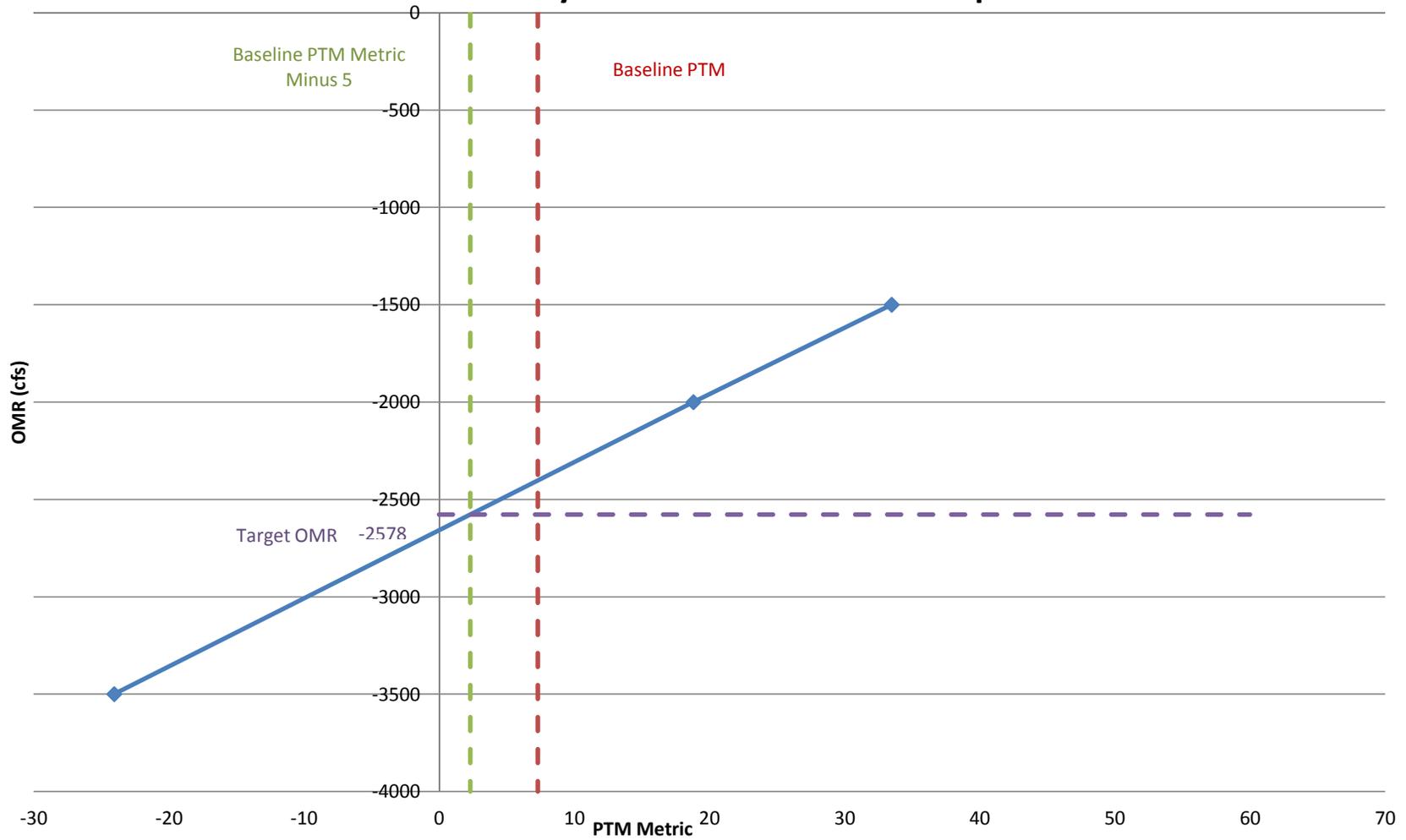
50% Particle Fate

Scenario ID	Number of Days	50% CVP	50% SWP	50% Chipps	PTM Metric
A	55	3.7	16.2	27.2	7.3
B	50	5.6	6.1	45.6	33.9
C	49	8.0	10.8	38.4	19.6
D	38	18.0	19.4	12.7	-24.7

# OMR Flows and 50 Day PTM Metric with San Joaquin River at 2500 cfs



# OMR Flows and 55 Day PTM Metric with San Joaquin River at 2500 cfs



28 Days

Scenario ID	% Chipps at 28 days	% to CVP at 28 days	% SWP at 28 days	PTM Metric at 28 days
A	9.5	1.2	3.2	5.1
B	15.2	1.6	0.8	12.8
C	12.2	3.3	2.8	6.2
D	7.4	13.4	12.8	-18.8

50 Days

Scenario ID	% Chipps at 50 days	% to CVP at 50 days	% SWP at 50 days	PTM Metric at 50 days
A	26.3	3.4	14.1	8.8
B	45.6	5.6	6.1	33.9
C	38.5	8.1	11.1	19.3
D	21.4	20.7	23.5	-22.7

55 Days

Scenario ID	% Chipps at 55 days	% to CVP at 55 days	% SWP at 55 days	PTM Metric at 55 days
A	27.2	3.7	16.2	7.3
B	47.0	6.1	7.4	33.5
C	39.9	8.6	12.4	18.8
D	22.0	21.4	24.7	-24.0

84 Days

Scenario ID	% Chipps at 84 days	% to CVP at 84 days	% SWP at 84 days	PTM Metric at 84 days
A	38.5	5.1	22.6	10.9
B	59.9	7.4	11.1	41.4
C	52.5	10.1	15.8	26.6
D	29.8	23.3	27.6	-21.2

50% Particle Fate

Scenario ID	Number of Days	50% Chipps	50% CVP	50% SWP	PTM Metric
A	55	27.2	3.7	16.2	7.3
B	50	45.6	5.6	6.1	33.9
C	49	38.4	8.0	10.8	19.6
D	38	12.7	18.0	19.4	-24.7