Smelt Working Group
May 2, 2016

Meeting Summary

The Working Group described the risk of entrainment under the Service-provided advice framework. Under this framework the relative risk of entrainment for OMR flow ranges is discussed and assessed. For the current week, the risk of entrainment of larval and juvenile Delta Smelt for each of the flow ranges is characterized as follows:

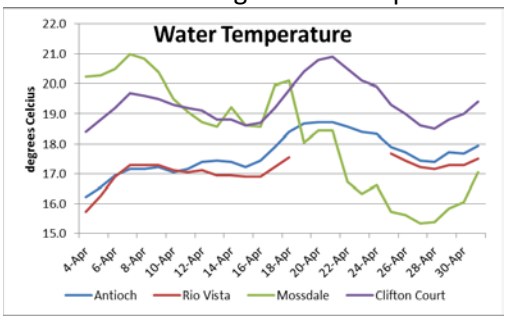
- -1250 to -2000 cfs has a low to medium risk of entrainment,
- -2000 to -3500 cfs has a medium to high risk of entrainment,
- -3500 to -5000 cfs has a high risk of entrainment.

The Working Group is following guidance for entrainment protections from both Action 2 (adult Delta Smelt) and Action 3 (juvenile Delta Smelt). The Working Group will continue to monitor Delta Smelt survey and salvage data and Delta conditions, and will meet again on Monday, May 9, 2016 at 10 am.

Reported Data

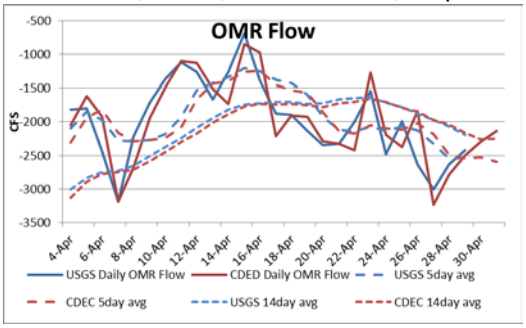
1. Current environmental data
    a. Temperature

    The 3-station average water temperature for May 1 was 17.9°C.



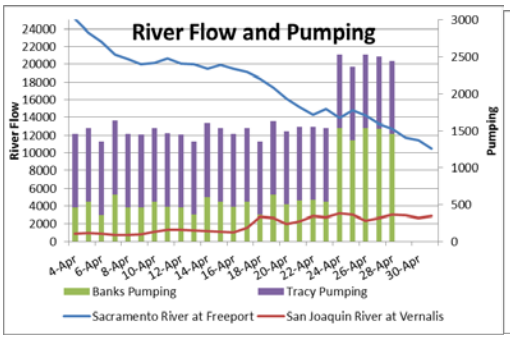
    b. OMR flow

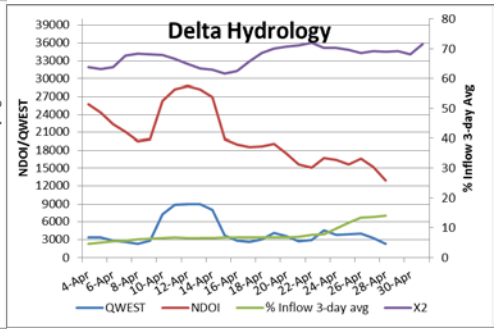
    USGS OMR daily, 5-day, and 14-day average flows on April 29 are -2420, -2537, and -2190 cfs, respectively. The CDEC OMR daily, 5-day, and 14-day average flows for May 1 were -2138, -2592, and -2250 cfs, respectively.



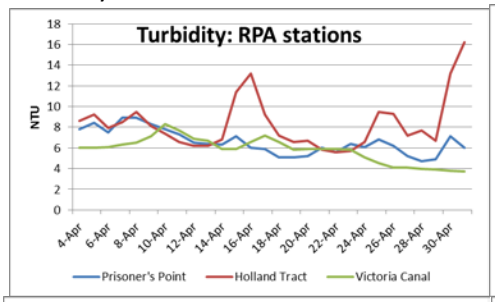
    c. River flows and pumping

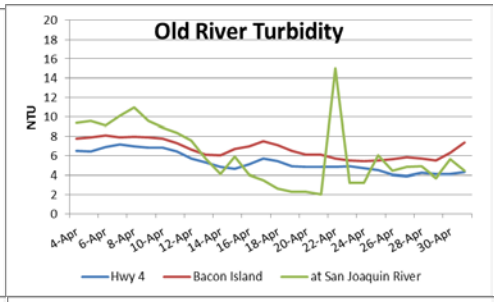
    Sacramento River at Freeport flow for May 1 was 10,509 cfs. San Joaquin River at Vernalis river flow for May 1 was 2859 cfs. X2 is at 71.6km. Combined exports are 2600 cfs today. Qwest for May 1 was 1580 cfs.

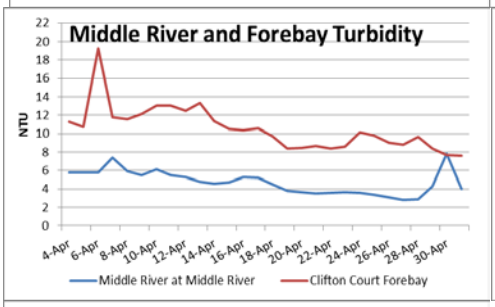


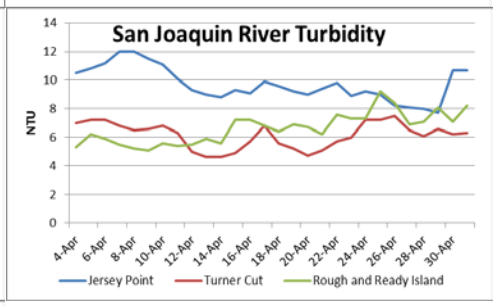


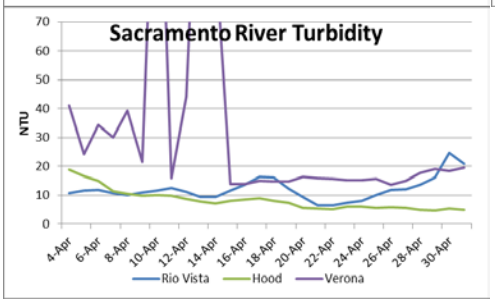
d. Turbidity











2. Delta fish monitoring

The CDFW 2015 FMWT indices are:
The 2015 Delta Smelt annual FMWT index is 7.
The 2015 Longfin Smelt annual FMWT index is 4.
Both indices are the lowest on record (i.e. since 1967).

Spring Kodiak Trawl #4 was in the field the week of April 4. A total of 13 Delta Smelt adults were collected, all from station 719. Sizes ranged from 65 to 78 mm. SKT #5 is in the field this week.

20-mm Survey #4 was in the field the week of April 25 through 28. Sample processing is 36% complete. So far, a total of 10 juvenile Delta Smelt were collected, all from station 719, ranging

in size from 16 to 32 mm. No Delta Smelt were collected in the central or south Delta. 20-mm Survey #5 is in the field the week of May 9.

The Early Warning Survey began November 30 and ended on March 30.

3. Modeling

New PTM runs were distributed to the group this morning for discussion.

4. Salvage

No adult Delta Smelt salvage has occurred since February 22. The cumulative season total of salvaged adult Delta Smelt is 12, which represents 29% of the concern level of the WY 2016 adult Delta Smelt incidental take. Four juvenile Delta Smelt were salvaged on April 28, combined with the previous salvage, represents 3% of the concern level of the WY 2016 juvenile Delta Smelt incidental take.

No adult Longfin Smelt have been observed in salvage sampling at either the federal or state Delta facilities during the current water year. Two juvenile Longfin Smelt were salvaged on March 9 at the SWP; eight juvenile Longfin Smelt were salvaged on March 11 at the CVP. Combined salvage of >20 mm Longfin Smelt is ten for the season.

Larval sampling has been conducted since March 1st at both the SWP and CVP. No larval Delta Smelt has been detected in the samples processed so far this season. Larval Longfin Smelt were detected at the SWP on March 16.

5. Expected Project Operations

Jones pumping plant is pumping 1600 cfs today. The daily average intake to Clifton Court (CC) is 1000 cfs. Combined pumping is 2600 cfs today. Pumping is constrained to comply with both the NMFS RPA IV.2.1 and the April 27 Service Determination, which constrains OMR flow to no more negative than -2500 cfs. On April 28, Reclamation requested the Service concur with allowing OMR flow to become more negative than -2500 cfs mid-week (referring to the week of May 2; see additional information in "Discussion.").). OMR flows are expected to become more negative than the 14-day average of -2,500 cfs by Tuesday (5/3/16), and thus the FWS determination will be the factor controlling exports unless the FWS concurs with Reclamation's request.

6. Delta Conditions Team

The DCT team met on Friday (4/29/16). A brief update of the discussion was provided to the Working Group by FWS.

7. Assessment of Risk:

<u>BiOp Background</u>

RPA Component 1, Action 2 states, "An action implemented using an adaptive process to tailor protection to changing environmental conditions after Action 1. As in Action 1, the intent is to protect pre-spawning adults from entrainment and, to the extent possible, from adverse hydrodynamic conditions." "The range of net daily OMR flows will be no more negative than -1,250 to -5,000 cfs. Depending on extant conditions specific OMR flows within this range are recommended by the Working Group from the onset of Action 2 through its termination…"

RPA Component 2, Action 3: "The objective of this RPA component (which corresponds to Action 3 in Attachment B), is to improve flow conditions in the Central and South Delta so that larval and juvenile Delta Smelt can successfully rear in the Central Delta and move downstream when appropriate" (page 282).

The WY 2016 adult Delta Smelt incidental take (IT) is 56, as stated in the Service's December 23, 2015 memo to the Bureau of Reclamation. The concern level is 42. The method to calculate the adult IT is described on p 386 of the 2008 BiOp, with the corrections described in both the February 22, 2013, and December 23, 2015 memos. The alternative approach that the Service presented to the 2015 independent review panel at the Long-term Operation Biological Opinions annual science review will be piloted this year.

The WY 2016 larval/juvenile Delta Smelt incidental take is 392, and the concern level is 261. The method to calculate the larval/juvenile IT is described on p 389, with revision provided in the February 22, 2013 Service memo to the Bureau of Reclamation.

2015 Delta Smelt abundance

The four primary 2015 annual abundance indices for all Delta Smelt life stages are the lowest on record.

	2014	2015
SKT	30.1	13.8
20-mm	1.1	0.3
TNS	0.5	0.0
FMWT	9	7

Discussion

As discussed in previous notes, the Working Group continues to conclude that overall risk of entrainment of adult Delta Smelt into the south Delta continues to be low.

The Working Group assumes spawning occurred, and may still be occurring, in the lower San Joaquin River, as well as potentially in the Old River corridor. The Working Group has continuing concerns regarding larvae in the Old River corridor as well as the lower San Joaquin River, given the decline of catch in surveys this year. Delta Smelt catch data from the most recent field surveys (20-mm Survey #4 [week of April 25], and SKT #4 [week of April 4]) do not show a strong presence of Delta Smelt in the central and south Delta. However, four juvenile Delta Smelt were salvaged on April 15 as well as on April 28, indicating a presence of juvenile Delta Smelt in the south Delta.

The SWG has stressed since early in the season, that Delta Smelt have been present not only in the lower San Joaquin, but also at times, in the south Delta. The confirmation of juvenile salvage on April 15, and April 28 is evidence of this. Members assume there are some number of fish in the south and central Delta. Even with detections in the 20-mm Survey #4 and the SKT #4 all in the Sacramento River system or downstream of the central Delta, members stressed their concern that the very low population abundance affects probability of detection, and, therefore, distribution cannot be determined with accuracy. Members indicated that a larger percentage of fish may be in the south and central Delta than would be assumed from field survey catch data.

Some members discussed a possible explanation for the juvenile Delta Smelt salvage that occurred last week: it may have resulted from entrainment into the south Delta that occurred very early in the season and taken until recently to reach the export facilities. In addition, there was discussion that there may be additional hatching in the central Delta (environmental conditions remain suitable for spawning and hatching, although adults have not been detected recently), and that reduced exports that result in less negative flows can protect the early life history stages in this region.

Given the OMR flows that were occurring on and just prior to April 15 and the particle entrainment results from this week's modeling runs, members maintained last week's advice that OMR flows more negative than -2500 cfs had a high risk of entrainment associated with them. The earlier life stages of Delta Smelt are at greater risk for entrainment, given that they behave more like a particle than older life stages. Older life stages have greater ability to control their position in the water columnThe SWG was informed of the April 28 communication from BOR to the Service requesting concurrence with proposed operations for this week, which were expected to result in OMR flows approaching -3000cfs by the third week in May. Given scheduled operations for this week (combined exports of 2600 cfs), the projects indicated that OMR flows would become more negative than those determined in the Service's March 24 determination (-2500 cfs on a 14-day running average) before the end of the week. Members noted that based on the PTM runs, there was a 5% increase in the percentage of particles entrained past the Old and Middle River flux points between the 2500 cfs (14.3%) and -3000 cfs (19.9%), for particles inserted at station 815. The entrainment advice for the OMR flow range of -2000 to -3500 cfs is considered a medium to high risk of entrainment.

The above discussion points influenced and contributed to all three flow ranges described below:

Advice Framework OMR Level Risk Ranking and Discussion—**Young of Year Delta Smelt**

- OMR flow of -1250 to -2000 cfs: There is a *low to medium* risk of entrainment under this flow range. This is the most protective range for larval Delta Smelt.
    - Risk factors: lowest annual indices on record, low likelihood of detection.
    - Salvage: four salvaged April 28, geographic influence of the pumps does not extend to central Delta under this OMR flow range
    - Unknowns: detection ability in salvage and trawl surveys has been severely reduced, given the record low abundance indexes.
    - Persistence of risk: expected to continue until at least May 9
- OMR flow of -2000 to -3500 cfs: There is a *medium to high* risk of entrainment under this flow range.
    - Risk Factors: lowest annual indices on record, low likelihood of detection
    - Salvage: four salvaged April 28, geographic influence of the pumps extends to the Old River corridor
    - Unknowns: detection ability in salvage and trawl surveys has been severely reduced, given the record low abundance indexes.
    - Persistence of Risk: expected to continue until at least May 9
- OMR flow of -3500 to -5000 cfs. There is a *high* risk of entrainment under this flow range.
    - Risk Factors: lowest annual indices on record, low likelihood of detection

- Salvage: four salvaged April 28, geographic influence of the pumps extends to the lower San Joaquin River.
- Unknowns: detection ability in salvage and trawl surveys has been severely reduced, given the record low abundance indexes.
- Persistence of Risk: expected to continue until at least May 9

Advice Framework OMR Level Risk Ranking and Discussion—**Adult Delta Smelt**

- OMR flow of -1250 to -2000 cfs: There is a low risk of entrainment under this flow range. This is the most protective range for Delta Smelt.
  - Risk factors: lowest annual indices on record.
  - Salvage: None since February 22, geographic influence of the pumps does not extend to central Delta under this flow range
  - Unknowns: detection ability in salvage and trawl surveys has been severely reduced, given the record low abundance indexes; low Sacramento River catch densities (unable to assess percentage of population in the lower San Joaquin River).
  - Persistence of risk: expected to continue through remainder of the season
- OMR flow of -2000 to -3500 cfs: There is a low risk of entrainment under this flow range, given conditions listed below:
  - Risk factors: lowest annual indices on record.
  - Salvage: none since February 22, geographic influence of the pumps not likely to extend to central Delta under this flow range
  - Unknowns: detection ability in salvage and trawl surveys has been severely reduced, given the record low abundance indexes, low Sacramento River catch densities (unable to assess percentage of population in the lower San Joaquin River).
  - Persistence of risk: expected to continue through remainder of the season.
- OMR flow of -3500 to -5000 cfs: There is a medium risk of entrainment under this flow range. Some members indicated this flow range had a high risk of entrainment.
  - Risk factors: lowest annual indices on record, reduced turbidity in the south Delta.
  - Salvage: none since February 22, geographic influence of the pumps is likely to extend to central Delta under this flow range.
  - Unknowns: detection ability in salvage and trawl surveys has been severely reduced, given the record low abundance indexes, low Sacramento River catch densities (unable to assess percentage of population in the lower San Joaquin River).
  - Persistence of risk: expected to continue until spawning has completed

The Working Group will continue to monitor conditions and smelt distribution and will meet again on Monday, May 9, 2016.

WEEKLY ADVICE FOR THE DEPARTMENT OF FISH AND WILDLIFE FOR LONGFIN SMELT

Advice for week of May 2, 2016:
The Smelt Working Group does not have any advice for Longfin Smelt based on recent information.

The period of potential Barker Slough operations restriction is over for 2016 (see #5 below).

Basis for advice:
The 2009 State Water Project 2081 for Longfin Smelt states that advice to WOMT and the DFW Director shall be based on:

1. Adult Salvage – total adult (>=80 mm) Longfin Smelt salvage (SWP+CVP) for December through February > 5 times the Fall Midwater Trawl Longfin Smelt annual abundance index.

2. Adult abundance, distribution or other information indicates that OMR flow advice is warranted.

3. Larva distribution in the Smelt Larva Survey or the 20-mm Survey finds Longfin Smelt larvae present at 8 of 12 central and south Delta sampling stations in 1 survey (809, 812, 815, 901, 902, 906, 910, 912, 914, 915, 918, 919; see Figure 1).

4. Larva catch per tow exceeds 15 Longfin Smelt larvae or juveniles in 4 or more of the 12 survey stations listed.

5. During the period January 15 through March 31 of a dry or critically dry water year only, advice for Barker Slough pumping plant operations may be warranted if larval Longfin Smelt are detected at station 716 and other information indicates risk of entrainment.

Discussion of Criteria

1. No Longfin Smelt were salvaged during the week of April 25-May 1. No Longfin Smelt have been salvaged since mid-March. On March 9, 2016, the first Longfin Smelt was salvaged for the water year, a young-of-the-year (≥ 20 mm); additional young-of-the-year were salvaged on March 11 for a total salvage of 10. Salvage of young-of-the-year does not count toward the adult salvage limit for advice. The **Longfin Smelt adult salvage threshold for advice is 20** based on a Fall Midwater Trawl abundance index of 4 for 2015 (see criterion in #1 above). No advice is warranted based on this criterion.

2. There is no new adult distribution information. No Bay Study sampling was conducted in April and no sampling was conducted in February or March. January Bay Study sampling detected no Longfin Smelt in the lower San Joaquin or Sacramento rivers. December Bay Study sampling collected no Longfin Smelt in the San Joaquin River. The December Fall Midwater Trawl sampled the region and did not detect Longfin Smelt in the San Joaquin River or the south Delta. Distribution information does not indicate advice is warranted based on this criterion.

3 & 4. The fourth 20-mm Survey was conducted during the week of April 25 and is partially processed (Table 1, Figure 1). No larvae were detected among the 12 criteria stations (Table 1, Figure 1). Neither the distribution (Basis for advice #3) nor the catch density (Basis for advice #4) criterion was achieved. Catches of Longfin Smelt larvae remain low, but have recently increased somewhat in Suisun Bay stations.

5. The Barker Slough criterion terminated for the water year on March 31.

Current conditions: The Sacramento River flow were10,509 cfs on May 1 and the San Joaquin River at Vernalis was 2,859 cfs. Also on May 1, Qwest was +1,580 cfs. Combined State and federal exports are at about 2,600 cfs and will remain at this level, resulting in a slightly more negative OMR than requested by the USFWS determination and subsequent memos, if the USFWS allows the OMR limit to shift to -3,000 cfs as a 14-day average.

There is no new adult distribution information.

Summary of Risk: Risk of entrainment in the south Delta is very low due to consistent lack of detection in the central and south Delta criteria stations. Qwest remains slightly positive at +1,580. There is very little likelihood of additional Longfin Smelt larvae hatching in the lower San Joaquin River, and larva numbers are likely to remain at zero (Table 1). April usually marks the end of the hatching season.

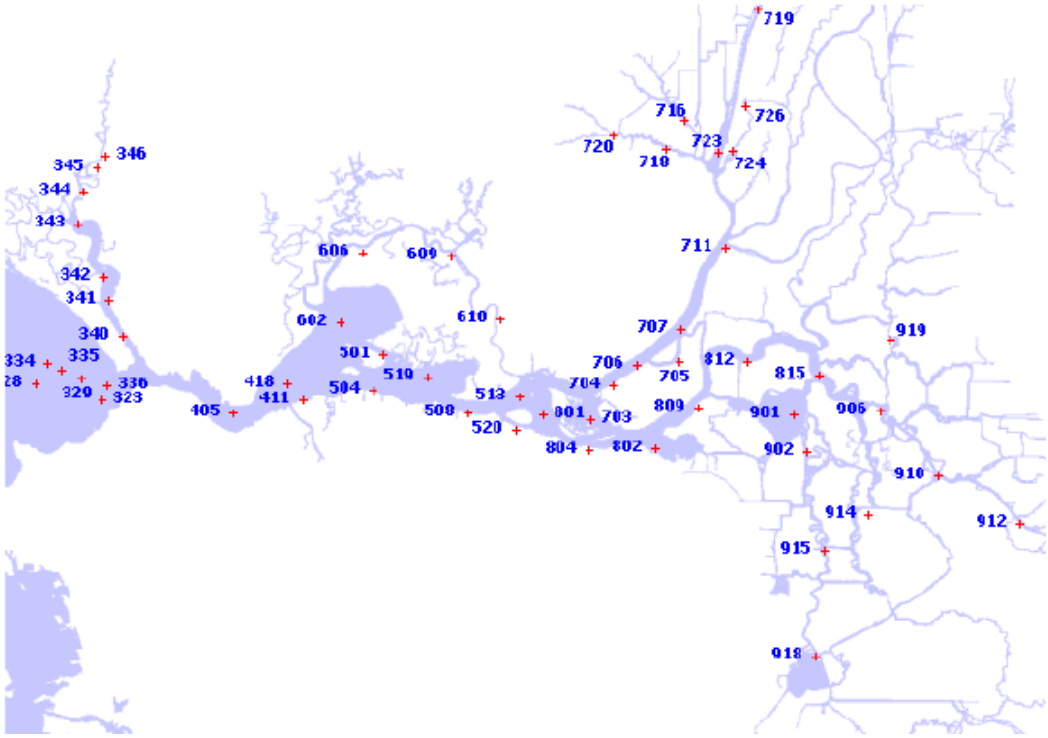
The Barker Slough concern period ended March 31.

Table 1. Longfin Smelt catch by station in the 20-mm Survey, #4. Sample processing is incomplete.

Year	Survey	Station	Date	# Tows Processed	Species_	Total Catch	Min Length	Max Length	Avg Length	
2016	4	323		0	Not Yet Processed	0				Suisun Bay & West
2016	4	340		0	Not Yet Processed	0				
2016	4	342		0	Not Yet Processed	0				
2016	4	343		0	Not Yet Processed	0				
2016	4	344		0	Not Yet Processed	0				
2016	4	345		0	Not Yet Processed	0				
2016	4	346		0	Not Yet Processed	0				
2016	4	405		0	Not Yet Processed	0				
2016	4	411		0	Not Yet Processed	0				
2016	4	418		0	Not Yet Processed	0				
2016	4	501		0	Not Yet Processed	0				
2016	4	504		0	Not Yet Processed	0				
2016	4	519		0	Not Yet Processed	0				
2016	4	602		0	Not Yet Processed	0				
2016	4	606		0	Not Yet Processed	0				
2016	4	609		0	Not Yet Processed	0				
2016	4	610		0	Not Yet Processed	0				
2016	4	508		0	Not Yet Processed	0				Confluence
2016	4	513		0	Not Yet Processed	0				
2016	4	520		0	Not Yet Processed	0				
2016	4	801	25-Apr-16	3	Longfin Smelt	22	12	24	16.41	
2016	4	804	26-Apr-16	3	No Longfin Catch	0				
2016	4	703		0	Not Yet Processed	0				Sac. River System
2016	4	704		0	Not Yet Processed	0				
2016	4	705	25-Apr-16	3	No Longfin Catch	0				
2016	4	706		0	Not Yet Processed	0				
2016	4	707		0	Not Yet Processed	0				
2016	4	711		0	Not Yet Processed	0				
2016	4	716		0	Not Yet Processed	0				
2016	4	718		0	Not Yet Processed	0				
2016	4	719	27-Apr-16	3	No Longfin Catch	0				
2016	4	720		0	Not Yet Processed	0				
2016	4	723		0	Not Yet Processed	0				
2016	4	724	27-Apr-16	1	No Longfin Catch	0				
2016	4	726		0	Not Yet Processed	0				
2016	4	809	26-Apr-16	3	No Longfin Catch	0				Central & South Delta
2016	4	812	26-Apr-16	3	No Longfin Catch	0				
2016	4	815	26-Apr-16	3	No Longfin Catch	0				
2016	4	901	25-Apr-16	3	No Longfin Catch	0				
2016	4	902	25-Apr-16	3	No Longfin Catch	0				
2016	4	906	25-Apr-16	3	No Longfin Catch	0				
2016	4	910	25-Apr-16	3	No Longfin Catch	0				
2016	4	912	25-Apr-16	3	No Longfin Catch	0				
2016	4	914	25-Apr-16	3	No Longfin Catch	0				
2016	4	915	25-Apr-16	3	No Longfin Catch	0				
2016	4	918*	25-Apr-16	2	No Longfin Catch	0				
2016	4	919	26-Apr-16	3	No Longfin Catch	0				

*Reduced tow time
Processing is complete through 4/29/2016

Figure 1. DFW's Smelt Larva Survey/20-mm Survey station locations.



SWG Weekly Salvage Update

Reporting Period: April 18-24, 2016

Prepared by Bob Fujimura on May 1, 2016: 21:00

Preliminary Results -Subject to Revision

	Daily Salvage									
Species/Life Stage	***18-Apr***	***19-Apr***	***20-Apr***	***21-Apr***	***22-Apr***	***23-Apr***	***24-Apr***	***Trend***		
Juvenile Delta Smelt										
SWP	0	0	0	0	0	0	0		0	
CVP	0	0	0	0	0	0	0		0	
TOTAL	0	0	0	0	0	0	0	↘	0.0	0
CUM TAKE	4	4	4	4	4	4	4			
% of 2016 CL	2%	2%	2%	2%	2%	2%	2%			
Juvenile Longfin Smelt										
SWP	0	0	0	0	0	0	0		0	
CVP	0	0	0	0	0	0	0		0	
TOTAL	0	0	0	0	0	0	0	→	0	
SWP daily export	718	1,255	992	1,101	1,111	1,074	3,058	↗	1,330	
CVP daily export	1,972	1,975	1,979	1,980	1,983	1,979	1,965	→	1,976	
SWP reduced counts	0%	0%	0%	0%	0%	0%	0%	→	0%	
CVP reduced counts	0%	0%	0%	0%	0%	0%	0%	→	0%	
SWP larval samples	100%	100%	100%	100%	100%	100%	100%	→	100%	
CVP larval samples	100%	100%	100%	100%	100%	100%	100%	→	100%	
DS larvae present - SWP	N	N	N	N	N	N	N	→		
DS larvae present - CVP	N	N	N	N	N	N	N	→		
LFS larvae present - SWP	N	N	N	N	N	N	N	→		
LFS larvae present - CVP	N	N	N	N	N	N	N	→		

TOTAL = combine daily salvages for CVP+SWP; daily water export = AF; Trend = compared to previous week

NA = not available at the time of this report; NS = not sampled

Reduced counts = percentage of time that routine salvage sample time were less than 30 min per 2 hours of salvage and export operations

Larval samples = percentage of daily scheduled samples taken during periods of water export

Yellow highlighted dates indicate fish salvage facility outage occurred.

Larvae present = whether Delta Smelt (DS) or Longfin Smelt < 20 mm was observed from daily fish larva collections at the SWP or CVP fish facilities

SWG Weekly Salvage Update

Reporting Period: April 25-May 1, 2016

Prepared by Bob Fujimura on May 2, 2016: 9:00

Preliminary Results -Subject to Revision

	Daily Salvage									
Species/Life Stage	***25-Apr***	***26-Apr***	***27-Apr***	***28-Apr***	***29-Apr***	***30-Apr***	***1-May***	***Trend***		
Juvenile Delta Smelt										
SWP	0	0	0	4	0	0	0		1	
CVP	0	0	0	0	0	0	0		0	
TOTAL	0	0	0	4	0	0	0	↗	0.6	4
CUM TAKE	4	4	4	8	8	8	8			
% of 2016 CL	2%	2%	2%	3%	3%	3%	3%			
Juvenile Longfin Smelt										
SWP	0	0	0	0	0	0	0		0	
CVP	0	0	0	0	0	0	0		0	
TOTAL	0	0	0	0	0	0	0	→	0	
SWP daily export	2,723	3,058	3,036	2,894	3,076	3,076	1,904	↗	2,824	
CVP daily export	1,957	1,951	1,936	1,944	1,944	1,970	3,139	↗	2,120	
SWP reduced counts	0%	0%	0%	0%	0%	0%	0%	→	0%	
CVP reduced counts	8%	8%	0%	0%	0%	0%	0%	↗	2%	
SWP larval samples	100%	100%	100%	100%	100%	100%	100%	→	100%	
CVP larval samples	100%	100%	100%	100%	NA	NA	NA	→	100%	
DS larvae present - SWP	N	N	N	N	NA	NA	NA	→		
DS larvae present - CVP	N	N	N	N	NA	NA	NA	→		
LFS larvae present - SWP	N	N	N	N	NA	NA	NA	→		
LFS larvae present - CVP	N	N	N	N	NA	NA	NA	→		

= missed count collection

= fish salvage facility outage occurred

TOTAL = combine daily salvages for CVP+SWP; daily water export = AF; Trend = compared to previous week

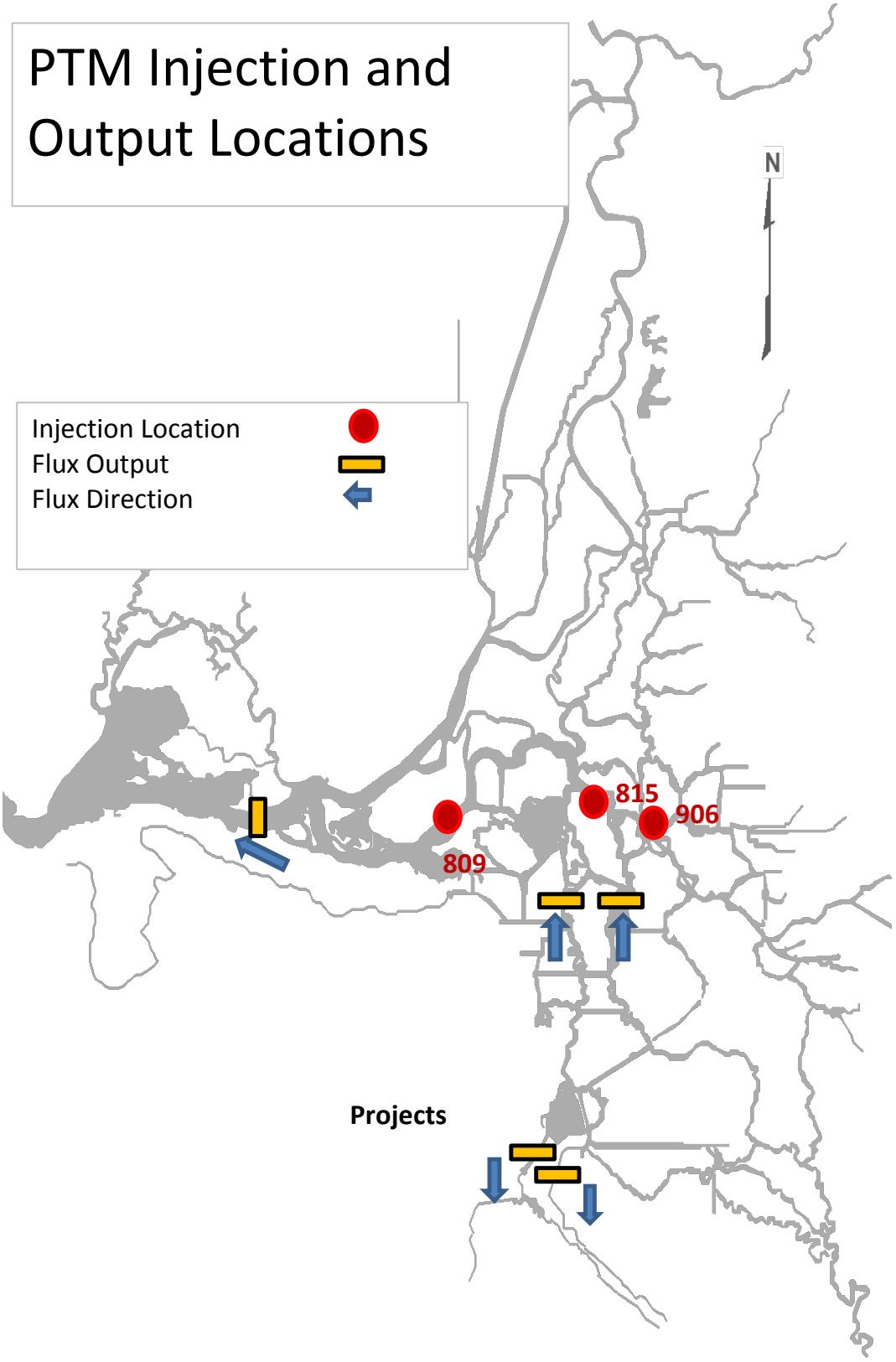
NA = not available at the time of this report; NS = not sampled

Reduced counts = percentage of time that routine salvage sample time were less than 30 min per 2 hours of salvage and export operations

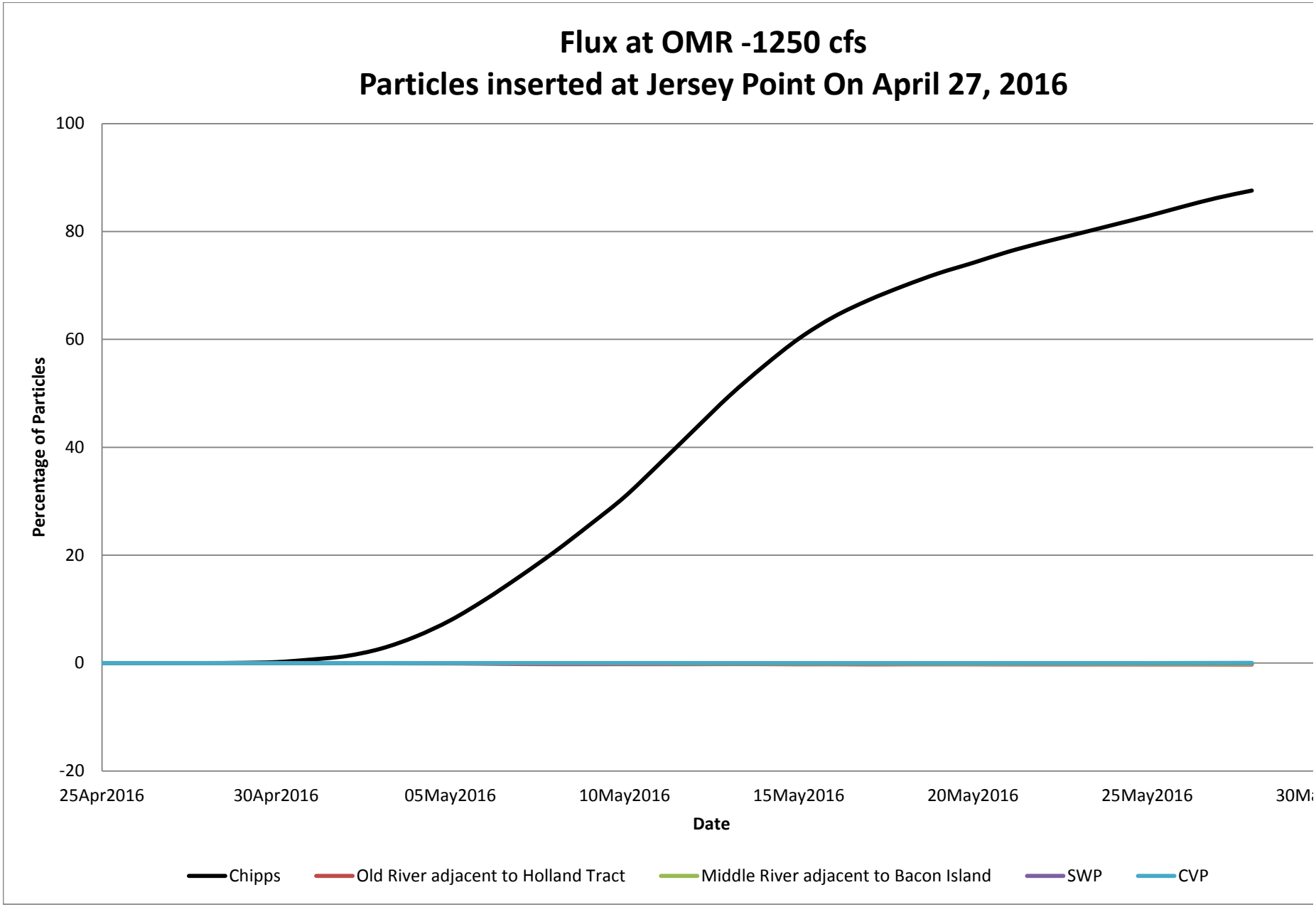
Larval samples = percentage of daily scheduled samples taken during periods of water export

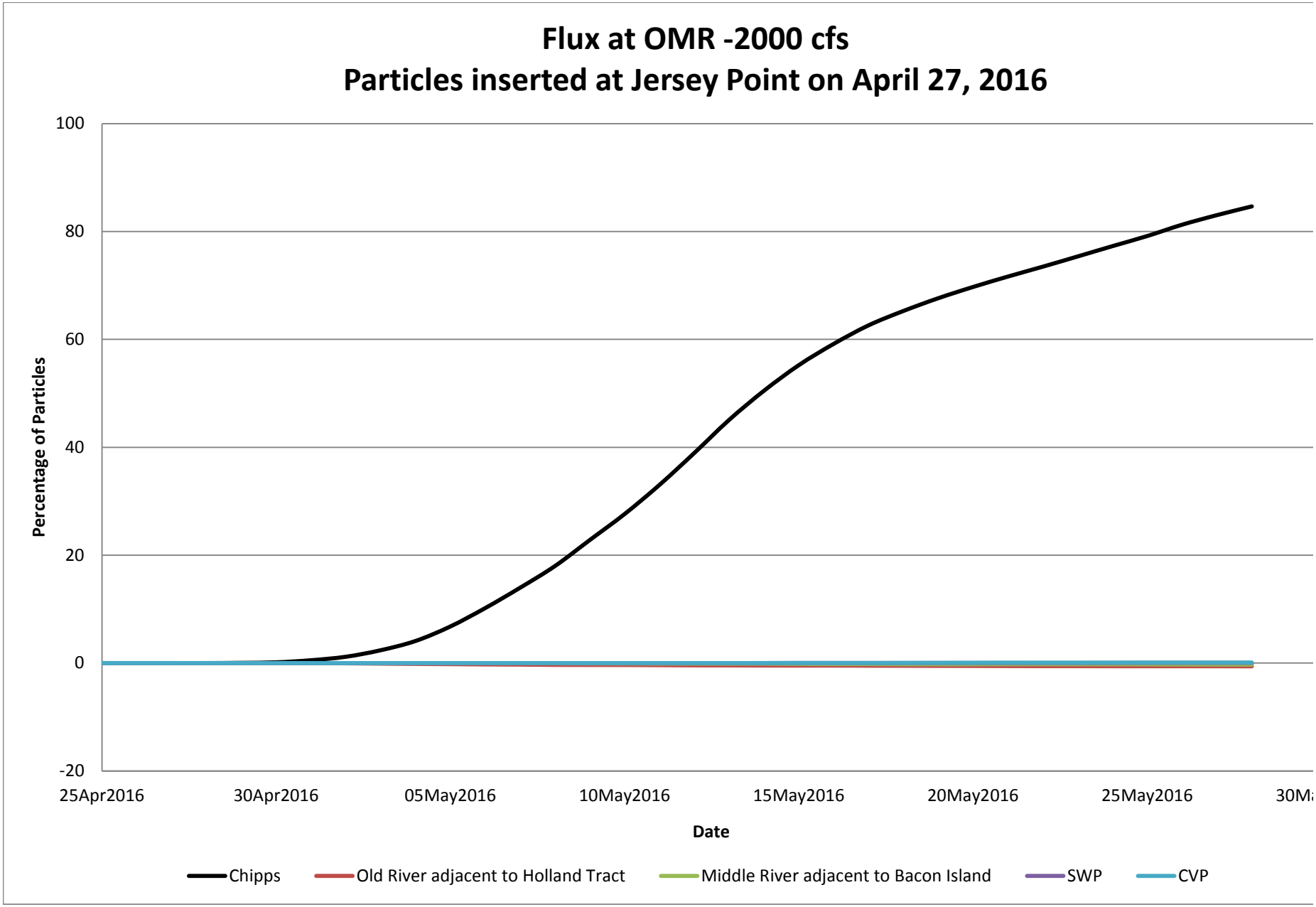
Larvae present = whether Delta Smelt (DS) or Longfin Smelt < 20 mm was observed from daily fish larva collections at the SWP or CVP fish facilities

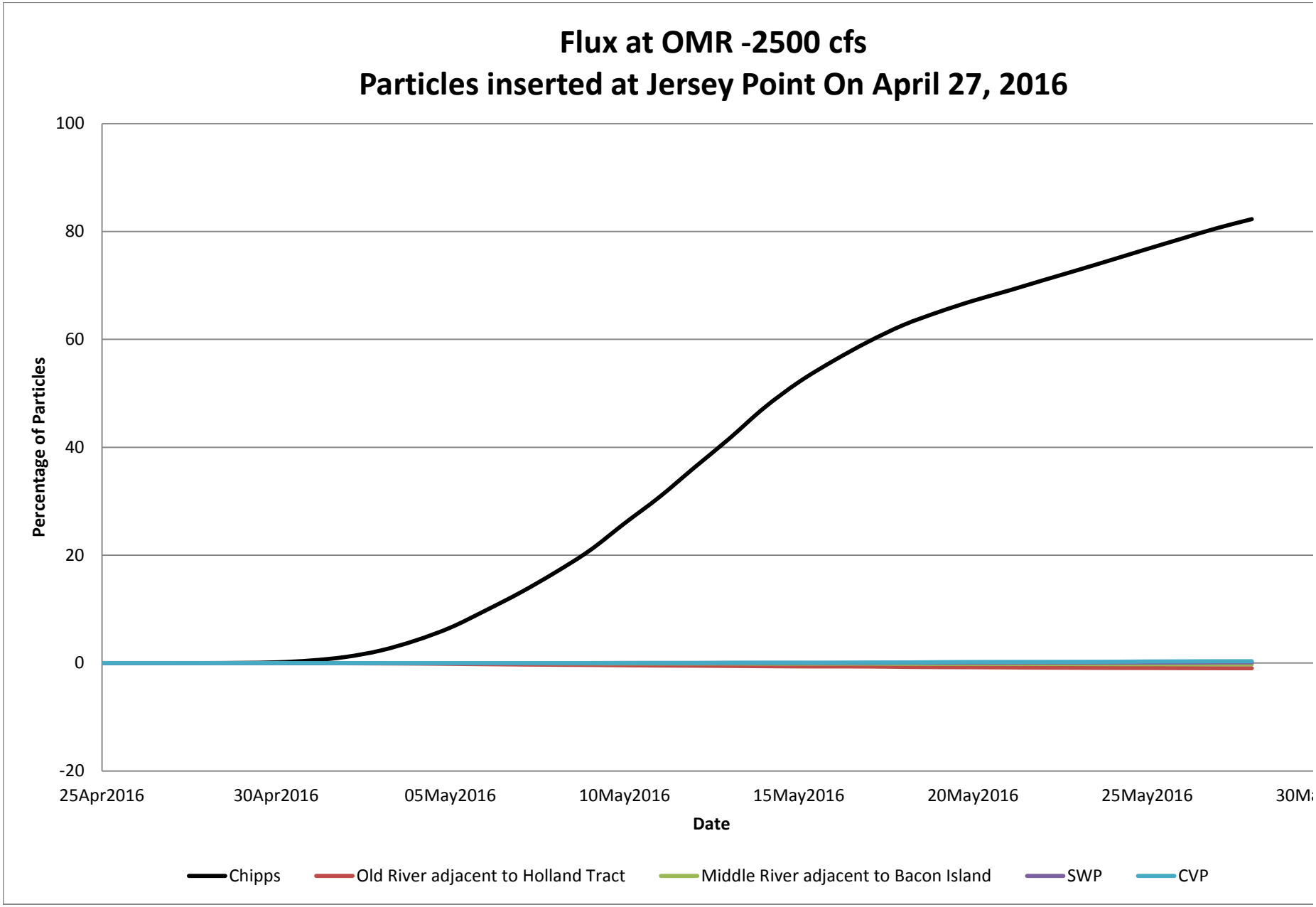
PTM Injection and Output Locations

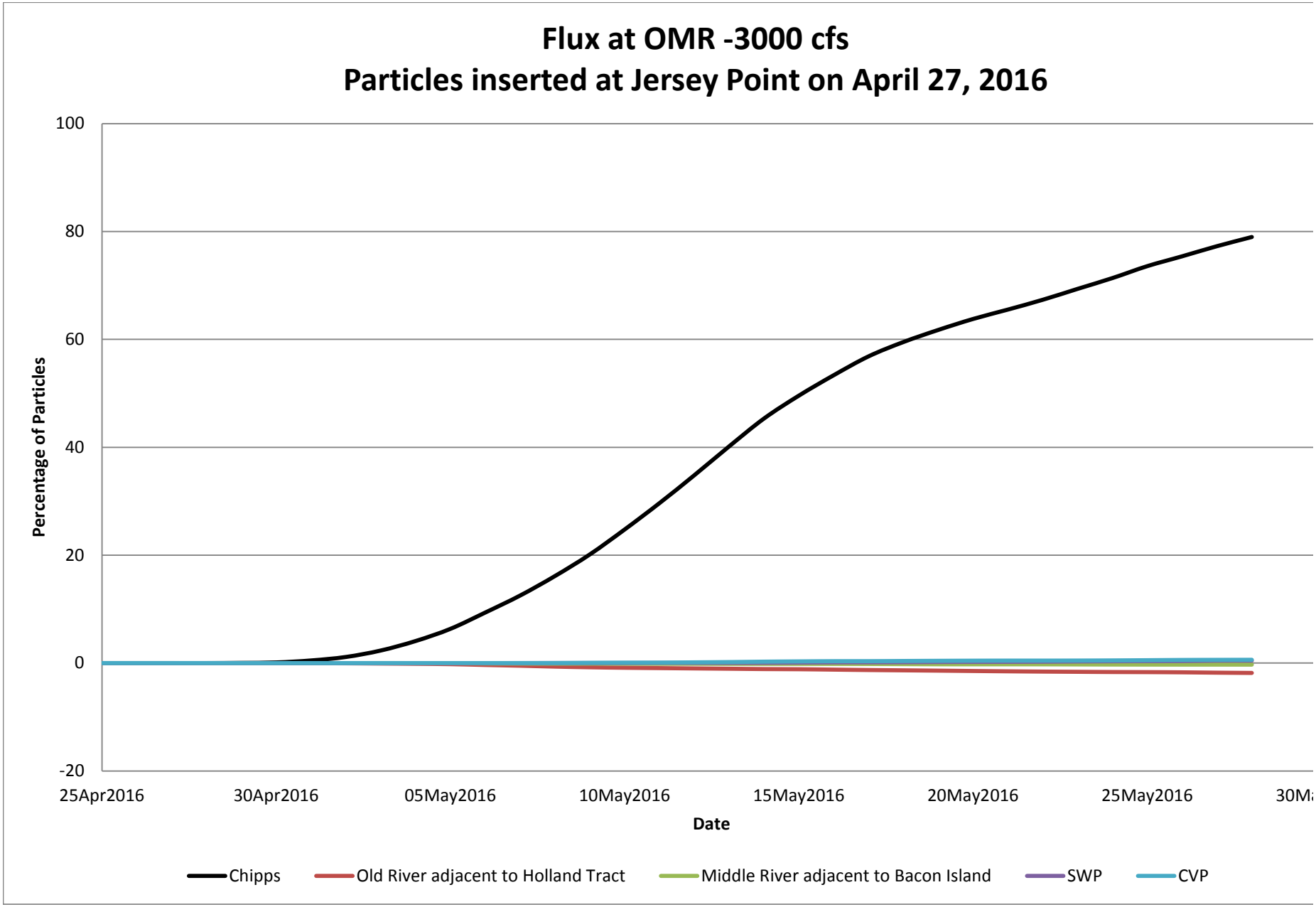


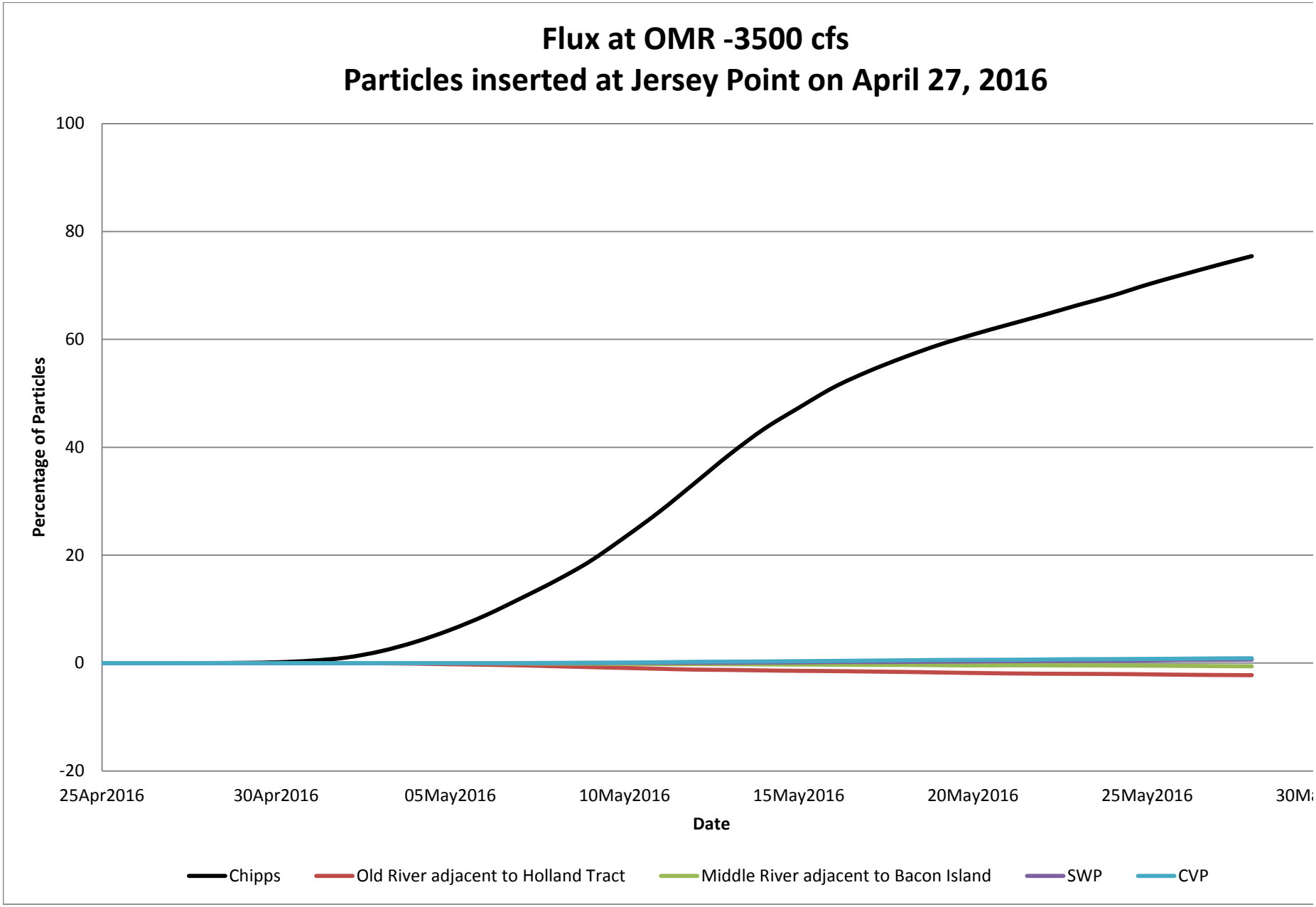
April 15, 2016

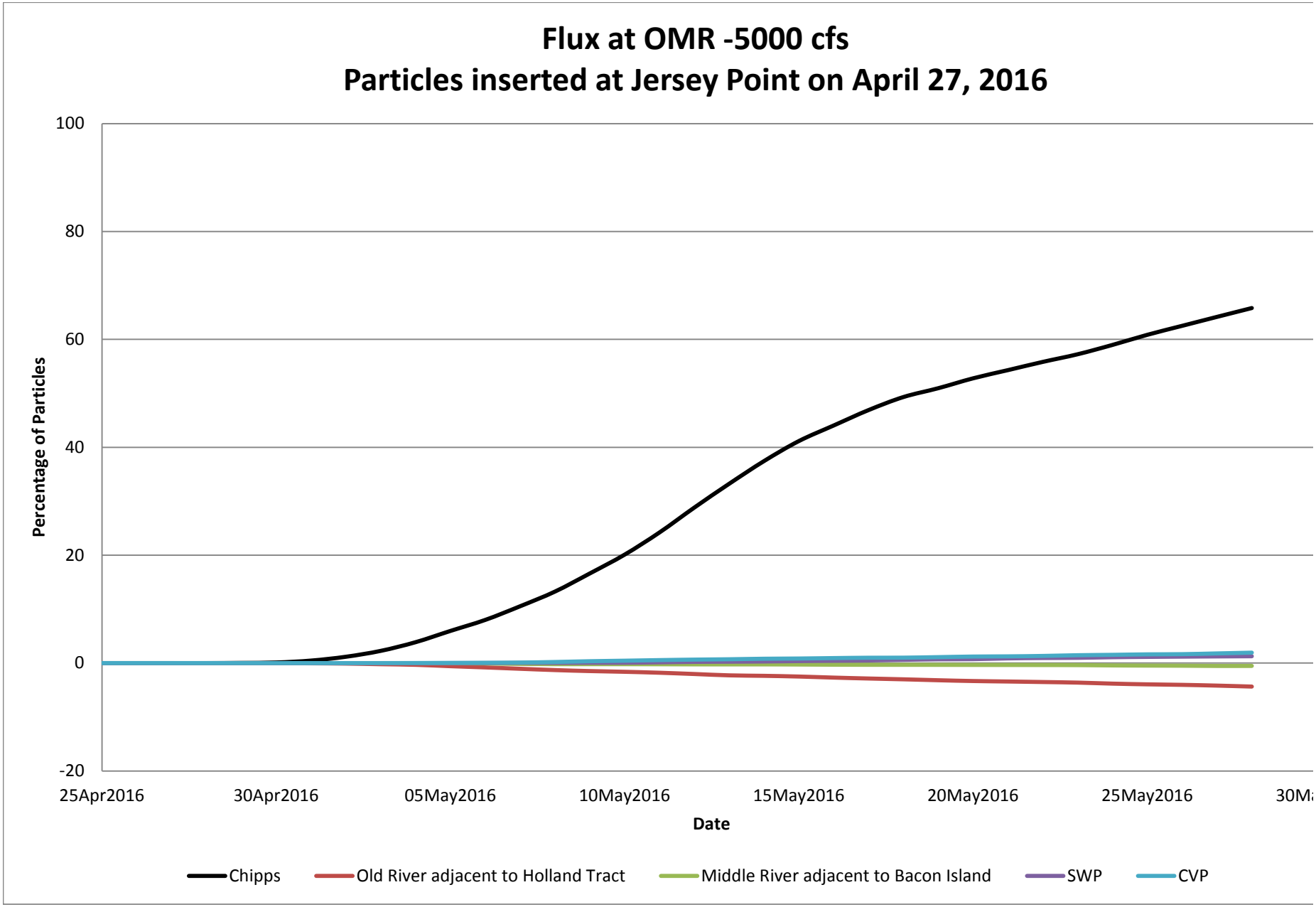

Flux at OMR -1250 cfs
Particles inserted at Jersey Point On April 27, 2016
Percentage of Particles
100
80
60
40
20
0
-20
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP

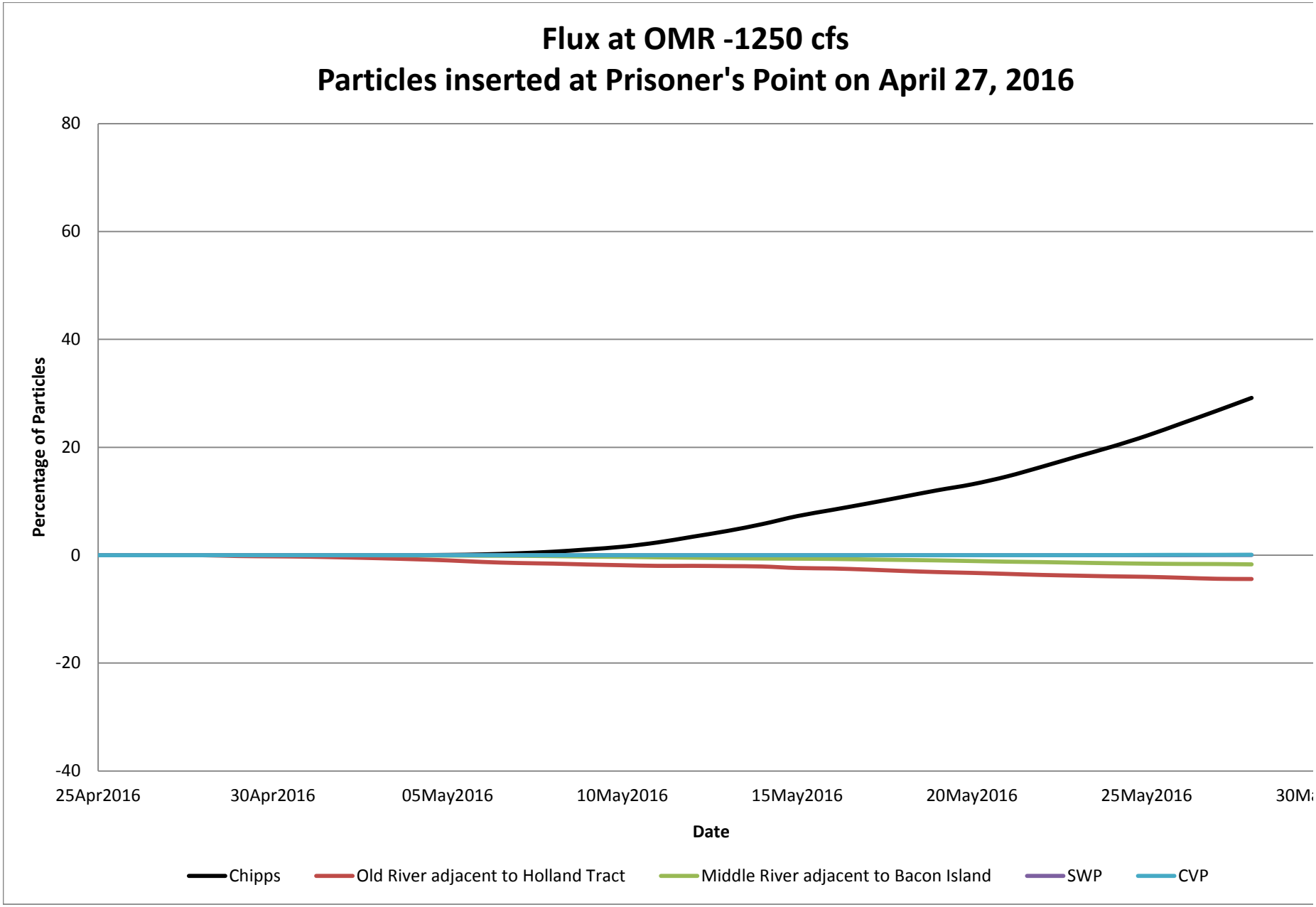

Flux at OMR -2000 cfs
Particles inserted at Jersey Point on April 27, 2016
Percentage of Particles
100
80
60
40
20
0
-20
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP

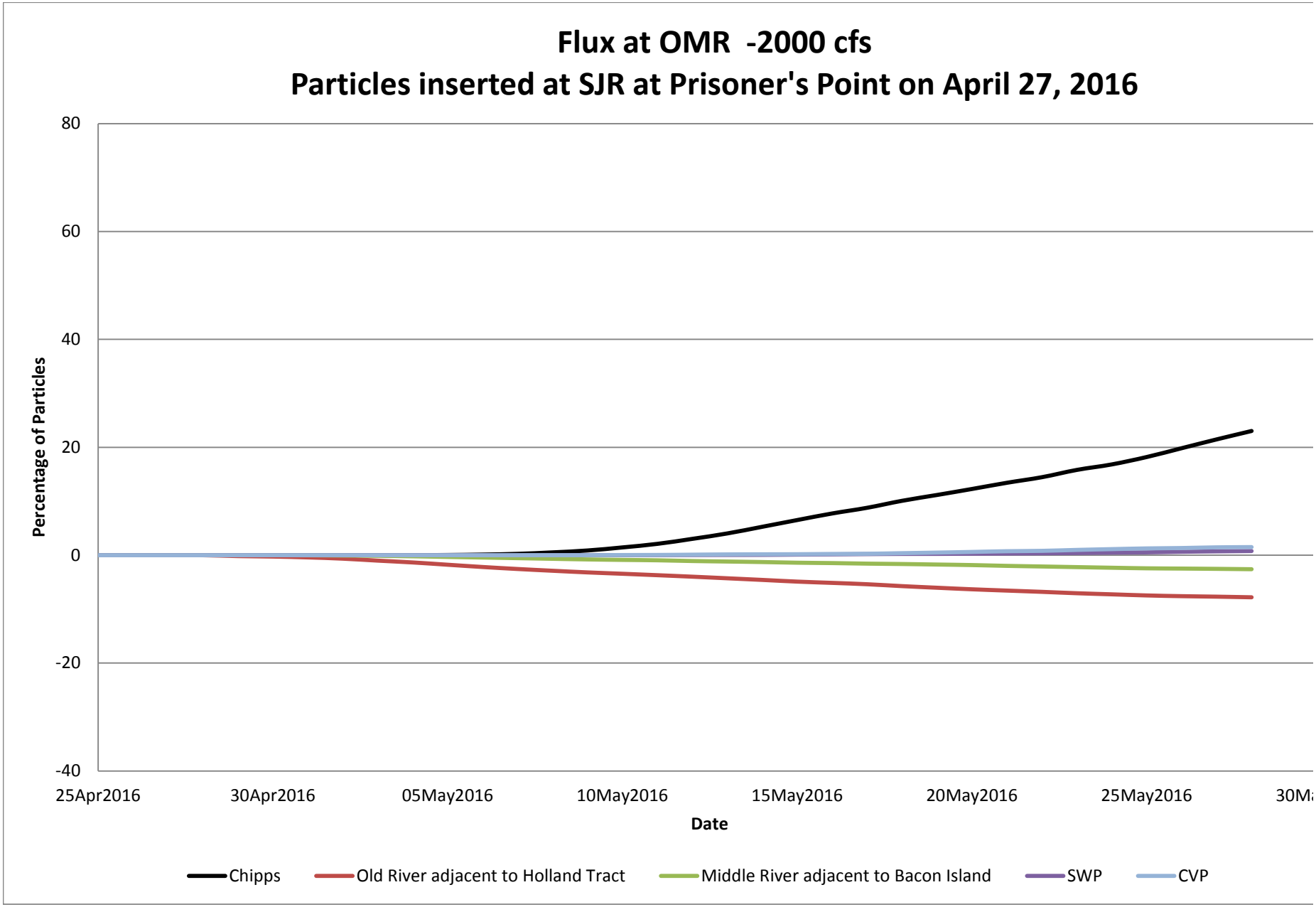

Flux at OMR -2500 cfs
Particles inserted at Jersey Point On April 27, 2016
Percentage of Particles
100
80
60
40
20
0
-20
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP

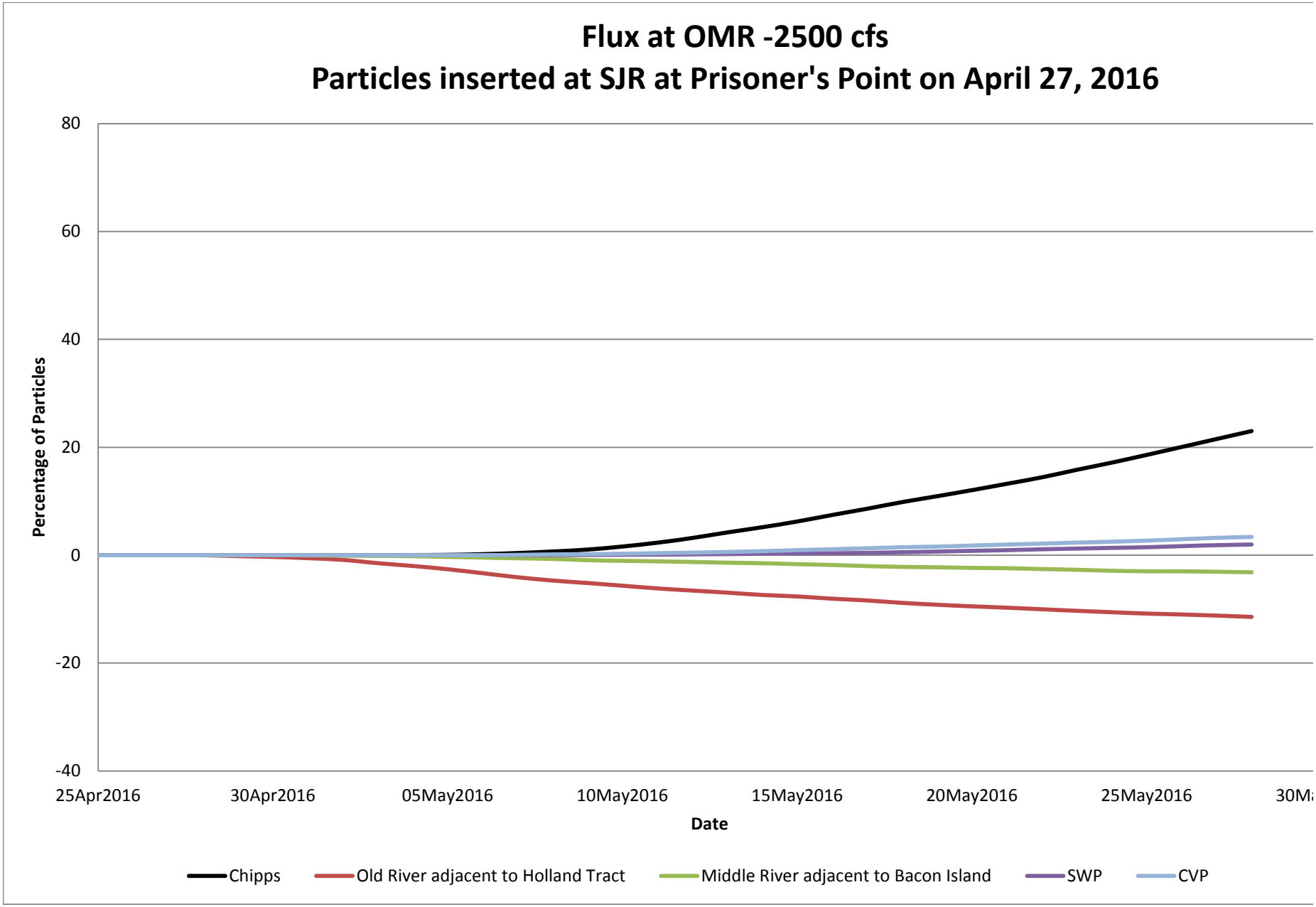

Flux at OMR -3000 cfs
Particles inserted at Jersey Point on April 27, 2016
Percentage of Particles
100
80
60
40
20
0
-20
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP

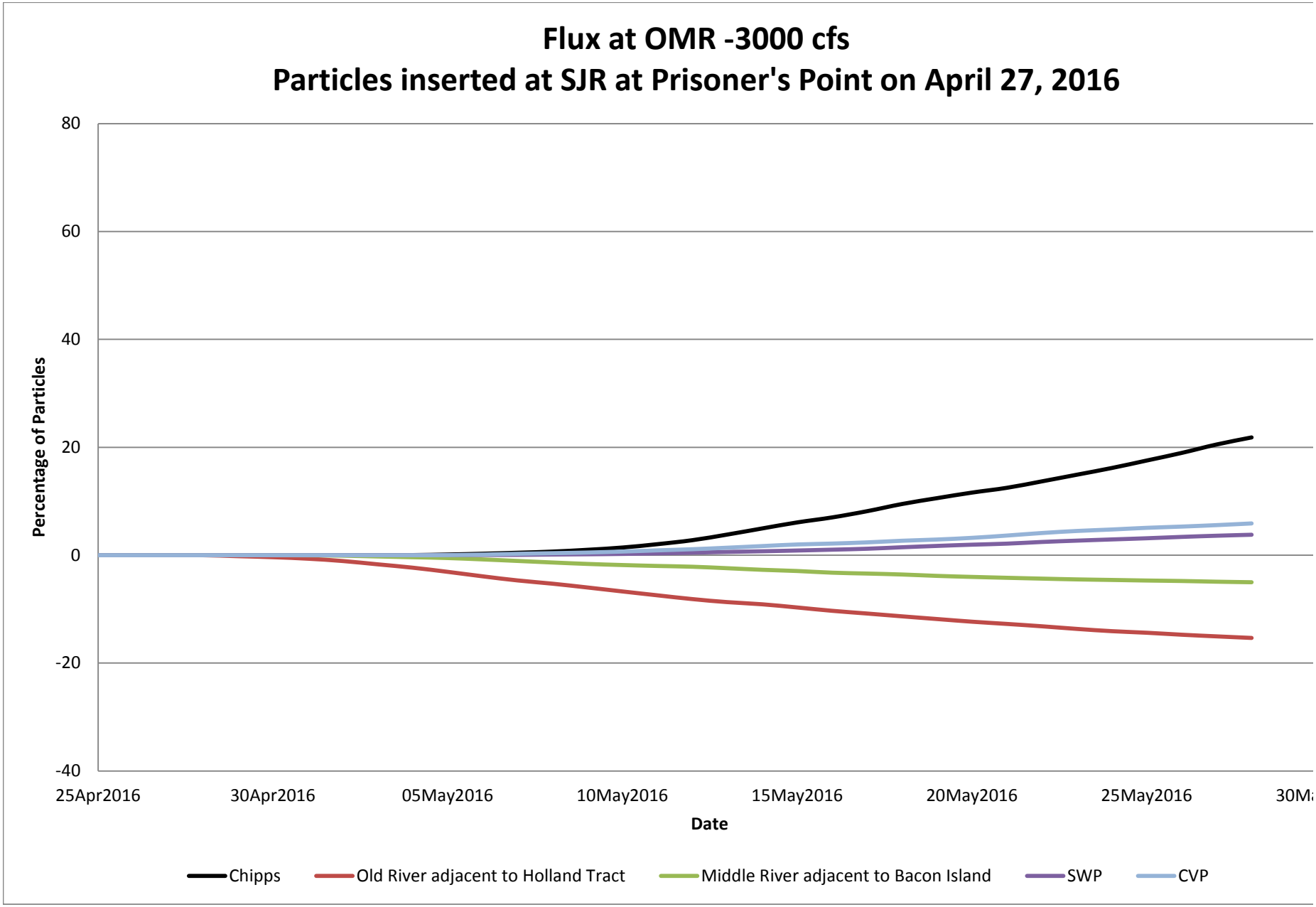

Flux at OMR -3500 cfs
Particles inserted at Jersey Point on April 27, 2016
Percentage of Particles
100
80
60
40
20
0
-20
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP

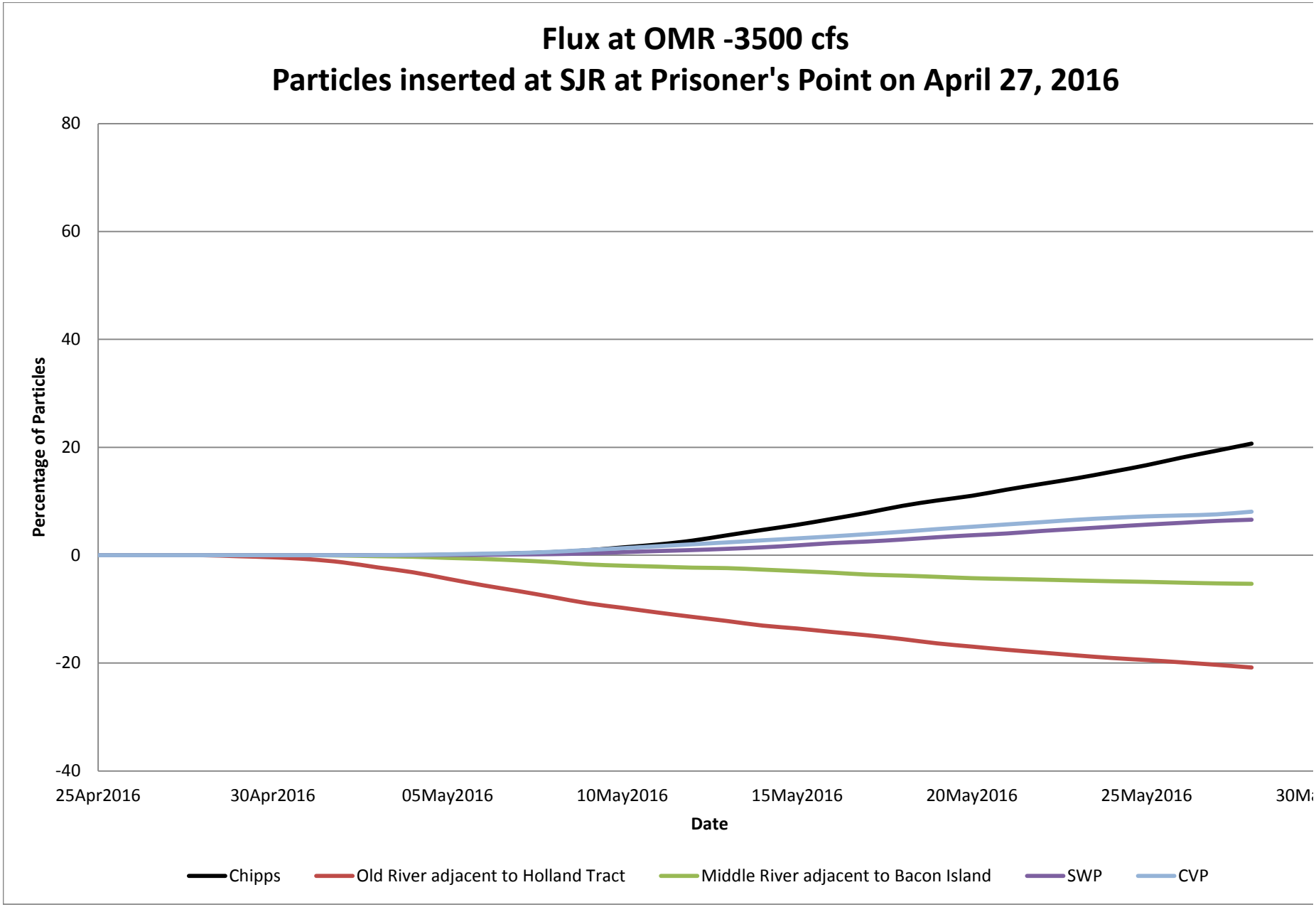

Flux at OMR -5000 cfs
Particles inserted at Jersey Point on April 27, 2016
Percentage of Particles
100
80
60
40
20
0
-20
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP

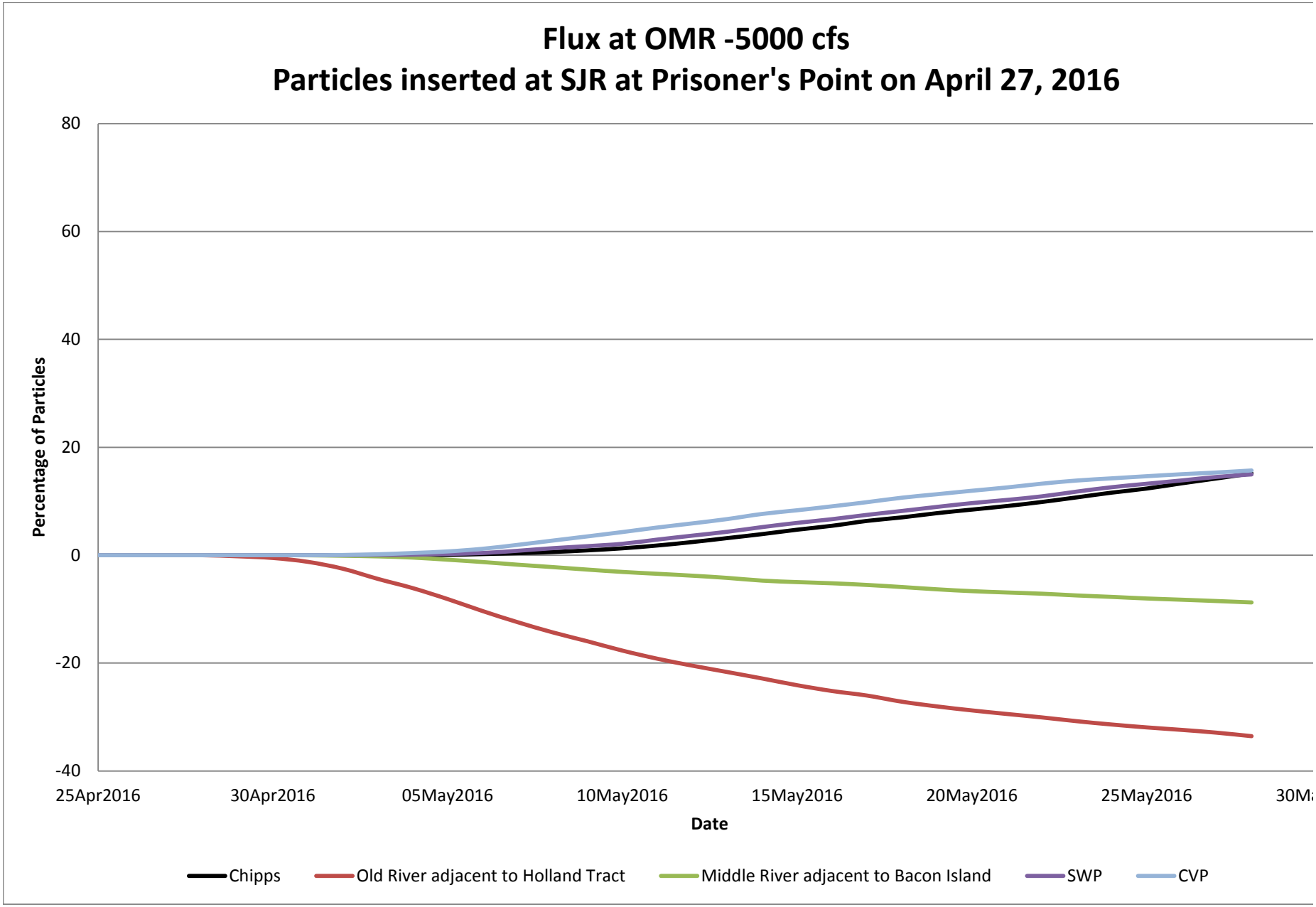

Flux at OMR -1250 cfs
Particles inserted at Prisoner's Point on April 27, 2016
Percentage of Particles
80
60
40
20
0
-20
-40
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP

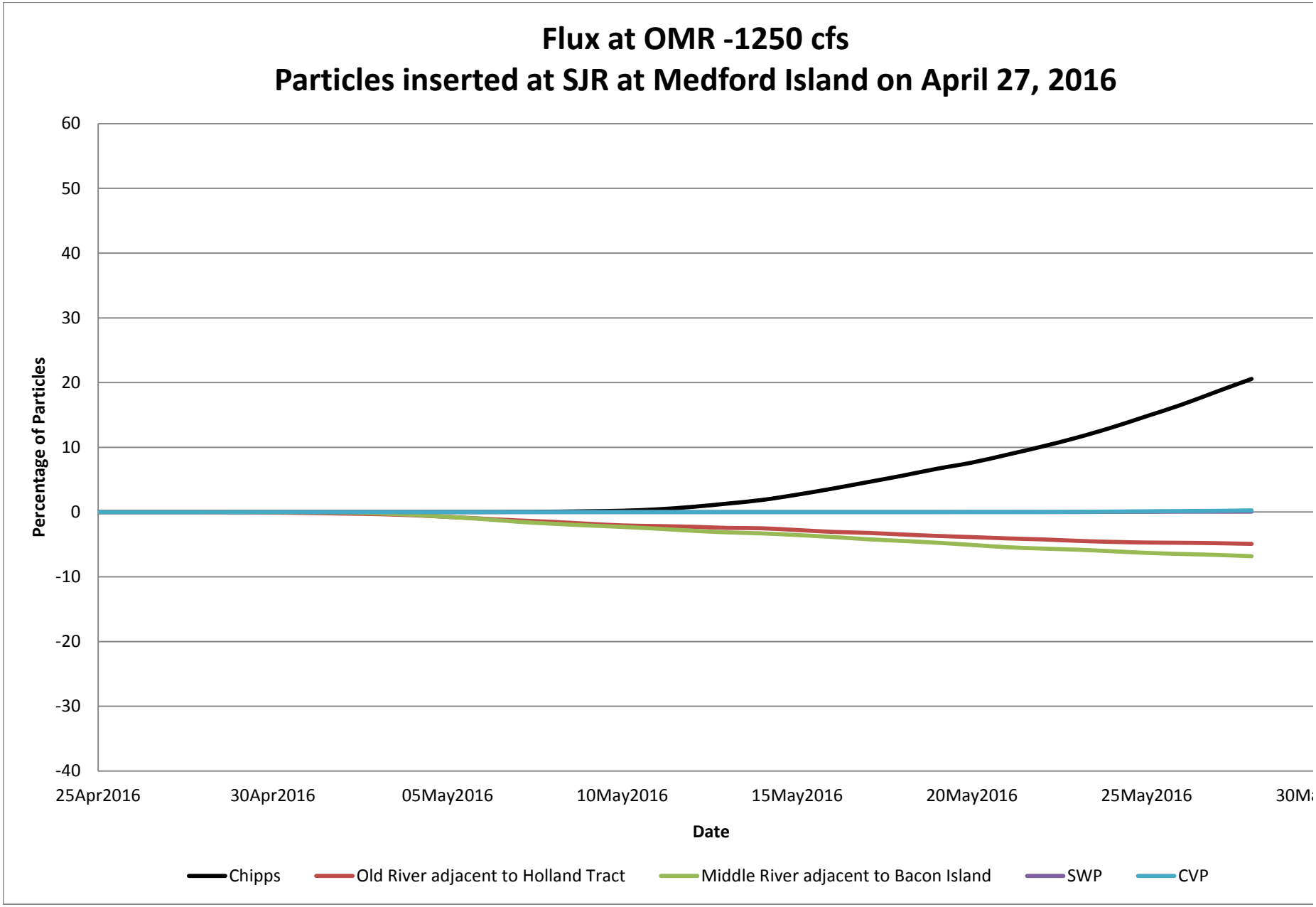

Flux at OMR -2000 cfs
Particles inserted at SJR at Prisoner's Point on April 27, 2016
Percentage of Particles
80
60
40
20
0
-20
-40
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP

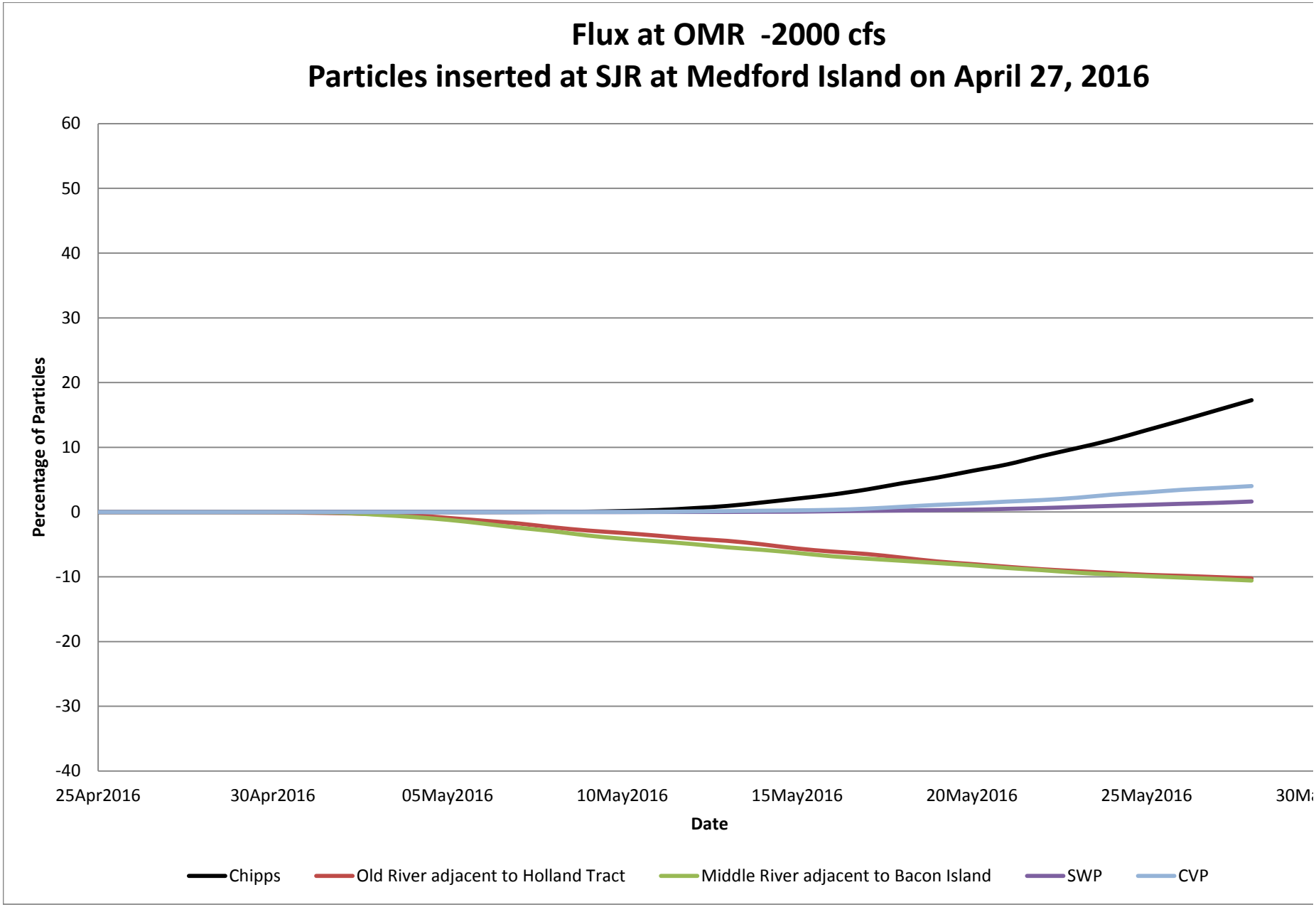

Flux at OMR -2500 cfs
Particles inserted at SJR at Prisoner's Point on April 27, 2016
Percentage of Particles
80
60
40
20
0
-20
-40
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP

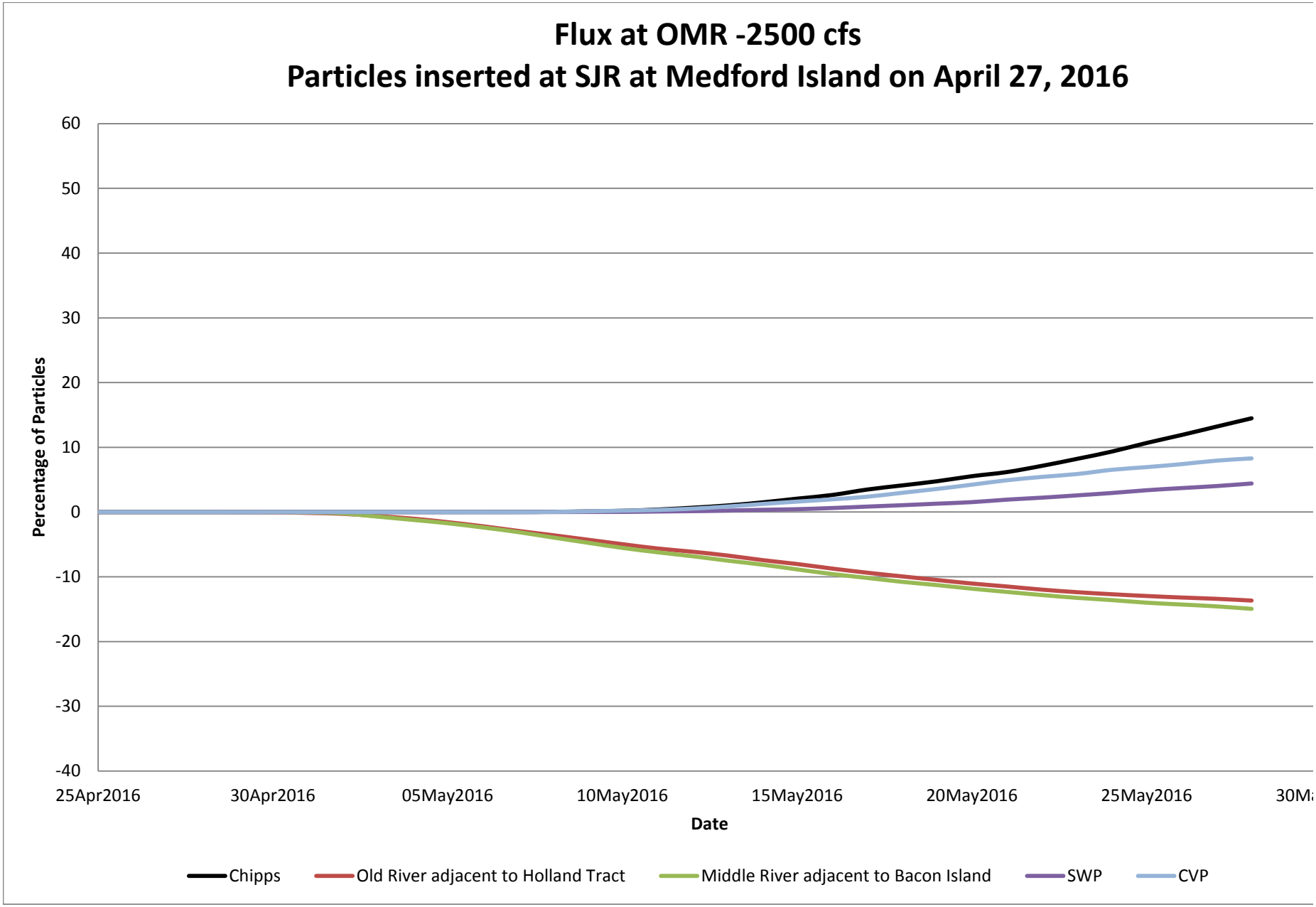

Flux at OMR -3000 cfs
Particles inserted at SJR at Prisoner's Point on April 27, 2016
Percentage of Particles
80
60
40
20
0
-20
-40
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP

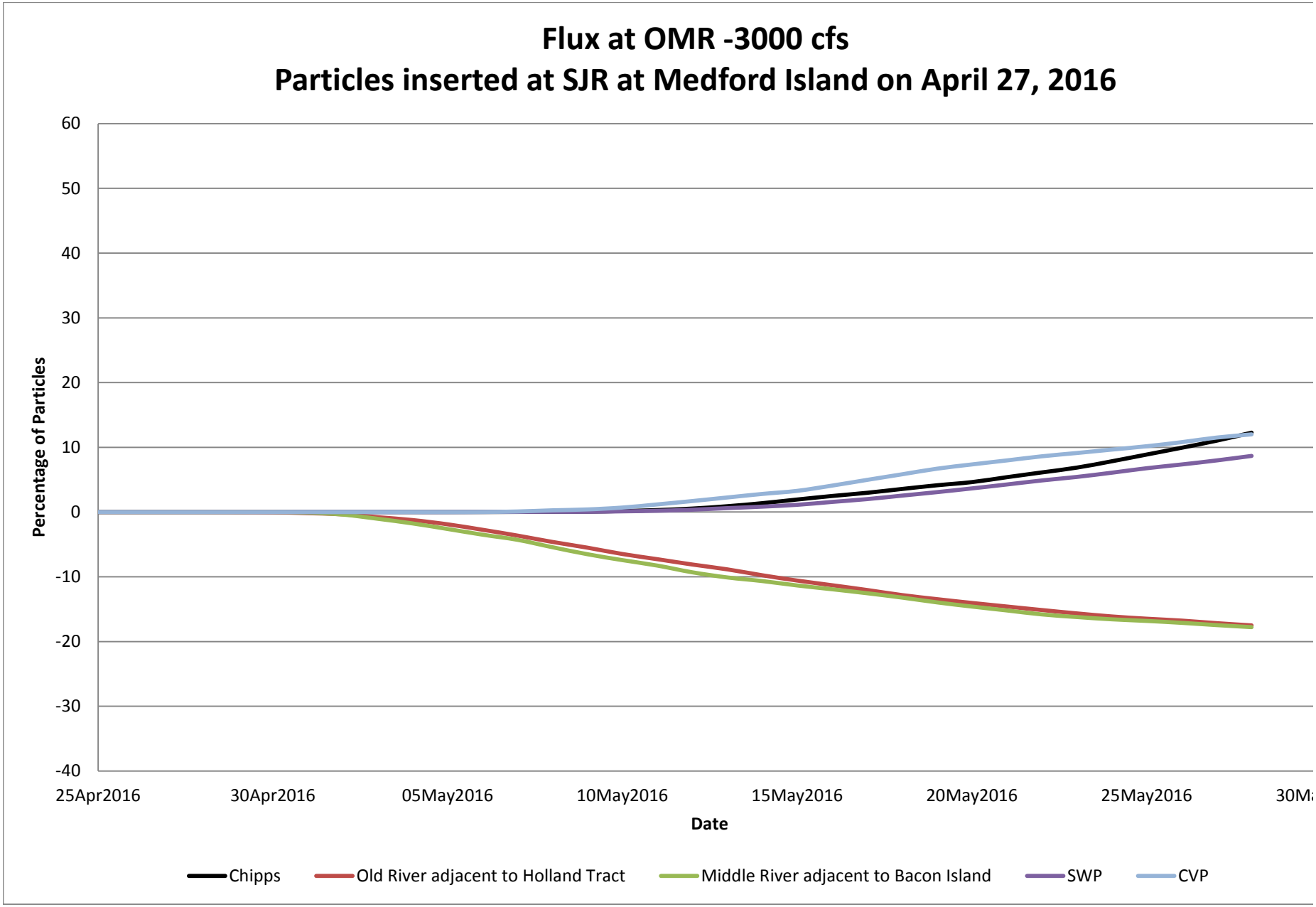

Flux at OMR -3500 cfs
Particles inserted at SJR at Prisoner's Point on April 27, 2016
Percentage of Particles
80
60
40
20
0
-20
-40
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP

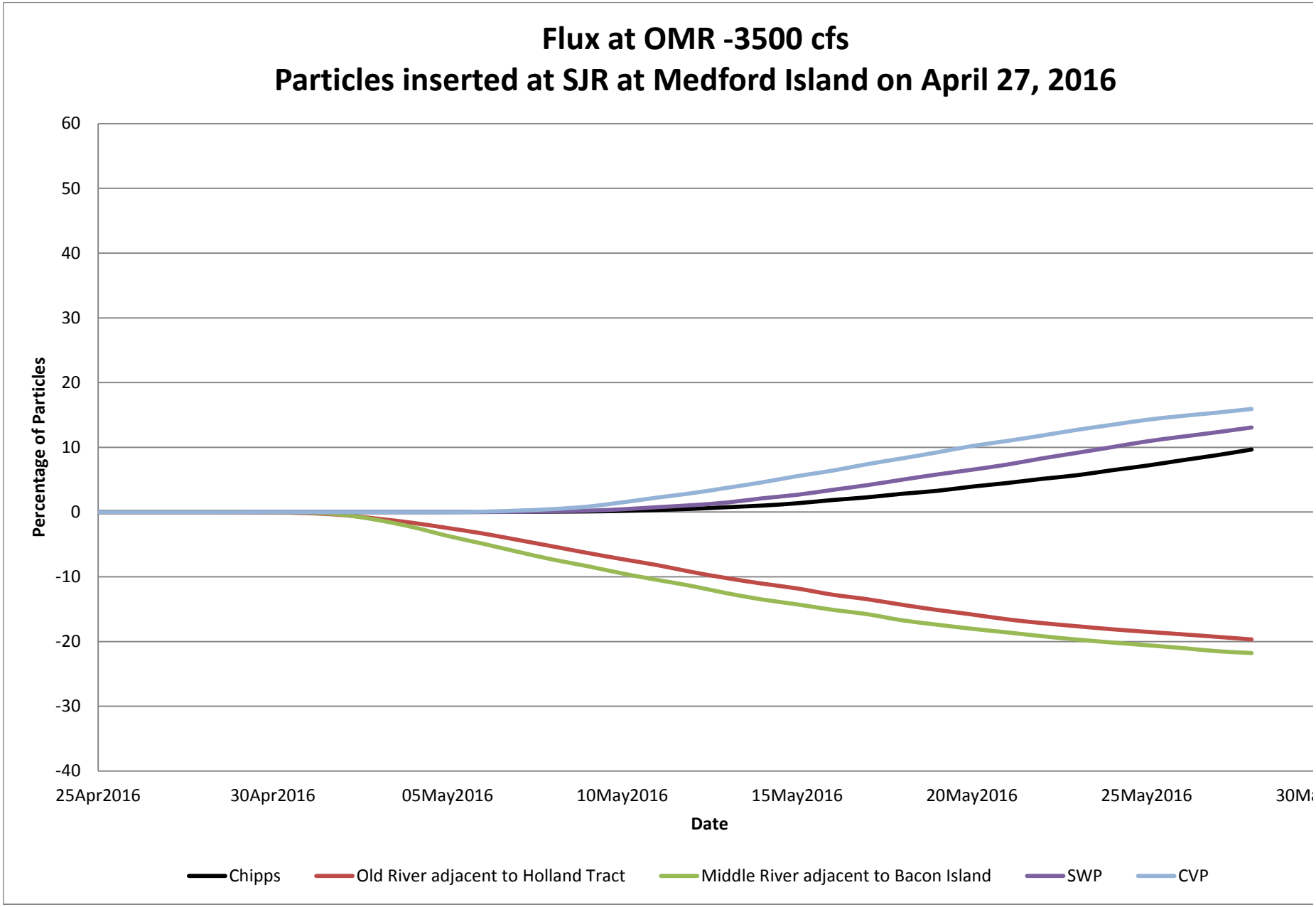

Flux at OMR -5000 cfs
Particles inserted at SJR at Prisoner's Point on April 27, 2016
Percentage of Particles
80
60
40
20
0
-20
-40
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP

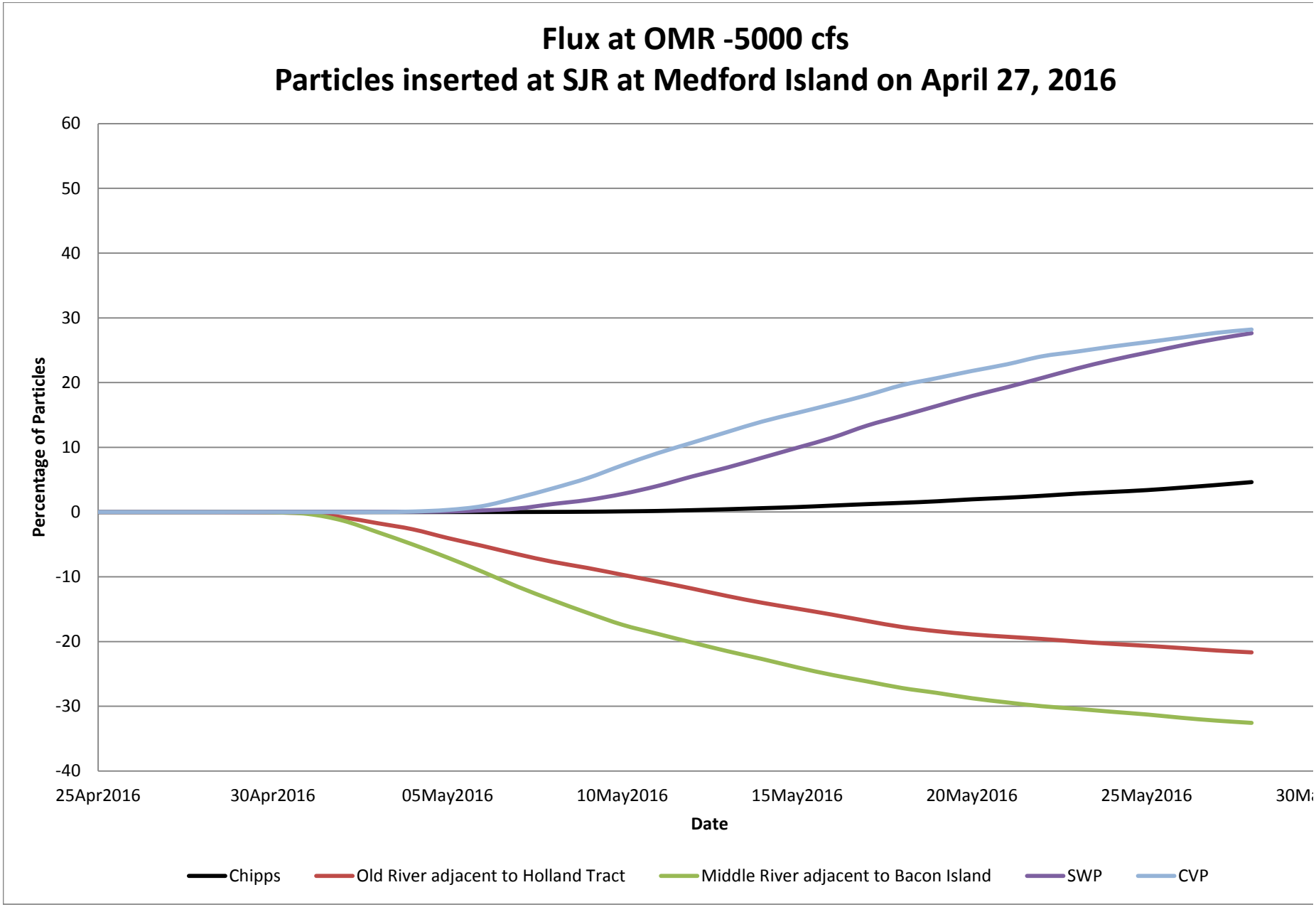

Flux at OMR -1250 cfs
Particles inserted at SJR at Medford Island on April 27, 2016
Percentage of Particles
60
50
40
30
20
10
0
-10
-20
-30
-40
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP


Flux at OMR -2000 cfs
Particles inserted at SJR at Medford Island on April 27, 2016
Percentage of Particles
60
50
40
30
20
10
0
-10
-20
-30
-40
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP


Flux at OMR -2500 cfs
Particles inserted at SJR at Medford Island on April 27, 2016
Percentage of Particles
60
50
40
30
20
10
0
-10
-20
-30
-40
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP


Flux at OMR -3000 cfs
Particles inserted at SJR at Medford Island on April 27, 2016
Percentage of Particles
60
50
40
30
20
10
0
-10
-20
-30
-40
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP


Flux at OMR -3500 cfs
Particles inserted at SJR at Medford Island on April 27, 2016
Percentage of Particles
60
50
40
30
20
10
0
-10
-20
-30
-40
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP


Flux at OMR -5000 cfs
Particles inserted at SJR at Medford Island on April 27, 2016
Percentage of Particles
60
50
40
30
20
10
0
-10
-20
-30
-40
25Apr2016
30Apr2016
05May2016
10May2016
15May2016
20May2016
25May2016
Date
Chipps
Old River adjacent to Holland Tract
Middle River adjacent to Bacon Island
SWP
CVP

PTM runs for the forecast period between April 26th and May 27th.

PTM Results on May 12, 2016

Location	OMR -1250*			OMR -2000			OMR -2500			OMR -3000			OMR -3500			OMR -5000**		
	809	815	906	809	815	906	809	815	906	809	815	906	809	815	906	809	815	906
CVP	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.5	0.5	0.1	1.1	1.7	0.2	2.0	2.9	0.6	5.9	10.7
SWP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.5	0.4	0.1	1.0	1.1	0.2	3.6	5.5
Middle R. adj Bacon Island	-0.1	-0.5	-2.9	-0.1	-1.1	-4.9	-0.1	-1.3	-6.8	-0.1	-2.1	-9.3	-0.2	-2.3	-11.4	-0.2	-3.8	-20.2
Old R. adj Holland Tract	-0.2	-2.0	-2.3	-0.4	-4.0	-4.1	-0.5	-6.6	-6.1	-1.0	-8.1	-8.1	-1.2	-11.4	-9.3	-2.0	-20.5	-11.8
Chipps	43.3	3.4	0.8	39.0	3.0	0.1	36.2	3.2	0.7	34.8	2.8	0.5	33.3	2.7	0.5	28.8	2.4	0.3

PTM Results on May 27, 2016

Location	OMR -1250*			OMR -2000			OMR -2500			OMR -3000			OMR -3500			OMR -5000**		
	809	815	906	809	815	906	809	815	906	809	815	906	809	815	906	809	815	906
CVP	0.0	0.1	0.2	0.1	1.5	3.7	0.3	3.2	7.9	0.6	5.6	11.5	0.9	7.6	15.4	1.8	15.3	27.7
SWP	0.0	0.0	0.1	0.0	0.7	1.4	0.1	1.9	4.0	0.5	3.6	8.0	0.6	6.3	12.3	1.2	14.5	26.7
Middle R. adj Bacon Island	-0.1	-1.6	-6.6	-0.3	-2.5	-10.3	-0.2	-3.1	-14.6	-0.3	-4.9	-17.5	-0.6	-5.2	-21.5	-0.5	-8.5	-32.2
Old R. adj Holland Tract	-0.3	-4.4	-4.8	-0.6	-7.7	-10.0	-0.9	-11.2	-13.4	-1.8	-15.0	-17.2	-2.2	-20.3	-19.3	-4.2	-32.9	-21.4
Chipps	86.2	26.8	18.6	83.0	21.5	15.7	80.6	21.5	13.2	77.3	20.5	11.0	73.8	19.4	8.8	64.2	14.2	4.2

Notes:

*For -1250: These assumptions and associated results were developed at the request of USFWS. DWR and Reclamation do not anticipate having to operate to this highly restrictive level given current hydrologic conditions and smelt population and distribution.

**For -5000: These assumptions and associated results were developed at the request of USFWS and are understood to be completely artificial. DWR and Reclamation do not intend to operate to this level given current hydrologic conditions and established objective limits.