

**Delta Operations for Salmonids and Sturgeon (DOSS) Group**  
**Conference call: 4/12/16 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 work with other technical teams. DOSS notes and advice can be found at: [http://www.westcoast.fisheries.noaa.gov/central\\_valley/water\\_operations/doss.html](http://www.westcoast.fisheries.noaa.gov/central_valley/water_operations/doss.html).

**DWR:** Aaron Miller, Kevin Reece, Mike Ford

**Reclamation:** Josh Israel

**NMFS:** Jeff Stuart, Kristin McCleery

**CDFW:** Bob Fujimura, Ken Kundargi, Duane Linander

**SWRCB:** Laurel Karren, Brittany Kammerer, Matt Holland

**FWS:** Craig Anderson, Leigh Bartoo

**Agenda Items**

1. Agenda review and introductions
2. RPA Implementation review
3. Current Operations
4. Smelt Working Group
5. Fish Monitoring: Salvage
6. Fish Monitoring: Hatchery winter-run Chinook acoustic-tracking
7. Fish Monitoring: RSTs/trawls/seines
8. Recent or Upcoming Hatchery Releases
9. DOSS Estimates of Fish Distribution and Entrainment Risk
10. DOSS Advice
11. Next DOSS meeting

**Agenda Item 2.**

**RPA Implementation Review**

**Delta RPA Actions that may affect operations during March and April:**

**Action IV.1.2<sup>1</sup> (DCC gate operations):**

- DCC gates have been closed since 12/15/15.

**Action IV.2.3<sup>2</sup> (OMR Flow Management)**

- No triggers exceeded over past week.
- Current OMR limit of -5,000 cfs is in effect for NMFS' species under this RPA action.

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<sup>1</sup> For details, see pages 62-66 in Enclosure 2 of the 2011 Amendments to the 2009 RPA document at: [http://www.westcoast.fisheries.noaa.gov/publications/Central\\_Valley/Water%20Operations/Operations,%20Criteria%20and%20Plan/040711\\_ocap\\_opinion\\_2011\\_amendments.pdf](http://www.westcoast.fisheries.noaa.gov/publications/Central_Valley/Water%20Operations/Operations,%20Criteria%20and%20Plan/040711_ocap_opinion_2011_amendments.pdf)

<sup>2</sup> For details, see pages 74-79 in Enclosure 2 of the 2011 Amendments to the 2009 RPA document at: [http://www.westcoast.fisheries.noaa.gov/publications/Central\\_Valley/Water%20Operations/Operations,%20Criteria%20and%20Plan/040711\\_ocap\\_opinion\\_2011\\_amendments.pdf](http://www.westcoast.fisheries.noaa.gov/publications/Central_Valley/Water%20Operations/Operations,%20Criteria%20and%20Plan/040711_ocap_opinion_2011_amendments.pdf)

**Action IV.2.1<sup>3</sup> (I:E ratio)**

- Beginning 4/1/16, the inflow to export ratio (I:E) RPA action (*i.e.*, San Joaquin River inflow at Vernalis to combined CVP/SWP exports) is in effect.
- The current water yeartype is classified as a Dry<sup>4</sup> year, requiring an I:E ratio of 2:1. This action restricts combined exports to 50% of Vernalis flow, or 1,500 cfs, whichever is greater).

**Agenda Item 3.**

**Current Operations (4/12/16)**

SWP		CVP	
<b>Exports (cfs)</b>			
Clifton Court Forebay	500*	Jones Pumping Plant	1,000
<b>Reservoir Releases (cfs)</b>			
Feather - Oroville	1,050**	American - Nimbus	3,000
		Sacramento - Keswick	5,000
		Stanislaus - Goodwin	400***
		Trinity - Lewiston	300
<b>Reservoir Storage (in TAF)</b>			
San Luis (SWP)	633	San Luis (CVP)	394
Oroville	3,107	Shasta	4,115
New Melones	631	Folsom	752
<b>Delta Operations</b>			
DCC	Closed	Sacramento River at Freeport (cfs)	20,534
Outflow Index (cfs)	~28,800	San Joaquin River at Vernalis (cfs)	400
E:I	5% (14-day avg.)	X2	<67 km

\* SWP plans to adjust inflows to CCFB to mirror changes in the San Joaquin River flows at Vernalis and pumping by the Byron-Bethany Irrigation District while complying with RPA Action IV.2.1.

\*\*Oroville Reservoir release was reduced last week and remains at current minimum of 1,050 cfs.

\*\*\*Goodwin released up to 900 cfs and decreased to 400 cfs on 4/11/16, where it remains today.

OMR as of 4/9/16:

	USGS gauges (cfs)	Index <sup>5</sup> (cfs)

<sup>3</sup> For details, see pages 68-70 in Enclosure 2 of the 2011 Amendments to the 2009 RPA document at: [http://www.westcoast.fisheries.noaa.gov/publications/Central\\_Valley/Water%20Operations/Operations.%20Criteria%20and%20Plan/040711\\_ocap\\_opinion\\_2011\\_amendments.pdf](http://www.westcoast.fisheries.noaa.gov/publications/Central_Valley/Water%20Operations/Operations.%20Criteria%20and%20Plan/040711_ocap_opinion_2011_amendments.pdf)

<sup>4</sup> I:E Ratio in effect depends upon the San Joaquin basin yeartype. The yeartype is currently designated as Dry.

<sup>5</sup> Beginning 2/16/16, the OMR Index values reported in the DOSS notes were calculated using an OMR Index equation that no longer includes (per the original intent of the index equation) the Contra Costa Water District's Rock Slough diversion in the export term. Beginning February 2016, the OMR Index values reported in the monthly OMR reports on the "CVO Reports" website (<http://www.usbr.gov/mp/cvo/index.html>) were calculated using this adjusted equation without the Rock Slough diversion.

5-day	-2,270	-1,874
14-day	-2,509	-2,282

The daily OMR Index on 4/11/16 was -1,863 cfs.

Review of factors controlling Delta exports for the period 4/1/16 to 4/12/16:

- Friday (4/1/16) through Tuesday (4/12/16) the NMFS RPA action IV.2.1 is controlling.
- FWS determination to protect Delta smelt larvae with an OMR no more negative than -2500 cfs remains in effect in addition to NMFS' RPA.

Weather forecast indicates a small system north of Sacramento, particularly in the Shasta area and North Coast, bringing small patches of precipitation Thursday morning. Unsettled weather will follow, but no systems predicted.

**Agenda Item 4.**

**Smelt Working Group**

The SWG met on Monday, 4/11/16 at 10am. Bartoo (FWS) provided the following SWG meeting summary via e-mail:

The Working Group agreed that given present distribution, current salvage, and Delta conditions, there was no indication that the projected combined exports of approximately 1500 cfs for the week (potentially resulting in daily average OMR flows of approximately -1800 cfs) need to be modified for the protection of Delta Smelt adults and larvae.

This entrainment risk assessment would change, should exports levels change from what was reported for the week (1500 cfs resulting in -1800 cfs OMR).

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, April 18, 2016 at 10 am.

SWG meeting notes are available at: [http://www.fws.gov/sfbaydelta/cvp-swp/smelt\\_working\\_group.cfm](http://www.fws.gov/sfbaydelta/cvp-swp/smelt_working_group.cfm).

**Agenda Item 5.**

**Fish Monitoring: Salvage<sup>6</sup>**

Fujimura (CDFW) provided the following summaries of salvage and loss at the SWP and CVP fish collection facilities. The salvage figures were generated on the CDFW salvage monitoring web-page: <http://www.dfg.ca.gov/delta/apps/salvage/SalvageExportCalendar.aspx>.

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<sup>6</sup> Salvage data reported in this section represent the total estimated and expanded salvage based on the number of fish observed at the fish collection facility. For example, if one steelhead is observed in the typical ½-hour sampling period within a 2-hour operation period, the single steelhead is expanded to a salvage of four.

**DOSS Weekly Salvage Update**  
 Reporting Period: April 4-April 10, 2016  
 Prepared by Bob Fujimura on April 11, 2016 15:30  
 Preliminary Results -Subject to Revision

Criteria	4-Apr	5-Apr	6-Apr	7-Apr	8-Apr	9-Apr	10-Apr	Trend	
<b>Loss Densities</b>									
Wild older juvenile CS	0	0	0	0	0	0	0	→	0.00
Wild steelhead	0	0	0	0	0	0	0.89	↘	0.13
<b>Exports</b>									
SWP daily export	910	1,074	709	1,264	900	900	1,074	↘	976
CVP daily export	1,975	1,971	1,973	1,981	1,985	1,984	1,985	↘	1,979
SWP reduced counts	0%	0%	0%	0%	0%	0%	0%	→	0%
CVP reduced counts	0%	0%	0%	0%	0%	0%	0%	→	0%

Loss Density = fish lost/TAF; water export = AF; Trend = compared to previous week; wild = adipose fin present  
 Loss = estimated number of fish lost at the CVP and SWP Delta export facilities based on estimated salvage (see below)  
 Reduced counts = percentage of time that routine salvage sample time were less than 30 min per 2 hours of salvage and export operations  
 Yellow highlighted dates indicate TFCF salvage outage occurred

**Chinook Salmon Weekly/Season Salvage and Loss**  
 Combined salvage and loss for both CVP and SWP fish facilities  
 Race determined by size at date of capture; hatchery = adipose fin missing;

Category	Weekly Total			Season Total	
	Salvage	Loss	Trend	Salvage	Loss
<b>Wild</b>					
Winter Run	0	0	→	36	56
Spring Run	0	0	↘	70	110
Late Fall Run	0	0	↘	44	166
Fall Run	0	0	→	82	92
Unclassified	0	0	→	14	NC
<b>Total</b>	<b>0</b>	<b>0</b>		<b>246</b>	<b>425</b>
<b>Hatchery</b>					
Winter Run	0	0	↘	213	629
Spring Run	12	10	↘	650	560
Late Fall Run	0	0	↘	93	298
Fall Run	0	0	↘	5	7
Unclassified	0	0	→	0	0
<b>Total</b>	<b>12</b>	<b>10</b>		<b>961</b>	<b>1,494</b>

Trend = weekly loss per race; Salvage = estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time  
 NC = can not be calculated

**Steelhead Weekly/Season Salvage and Loss**  
 Combined salvage and loss for both CVP and SWP fish facilities

Category	Weekly Total			Season Total	
	Salvage	Loss	Trend	Salvage	Loss
Wild	4	3	↘	112	266
Hatchery	2	9	↘	1,280	3,447
<b>Total</b>	<b>6</b>	<b>11</b>		<b>1,392</b>	<b>3,713</b>

State Water Project loss = salvage x 4.33; Central Valley Project loss = salvage x 0.68

Figure 1. DOSS weekly salvage update for the reporting period 4/4/16-4/11/16.

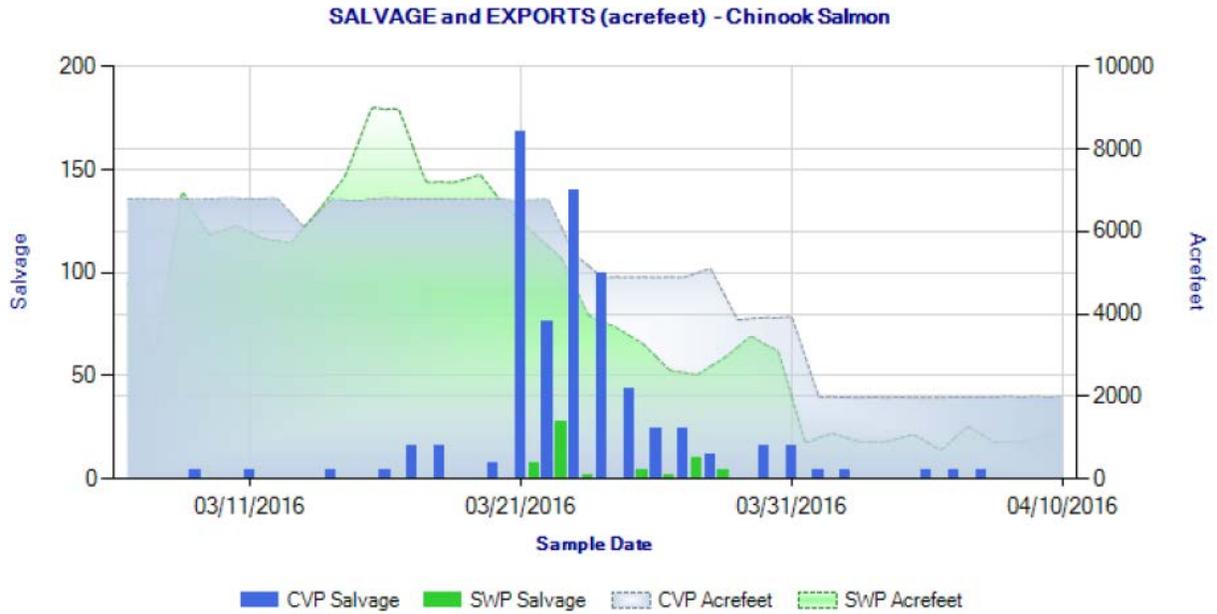


Figure 2. Daily salvage of Chinook salmon (all races) and water exports from the state and federal fish salvage facilities during March 7, 2016 through April 10, 2016.

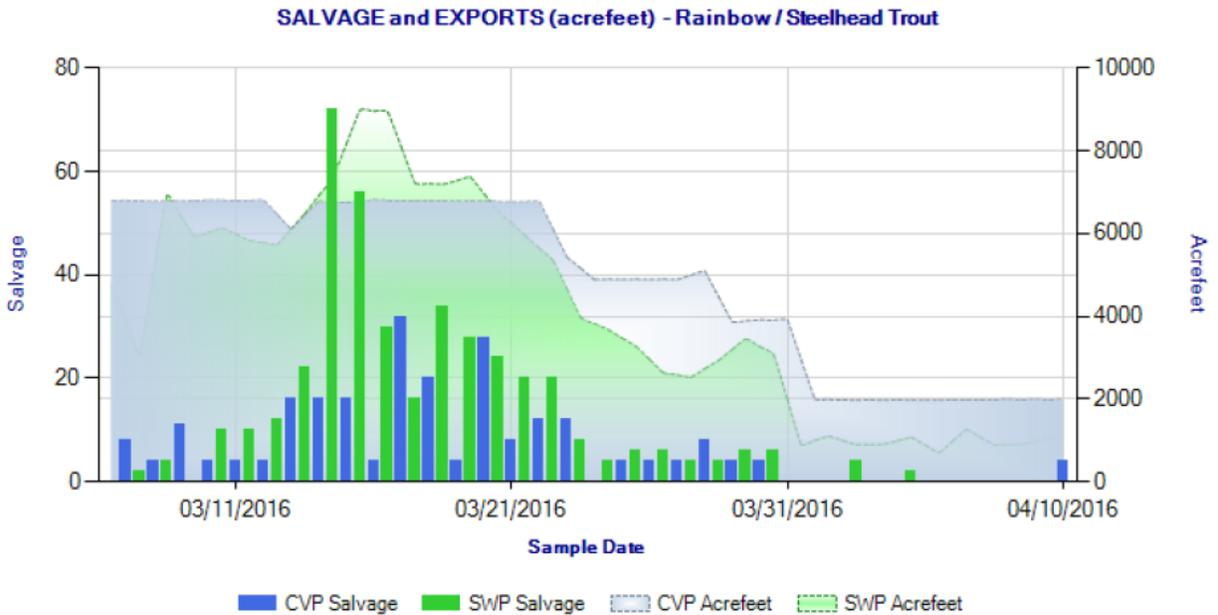


Figure 3. Daily salvage of steelhead and water exports from the state and federal fish salvage facilities during March 7, 2016 through April 10, 2016.

Preliminary salvage report for Monday, 4/11/16:

- Unclipped and clipped salvage decreased this week. No sturgeon observed.

- There was a 1-hour scheduled outage at the Tracy facility to troubleshoot low drain efficiency. One of the drain pumps was not performing properly. It will eventually need to be replaced.

**Coded-wire-tag recoveries**

Mulligan (DWR) provided the following summary of coded-wire-tag recoveries at the SWP and CVP fish collection facilities. The cumulative loss of the hatchery winter-run Chinook group (released by Livingston Stone National Fish Hatchery (LSNFH) on 2/17/16 to 2/18/16) is 11.19, 0.003% of the number released. The most recent salvage of LSNFH hatchery winter-run Chinook occurred on Monday, 3/14/16. The cumulative loss of the third spring-run Chinook surrogate group (released from Coleman National Fish Hatchery on 1/12/16) continues to hold at 0.412%, near the 0.5% OMR trigger threshold under Action IV.2.3. Loss of Chinook within any spring-run Chinook surrogate group has not occurred since 2/12/16.

**Agenda Item 6.**

**Fish Monitoring: Hatchery winter-run Chinook acoustic-tracking**

LSNFH released approximately 420,000 hatchery winter-run Chinook at Bonnyview Bridge in Redding – one group on 2/17/16 and the other group on 2/18/16. 285 of each release group (for a total of 570) were acoustic-tagged with JSATS tags and NOAA’s Southwest Fisheries Science Center (SWFSC) is tracking movement of these acoustic-tagged fish past eight “real-time” receiver locations from Redding to Middle River.

The March 28 update summarizing last week’s notes is the latest winter-run update unless additional tagged fish show up at Tower Bridge. 49% of the acoustic-tagged hatchery winter-run Chinook had passed the Tower Bridge receiver in Sacramento.

**Agenda Item 7.**

**Fish Monitoring: RSTs/trawls/seines**

The following table presents fish monitoring data. Unless otherwise noted, reported sizes are fork length and runs are based on length at date criteria. See also:

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

Location	Chippis Is. Midwater Trawl <sup>A</sup>	Station 902/Jersey Pt./Prisoners Pt. Trawls <sup>A</sup>	Sacramento Trawl <sup>A</sup>	Beach Seines <sup>A</sup>	Knights Landing RST <sup>B</sup>	Tisdale RST <sup>C</sup>	GCID RST <sup>D</sup>	Mossdale Kodiak Trawl <sup>A</sup>
Sample Date	4/4, 4/6, 4/8	902: Jersey Pt: Pris. Pt: No data received	4/4, 4/6, 4/8	4/4, 4/7	4/4-4/7	4/4-4/10	No data since 4/4	No data received
FR Chinook			26	129	59	80		
WR Chinook	29							
SR Chinook	154		36	4	76	26		
LFR Chinook				10				

<b>Ad-Clipped Chinook</b>	80		13	2	24	16		
<b>Chinook Adult</b>								
<b>Steelhead (wild)</b>								
<b>Steelhead (ad-clip)</b>	1		1		1			
<b>Green Sturgeon</b>								
<b>Delta Smelt</b>								
<b>Splittail</b>	1			149				
<b>Longfin Smelt</b>								
<b>Flows (avg. cfs)</b>					10,900	10,030		
<b>W. Temp. (avg. °F)</b>					64.0	62.7		
<b>Turbidity (avg. NTU)</b>					25.1	24.0		

<sup>A</sup> Data reported in the 4/3 to 4/9 DJFMP sampling summary. Sacramento trawls switched from Kodiak trawl net to mid-water trawl net April 1. Mossdale trawl sampling being conducted by CDFW starting April 4 through end of June, no data received for this period.

<sup>B</sup> Sampling period was from 4/4 at 10:00 am to 4/7 at 10:45 am. 516 VIE-marked (orange) FRCS were released 1 mile up-river @ 9:48 am on 4/5/16.

<sup>C</sup> Sampling period was from 4/4 at 11:00 am to 4/10 at 12:00 am. River Right cone clicker malfunction on 4/6/16.

<sup>D</sup> On 3/4 at 9:00 am, the GCID trap was pulled from the bypass channel to avoid the expected peak in high flows and heavy debris.

### **Red Bluff Diversion Dam (RBDD) Monitoring**

USFWS biweekly report (3/25/16-4/7/16) for preliminary daily estimates of passage, 90% confidence intervals, and fork length ranges of unmarked juvenile salmonids captured by rotary screw traps at RBDD included:

<b>Run and Species</b>	<b>Biweekly Total</b>	<b>Brood Year Total</b>
Winter-run Chinook (BY2015)	1,990	338,441

### **Agenda Item 8.**

#### **Recent or Upcoming Hatchery Releases**

On 4/14-15/2016, the Feather River Fish Hatchery intends to release approximately 1 million brood year 2015 hatchery spring-run Chinook salmon into the Feather River at Gridley and Boyd's pump (500,000 at each location). All hatchery fish released will be ad-clipped and code wire tagged.

Merced hatchery fish are in the process of being clipped and tagged but a release date has not yet been provided. The release may occur during the next Stanislaus pulse.

**Agenda Item 9.**

**DOSS Estimates of Fish Distribution and Entrainment Risk**

DOSS estimates of the current distribution of listed Chinook, as a percentage of the population, are based on recent monitoring data and historical migration timing patterns. As monitoring information is received, listed species distribution will be updated and included in the following table.

<b>Location</b>	<b>Yet to Enter Delta (Upstream of Knights Landing)</b>	<b>In the Delta</b>	<b>Exited the Delta (Past Chippis Island)</b>
<i>Young-of-year (YOY) winter-run Chinook salmon<sup>1</sup></i>	<1% (Last week: same)	15% - 30% (Last week: 25% - 40%)	70% - 85% (Last week: 60% - 75%)
<i>Young-of-year (YOY) spring-run Chinook salmon*</i>	<5% (Last week: same)	20% - 30% (Last week: 30% - 40%)	65% - 75% (Last week: 55% - 65%)
<i>Hatchery winter-run Chinook salmon</i>	<1% (Last week: same)	<10% (Last week: 10% - 20%)	>90% (Last week: 80% - 90%)

\*Once hatchery fall-run releases (75% of which are unmarked) occur upstream of a monitoring location, DOSS assumes that many of the unclipped spring-run-sized Chinook observed in monitoring may be unmarked fall-run Chinook that fall into the spring-run size range. Because Coleman National Fish Hatchery released 864,400 BY 2015 fall-run Chinook into Battle Creek on 3/14/16, and another 1,374,000 BY 2016 fall-run Chinook on 3/22/16. The average size for the released FRCS production fish were just slightly smaller than the size at date for the minimum size of SRCS.

**Rationale for changes in distribution**

Wild winter-run Chinook: The fraction of wild winter-run upstream of the Delta stayed the same since DOSS thinks a few stragglers may still remain upstream, but that this fraction is very small relative to the entire population. The increase in the fraction of wild winter-run having exited the Delta is based on lengthening days, warming weather, and seasonal timing (historical peak winter-run outmigration from the Delta is in March), all of which DOSS considers conducive to winter-run outmigration. 29 winter-run-sized wild Chinook were reported in the Chippis Trawl, as opposed to 15 last week.

Wild spring-run Chinook: The fraction of wild spring-run upstream of the Delta stayed the same since there are still spring-run entering the Delta: 76 at Knight’s Landing, 36 at Sacramento trawl (note that some or many of these may be unmarked hatchery fall-run Chinook; see footnote to fish distribution table). The seasonal timing is another indicator of spring-run movement. The increase in the fraction of wild spring-run having exited the Delta is based on the 154 spring-run-sized wild Chinook reported in the Chippis Trawl, warming temperatures, and seasonal timing. Therefore the DOSS group believes that more spring-run have exited the Delta this week as well.

Hatchery winter-run Chinook: The fraction of hatchery winter-run upstream of the Delta was reduced based on historical movement, their release was two months ago and they have been rearing in the Delta for two months, increased temperatures and seeing no winter-run at the monitoring location in or above the Delta. The decrease in the fraction of hatchery winter-run in the Delta was due to DOSS’s estimate that most hatchery winter-run have exited the Delta by

this time of the year, based on the very low numbers of clipped WRCS hatchery fish seen in the fish monitoring at Chipps Island and at the salvage facilities in the past several weeks.

### **DOSS Feedback on Entrainment Risk**

DOSS provides weekly entrainment risk outlooks by considering (a) two different categories of entrainment risk based on listed fish distribution and (b) factors that influence their potential for entrainment. The two entrainment risk categories considered include:

- **Interior Delta Entrainment Risk**- fish in the Sacramento River that have the potential to be entrained into the Interior Delta through the Delta Cross Channel (when open) and/or Georgiana Slough; and
- **CVP/SWP Facilities Entrainment Risk**- fish in the Interior Delta that have the potential to be entrained into the CVP/SWP facilities.

Influencing factors considered include:

- **Exposure Risk** (both categories)- estimated scale (low, medium, high) of fish anticipated to be in vicinity of an entrainment risk,
- **Routing Risk** (Interior Delta Entrainment Risk)- estimated scale (low, medium, high) that flow split conditions could result in fish migrating into the interior delta instead of remaining in main channel, and
- **OMR/Export Risk** (CVP/SWP Facilities Entrainment Risk)- for fish in the Interior Delta, estimated scale (low, medium, high) that OMR and/or Export levels could result in entrainment associated with CVP/SWP facilities.

To provide an overall assessment of entrainment risk, the estimated current status of these influencing factors are described below for each of the entrainment risk categories.

### **Interior Delta Entrainment Risk for listed salmonids in the Sacramento River over the next week:**

Outflow is still large enough to avoid reverse flows in the upper Delta. Most winter-run are out of the system. Most spring-run have moved towards the western Delta.

- **Exposure Risk:** LOW (*last week: same*)
  - Flow and turbidities have decreased which are cues for salmonid movement, and most fish are likely to have moved downstream and into the Delta at this time.
- **Routing Risk:** LOW (*last week: same*)
  - Continued elevated river flows (~25,000 cfs) are expected to mute the tidal effects at Georgiana Slough and maintain positive downstream flows during all tidal phases (reducing the risk of routing into Georgiana Slough) for those fish remaining upstream of this divergence.
- **Overall Entrainment Risk:** LOW (*last week: same*)

### **CVP/SWP Facilities Entrainment Risk for listed salmonids in the Interior Delta over the next week:**

Most fish have moved through the Delta, the DCC barrier is in place, and export levels are low, which is a cue for salmonids to move downstream and out of the Delta.

- **Exposure Risk:** LOW (*last week: LOW TO MEDIUM*)
- **OMR/Export Risk:**

- OMR -2,500 cfs to -3,500 cfs: LOW (*last week: same*)
- OMR -3,500 cfs to -5,000 cfs: MEDIUM (*last week: same*)
- **Overall Entrainment Risk:**
  - OMR -2,500 cfs to -3,500 cfs: LOW (*last week: same*)
  - OMR -3,500 cfs to -5,000 cfs: LOW (*last week: MEDIUM*),
    - LOW to MEDIUM (*last week: same*) if steelhead are observed in the Mossdale trawls since more negative OMR will enhance entrainment risk.

**Agenda Item 10.**

**DOSS Advice to WOMT and NMFS:** None

**Agenda Item 11.**

**Next Meeting:** The next DOSS conference call will be on 4/19/16 at 9am.

Graphs for Chinook salmon and steelhead observed at monitoring locations in the Sacramento and San Joaquin rivers and Delta were not provided this week. They will be available at:

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