

Delta Operations for Salmonids and Sturgeon (DOSS) Group
Conference call: 2/14/2017 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.

CDFW: Bob Fujimura, Duane Linander, Ken Kundargi, Jason Julienne, Jerry Morinaka

DWR: Kevin Reece, Farida Islam, Bryant Giorgi

NMFS: Barb Byrne, Kristin McCleery

Reclamation: Tom Patton, Towns Burgess, Josh Israel, Elissa Buttermore, Travis Yonts, Mike Hendrick

SWRCB: Chris Kwan, Chris Carr

USFWS: Craig Anderson, Felipe Carillo

Agenda Items

1. Agenda review and introductions
2. RPA Implementation review (For the DOSS Dashboard, click on the "Triggers & Indices" tab at: www.baydeltalive.com/djfmfp)
3. Smelt Working Group update
4. Current Operations
5. Hatchery Releases
6. Fish Monitoring: Tracking of acoustic-tagged hatchery winter-run Chinook salmon
7. Fish Monitoring: Salvage
8. Fish Monitoring: RSTs/trawls/seines
9. DOSS Estimates of Fish Distribution and Assessments of Entrainment Risk
10. DOSS advice
11. Next DOSS meeting

Agenda Item 2.

RPA Implementation Review

Delta RPA Actions affecting operations during February:

Action IV.1.2¹ (DCC gate operations):

- From February 1 to May 20, the gates will remain closed.

¹ 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

Action IV.2.3² (OMR Management)

- Implementation of this action in WY 2017 began 1/1/17, and requires that Old and Middle River (OMR) flow be no more negative than -5,000 cfs.
- Since the action went into effect on 1/1/17, no salvage-based triggers that would require more positive OMR levels have been exceeded.

Agenda Item 3.

Draft Smelt Working Group update

The Smelt Working Group (SWG) met on Monday, 2/13/17 at 10am. Bartoo (USFWS) provided the following SWG meeting summary:

The Working Group reviewed current Delta conditions, survey data, and forecasted weather. The SWG is now looking to both Action 2 and 3 for guidance in assessing the risk of entrainment, due to the increase in water temperatures. The SWG indicated that the anticipated OMR flows (Index -1,400 cfs today and anticipated to become positive later in the week) are sufficiently protective of Delta Smelt.

The Working Group is following guidance for entrainment protections from Action 2 (adult Delta Smelt) and Action 3 (juveniles). The Working Group will continue to monitor Delta Smelt survey and salvage data and Delta conditions, and will meet again on Tuesday, February 21, 2017 at 10 am.

Agenda Item 4.

Current Operations

| SWP | | CVP | |
|-----------------------------------|----------|-------------------------------------|--------|
| Exports (cfs) | | | |
| Clifton Court Forebay | 10,300* | Jones Pumping Plant | 4,200 |
| Reservoir Releases (cfs) | | | |
| Feather - Oroville | 100,000 | American - Nimbus | 30,000 |
| | | Sacramento - Keswick | 79,000 |
| | | Stanislaus - Goodwin | 200 |
| | | Trinity - Lewiston | 300 |
| Reservoir Storage (in TAF) | | | |
| San Luis (SWP) | 1,074 | San Luis (CVP) | 794 |
| Oroville | 3,578 | Shasta | 4,369 |
| New Melones | 1,342 | Folsom | 676 |
| Delta Operations | | | |
| DCC | Closed | Sacramento River at Freeport (cfs) | 85,000 |
| Outflow Index (cfs) | ~350,000 | San Joaquin River at Vernalis (cfs) | 32,000 |

² 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

| | | | |
|-----|------------------|----|--------|
| E:I | 7% (14-day avg.) | X2 | <56 km |
|-----|------------------|----|--------|

*SWP exports will likely be reduced beginning 2/15/17 due to filling the State share of San Luis Reservoir and reduced demand.

Beginning 2/15/17, the SWP will be pumping 1,500 cfs for the CVP under Stage 1 Joint Point of Diversion (JPOD) operations.

OMR as of 2/13/17:

| | Index (cfs) |
|--------|-------------|
| Daily | +2,000 |
| 14-day | -3,400 |

OMR as of 2/11/17:

| | USGS gauges (cfs) | Index (cfs) |
|--------|-------------------|-------------|
| Daily | -2,000 | -3,200 |
| 14-day | -4,100 | -3,700 |

Factors controlling Delta exports:

- 2/7 – 2/14: Both CVP and SWP facilities at maximum operational capacity

Wet weather will continue off and on for the next 10 days beginning on Wednesday night.

Agenda Item 5.

Hatchery Releases

Spring-run Chinook are expected to be released in the San Joaquin River in early March as part of the San Joaquin River Restoration Program.

Agenda Item 6.

Fish Monitoring: Tracking of acoustic-tagged hatchery winter-run Chinook salmon

Livingston Stone National Fish Hatchery released approximately 141,388 hatchery winter-run Chinook at Caldwell Park in Redding on 2/2/17. 569 were acoustic-tagged with JSATS tags and NOAA’s Southwest Fisheries Science Center (SWFSC) is tracking movement of these acoustic-tagged fish past several “real-time” receiver locations near Colusa and Sacramento. As of the morning of 2/14/17, zero acoustic-tagged hatchery winter-run Chinook salmon have been detected at the receivers in Sacramento.

High flows and turbidity may be limiting detections of acoustic-tagged fish and some acoustic-tagged fish may spill into the Yolo Bypass and not pass the Sacramento receivers.

Agenda Item 7.
Fish Monitoring: Salvage³

DOSS Weekly Salvage Update
 Reporting Period: February 6-February 12, 2017
 Prepared by Bob Fujimura on February 13, 2017 16:29
 Preliminary Results -Subject to Revision

| Criteria | 6-Feb | 7-Feb | 8-Feb | 9-Feb | 10-Feb | 11-Feb | 12-Feb | Trend | |
|------------------------|--------|--------|--------|--------|--------|--------|--------|-------|--------|
| Loss Densities | | | | | | | | | |
| Wild older juvenile CS | 0.61 | 0.62 | 0 | 0 | 0 | 0 | 0 | ↗ | 0.18 |
| Wild steelhead | 0 | 0 | 0 | 0 | 0.10 | 0 | 0 | ↗ | 0.01 |
| Exports | | | | | | | | | |
| SWP daily export | 20,210 | 19,778 | 19,638 | 19,437 | 19,568 | 19,369 | 19,751 | → | 19,679 |
| CVP daily export | 8,038 | 8,093 | 8,106 | 8,136 | 8,148 | 8,205 | 8,185 | → | 8,130 |
| SWP reduced counts | 0% | 17% | 0% | 0% | 0% | 0% | 0% | ↗ | 2% |
| 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 brief fish facility 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 |
| Wild | | | | | |
| Winter Run | 4 | 17 | ↗ | 16 | 40 |
| Spring Run | 0 | 0 | → | 0 | 0 |
| Late Fall Run | 4 | 17 | → | 20 | 73 |
| Fall Run | 786 | 2,254 | ↗ | 6,783 | 13,550 |
| Unclassified | 0 | 0 | → | 84 | NC |
| Total | 794 | 2,289 | | 6,903 | 13,663 |
| Hatchery | | | | | |
| Winter Run | 1 | 4 | ↗ | 317 | 948 |
| Spring Run | 0 | 0 | → | 0 | 0 |
| Late Fall Run | 4 | 17 | → | 639 | 1,387 |
| Fall Run | 0 | 0 | → | 116 | 192 |
| Unclassified | 0 | 0 | → | 6 | NC |
| Total | 5 | 22 | | 1,078 | 2,527 |

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 | ↗ | 24 | 60 |
| Hatchery | 28 | 118 | ↗ | 29 | 118 |
| Total | 32 | 120 | | 53 | 178 |

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

³ 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.

Generated by Bob Fujimura on February 13, 2017

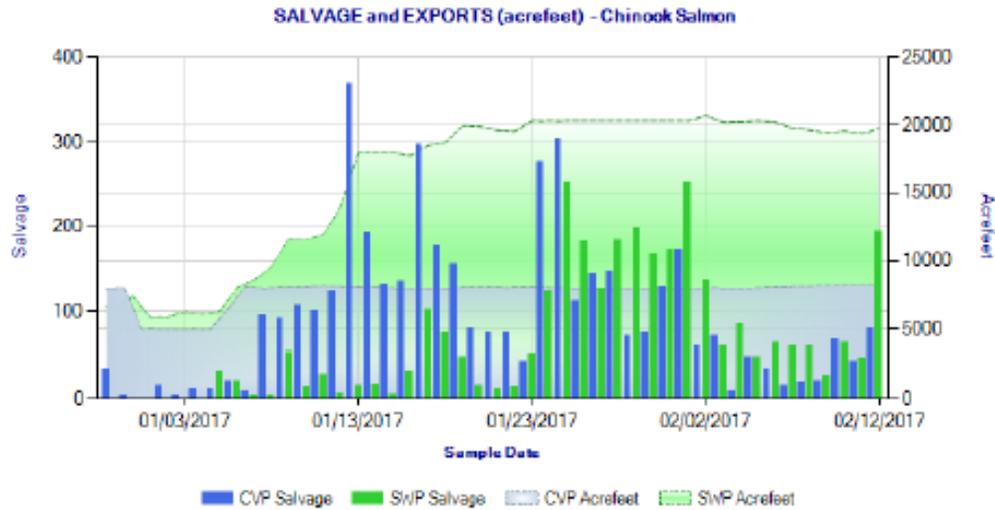


Figure 1. Daily salvage of Chinook Salmon (all races) and water exports from the state and federal fish salvage facilities during Dec 30, 2016 through Feb 12, 2017. Graph obtained from the DFG salvage monitoring web-page: <http://www.dfg.ca.gov/delta/apps/salvage/SalvageExportCalendar.aspx>.

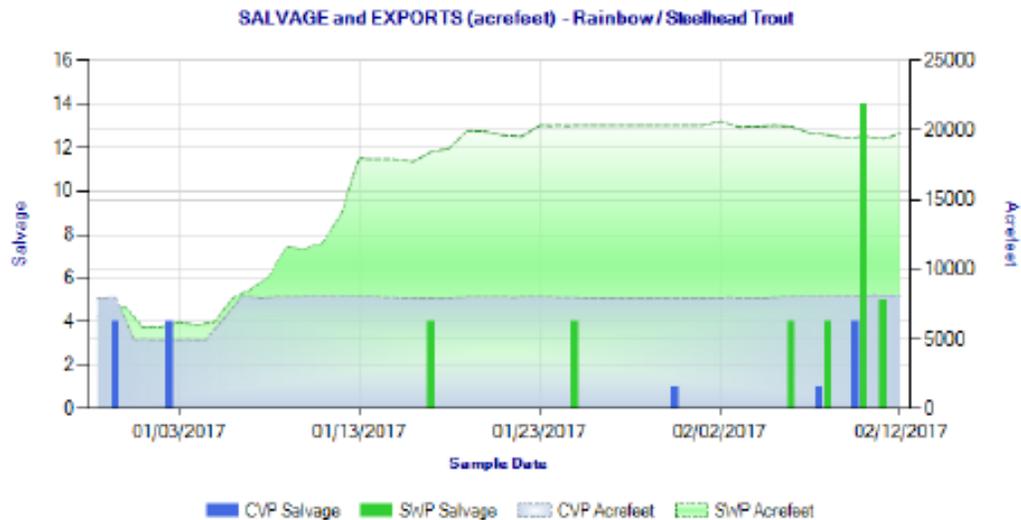


Figure 2. Daily salvage of Steelhead and water exports from the state and federal fish salvage facilities during Dec 30, 2016 through Feb 12, 2017. Graph obtained from the DFG salvage monitoring web-page: <http://www.dfg.ca.gov/delta/apps/salvage/SalvageExportCalendar.aspx>.

Genetics-based run assignment results (Provided by Reclamation):

The focus of DOSS is on the genetics-based run assignment of older-juvenile-sized Chinook salmon observed in salvage at the SWP and CVP fish collection facilities in WY 2017. Through 1/19/17, seven older-juvenile-sized fish (three winter-run-sized and four late-fall-run-sized) were observed in salvage and tissue samples were sent for processing. Because tissue samples are processed in a batch size of approximately 96, the results also include tissue samples from:

- a subsample of the large (not assigned to run) Chinook salvaged at the SWP and CVP fish collection facilities in WY 2017
- a subsample of winter-run-sized and spring-run-sized Chinook captured in the Red Bluff Diversion Dam rotary screw traps since September 2016

| Older juvenile sized fish prior to 1/19/2017 | | Length at Date (Delta Model) | | | |
|--|-------------|------------------------------|-----------|--------|--------|
| | | Adult | Late Fall | Spring | Winter |
| Genetic Race Identification | CVP | | | | |
| | Non-winter | | 2 | | 2 |
| | RBDD | | | | |
| | Non-winter | | | 1 | |
| | Winter | | | 1 | 78 |
| | SWP | | | | |
| | Failed | 1 | | | |
| | Non-winter | 4 | 2 | | 1 |

More details on genetics-based race assignment provided in Attachment 1.

CONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES as of 2/13/17

| Release Date | CWT Race | Hatchery | Release Site | Release Type | Confirmed Loss | Number Released ¹ | Total Entering Delta | % Loss of Number Released ² | % Loss of Total Entering Delta ³ | First Stage Trigger | Date of First Loss ⁴ | Date of Last Loss ⁴ |
|--------------|----------|----------------|-------------------|------------------|----------------|------------------------------|----------------------|--|---|---------------------|---------------------------------|--------------------------------|
| 12/9/2016 | LF | Coleman NFH | Battle Creek | Production | 1492.21 | 861,966 | n/a | 0.173 | n/a | n/a | 12/18/2016 | 1/23/2017 |
| 12/12/2016 | LF | Coleman NFH | Battle Creek | Spring Surrogate | 181.82 | 75,000 | n/a | 0.242 | n/a | 0.50% | 12/22/2016 | 1/19/2017 |
| 12/21/2016 | LF | Coleman NFH | Battle Creek | Spring Surrogate | 346.73 | 81,279 | n/a | 0.427 | n/a | 0.50% | 12/30/2016 | 1/29/2017 |
| 1/9/2017 | LF | Coleman NFH | Battle Creek | Spring Surrogate | 0.00 | 75,000 | n/a | 0 | n/a | 0.50% | * | * |
| 2/2/2017 | W | Livinstone NFH | Sacramento River | WR | 0.00 | 141,388 | n/a | 0 | n/a | 0.50% | * | * |
| 11/29/2016 | S | SJRRP | San Joaquin River | Experimental | 116.82 | 544 | n/a | 0.273 | n/a | n/a | 1/8/2017 | 1/17/2017 |
| 11/29/2016 | F | SJRRP | San Joaquin River | Experimental | 6.05 | 1,200 | n/a | 0.014 | n/a | n/a | 12/27/2016 | 1/14/2017 |

UNCONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES, 2016/2017

| Facility | Unknown CWT Loss ⁵ | Unread CWT Loss ⁶ | Unknown Hatchery Loss ⁷ | Acoustic Tag Loss ⁸ | Number of Unassigned CWTs ⁹ |
|--------------|-------------------------------|------------------------------|------------------------------------|--------------------------------|--|
| SWP | 141.38 | | | | |
| CVP | 2.6 | | | | |
| TOTAL | 143.98 | | | | |

¹Number released with the adipose-fin clipped and a coded-wire tag (CWT).

²% Loss of Number Released = (Confirmed Loss/Number Released)*100.

³% Loss of Total Entering Delta= (Confirmed Loss/Total Entering Delta)*100.

⁴Date of first and last loss accounts for all CWT loss even those from special studies where salvage and loss=0.

⁵Adipose-fin clipped Chinook was observed during fish count, but tag code could not be determined (e.g., damaged tag, lost tag, no tag, or Chinook released).

⁶Adipose-fin clipped Chinook was collected during fish count and has not been processed yet.

⁷CWT has been read, but hatchery release information not yet available.

⁸Adipose-fin clipped Chinook released due to presence of sutures.

⁹CWT cannot currently be assigned to a salvage record with certainty since the CWT was lost and then found. CWT may be assigned to a salvage record if new information is available.

Agenda Item 8.

Fish Monitoring: The following table presents fish monitoring data summarized over the identified sampling dates. Unless otherwise noted, any reported sizes are fork length. Chinook run assignments are based on length-at-date criteria. DOSS acknowledges the limitations of the length-at-date criteria, particularly in distinguishing between young-of-year spring run Chinook and young-of-year fall-run Chinook. When reviewing spring-run catch in the monitoring data, DOSS considers that run misclassifications might arise from both large genetic fall-run falling into the spring-run sized class and small genetic spring-run falling into the fall-run size class.

| Location | Chippis Is. Midwater Trawl ^{A, E} | Sacramento Trawl ^A | Beach Seines ^A | Knights Landing RST ^B | Tisdale RST ^C | GCID RST ^D | Mossdale Kodiak Trawl ^A |
|----------------------|--|-------------------------------|---------------------------|----------------------------------|--------------------------|-----------------------|------------------------------------|
| Sample Date | 2/5-2/6, 2/8-2/11 | 2/5, 2/6 | 2/7, 2/9, 2/10 | 2/5-2/12 | 2/5-2/7 | - | 2/8, 2/10 |
| FR Chinook | 2 | 363 | 191 | 563 | 293 | | 12 |
| SR Chinook | | 3 | 1 | 7 | 2 | | |
| WR Chinook | | | | 1 | 2 | | |
| LFR Chinook | | | 1 | | | | |
| Ad-Clipped Chinook | 2 | | | 4 WR | | | |
| Steelhead (ad-clip) | | | | 2 | 2 | | |
| Steelhead (wild) | 5 | | | 5 | | | |
| Green Sturgeon | | | | | | | |
| Flows (avg. cfs) | | | | 27,857 | 39,850 | | |
| W. Temp. (avg. °F) | | | | 51.6 | 46.5 | | |
| Turbidity (avg. NTU) | | | | 248.8 | 72.5 | | |

^AData reported in the 2/5 to 2/11 DJFMP sampling summary.

^BKnights Landing RST sampling period was from 2/5 at 9:15 am to 2/12 at 9:15 am.

^CTisdale RST sampling period was from 2/5 at 9:00 am to 2/7 at 9:30 am.

^DThe GCID RST cone was pulled on 1/3 at 9:00 pm due to predicted high flows and heavy debris.

Red Bluff Diversion Dam (RBDD)

Chinook run assignments are based on length-at-date criteria. DOSS acknowledges the limitations of the length-at-date criteria, particularly in distinguishing between young-of-year spring run Chinook and young-of-year fall-run Chinook. The USFWS biweekly report (1/29/17-2/11/17) for preliminary daily estimates of passage for all runs of unmarked juvenile Chinook salmon and steelhead captured by rotary screw traps at RBDD included:

| Run and Species | Biweekly Total | Brood Year Total (90% CI) |
|-----------------|----------------|---------------------------|
|-----------------|----------------|---------------------------|

| | | |
|-----------------------------|--------|---------------------------|
| Winter-run Chinook (BY2016) | 639 | 523,800 (386,231-661,278) |
| Spring-run Chinook (BY2016) | 11,067 | 63,645 (19,435-107,855) |

Enhanced Delta Smelt Monitoring (EDSM) Catch

EDSM data posted on DJFMP website:

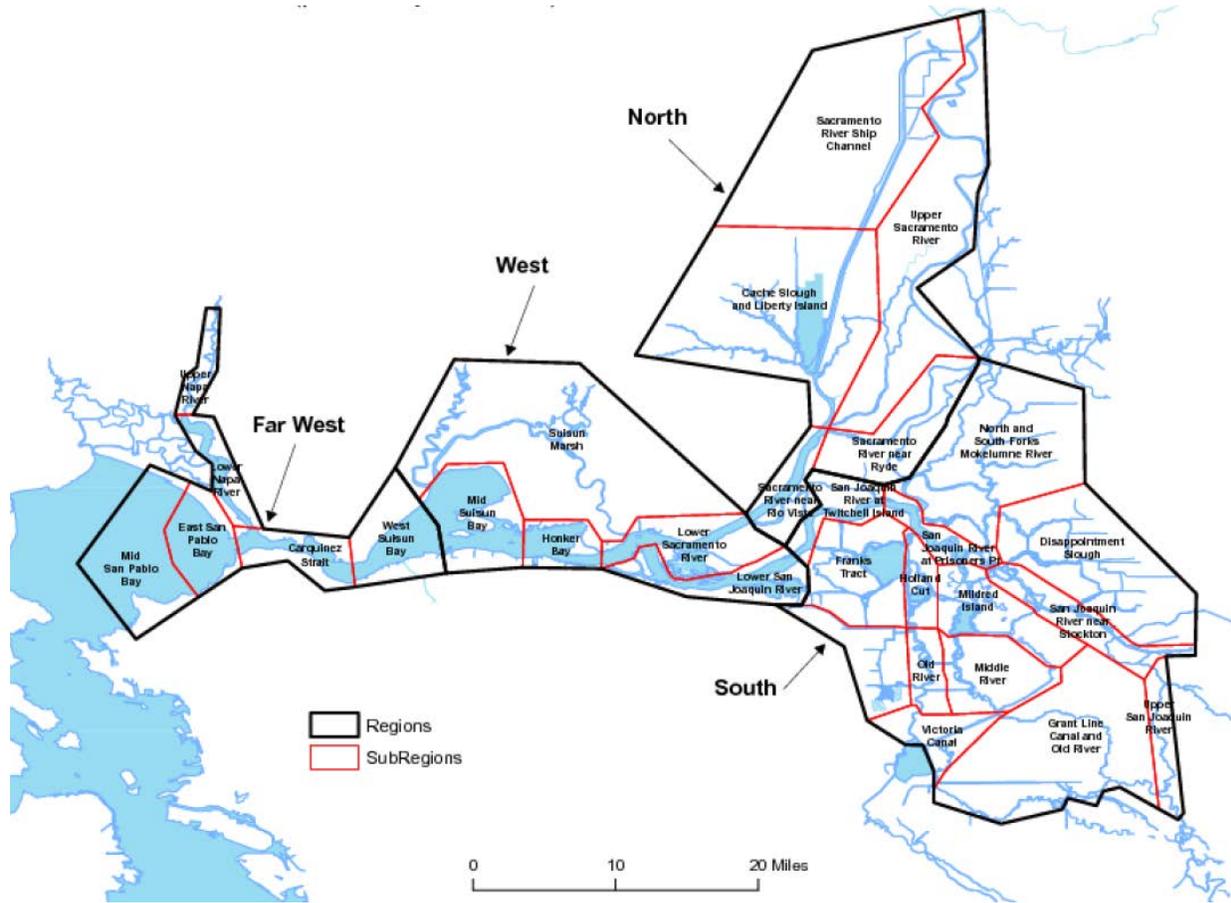
https://www.fws.gov/lodi/juvenile_fish_monitoring_program/jfmp_index.htm

Chinook run assignments for unclipped fish are based on length-at-date criteria. DOSS acknowledges the limitations of the length-at-date criteria, particularly in distinguishing between young-of-year spring run Chinook and young-of-year fall-run Chinook. When reviewing spring-run catch in the monitoring data, DOSS considers that run misclassifications might arise from both large genetic fall-run falling into the spring-run sized class and small genetic spring-run falling into the fall-run size class.

Over the last week of sampling (2/6/17-2/9/17), a total of 42 fall-run-sized Chinook and 2 ad-clipped steelhead were caught across all sampling sites. Salmonid catch in the EDSM sampling is summarized in the table below by subregion, and in the bubble plots by individual sampling location.

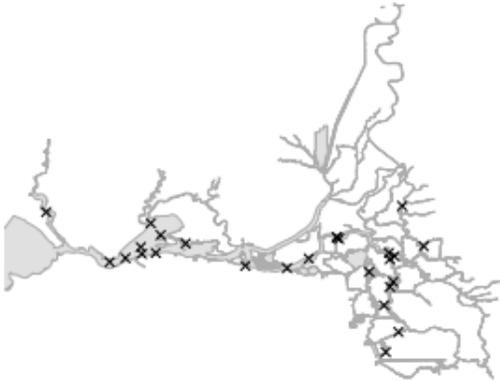
| Subregion | Raw catch | | | | | | Total Tow Minutes | Catch per 10-minute tow* | | | | | | Region |
|---|--------------------|--------------------|------------------|-----------------------|----------------|------------------|-------------------|--------------------------|--------------------|------------------|-----------------------|----------------|------------------|----------|
| | Winter-run Chinook | Spring-run Chinook | Fall-run Chinook | Late-fall-run Chinook | Tagged Chinook | Tagged Steelhead | | Winter-run Chinook | Spring-run Chinook | Fall-run Chinook | Late-fall-run Chinook | Tagged Chinook | Tagged Steelhead | |
| Victoria Canal | 0 | 0 | 1 | 0 | 0 | 0 | 165 | 0 | 0 | 0.06 | 0 | 0 | 0 | south |
| San Joaquin River at Prisoner's Pt | 0 | 0 | 1 | 0 | 0 | 0 | 130 | 0 | 0 | 0.08 | 0 | 0 | 0 | |
| San Joaquin River near Stockton | 0 | 0 | 12 | 0 | 0 | 0 | 25 | 0 | 0 | 4.80 | 0 | 0 | 0 | |
| San Joaquin River near Twitchell Island | 0 | 0 | 11 | 0 | 0 | 0 | 60 | 0 | 0 | 1.83 | 0 | 0 | 0 | |
| Lower Sacramento River | 0 | 0 | 5 | 0 | 0 | 0 | 65 | 0 | 0 | 0.77 | 0 | 0 | 0 | West |
| Mid Suisun Bay | | | 10 | | | | 70 | | | 1.43 | | | | |
| West Suisun Bay | 0 | 0 | 2 | 0 | 0 | 2 | 160 | 0 | 0 | 0.13 | 0 | 0 | 0.13 | Far West |
| Total | 0 | 0 | 42 | 0 | 0 | 2 | 675 | | | | | | | |

Map of EDSM sampling regions and subregions:

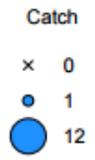
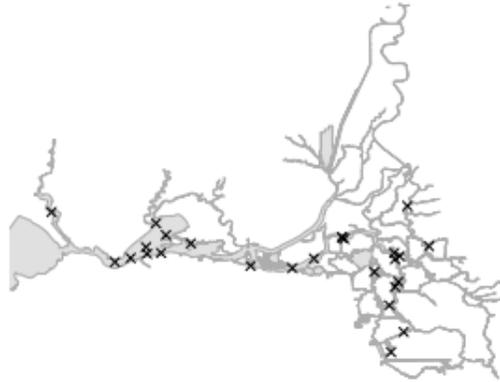


EDSM Sampling 2/6/17 – 2/9/17

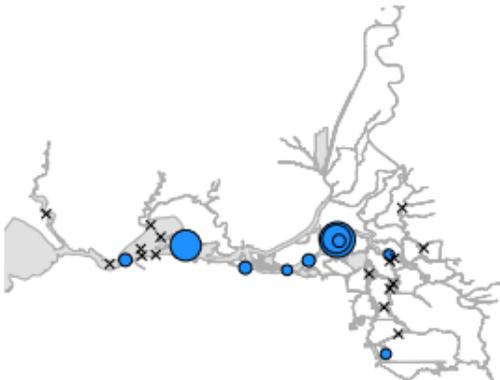
Unclipped Winter-run Chinook



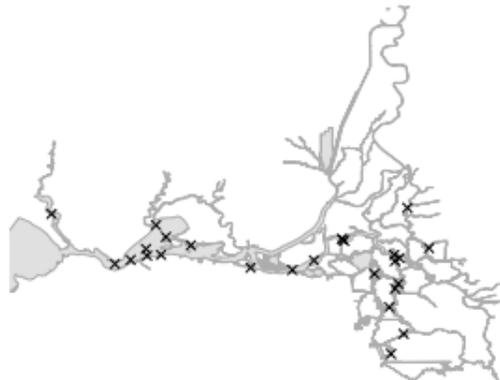
Unclipped Spring-run Chinook



All unclipped Chinook



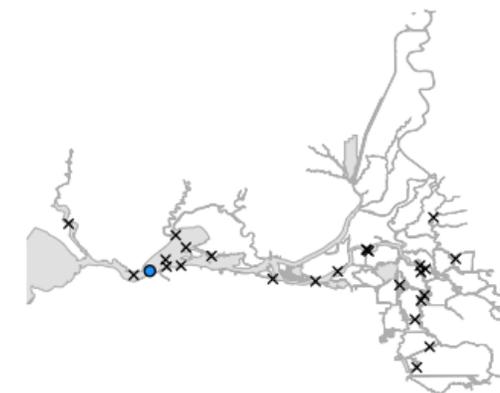
All clipped Chinook



All unclipped steelhead



All clipped steelhead

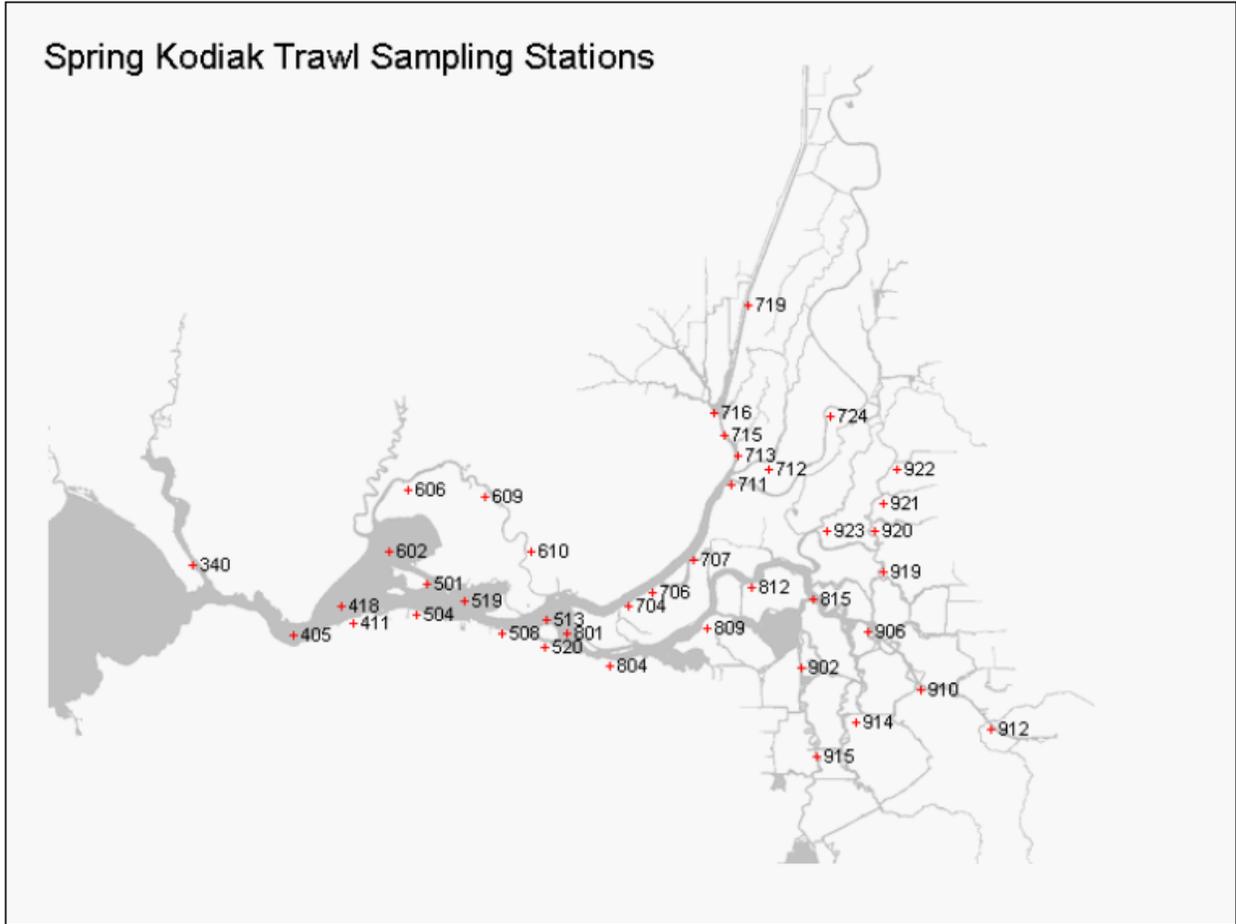


Spring Kodiak Trawl - Survey 2

2017 Spring Kodiak Trawl preliminary salmonid catch from February 6-9. Data are preliminary and subject to change; Chinook run assignments are based on length-at-date criteria. Unless otherwise noted, each station is sampled with a single 10-minute tow.

| Station | # of Fish | Fall Run Chinook | | Spring Run Chinook | | Winter Run Chinook | | Late Fall Run Chinook | | Steelhead | | |
|---------|-----------|------------------|-------------|--------------------|-------------|--------------------|-------------|-----------------------|-------------|-----------|-----------------------|-------------------|
| | | Clipped | Not Clipped | Clipped | Not Clipped | Clipped | Not Clipped | Clipped | Not Clipped | Clipped | Not Clipped | |
| 340 | 1 | | 1 | | | | | | | | | Suisun Bay & West |
| 405 | 0 | | | | | | | | | | | |
| 411 | 0 | | | | | | | | | | | |
| 418 | 0 | | | | | | | | | | | |
| 501 | 0 | | | | | | | | | | | |
| 504 | 0 | | | | | | | | | | | |
| 519 | 0 | | | | | | | | | | | |
| 602 | 1 | | 1 | | | | | | | | | |
| 606 | 7 | | 6 | | 1 | | | | | | | |
| 609 | 49 | | 49 | | | | | | | | | |
| 610 | 33 | | 33 | | | | | | | | | |
| 508 | 4 | | 4 | | | | | | | | Confluence | |
| 513 | 2 | | | | | | | | 2 | | | |
| 520 | 0 | | | | | | | | | | | |
| 801 | 0 | | | | | | | | | | | |
| 804 | 1 | | 1 | | | | | | | | Sac River System | |
| 704 | 4 | | 4 | | | | | | | | | |
| 706 | 7 | | 7 | | | | | | | | | |
| 707 | 4 | | 4 | | | | | | | | | |
| 711 | 5 | | 5 | | | | | | | | | |
| 712 | 13 | | 13 | | | | | | | | | |
| 713 | 5 | | 5 | | | | | | | | | |
| 715 | 7 | | 7 | | | | | | | | | |
| 716 | 0 | | | | | | | | | | | |
| 719* | 2 | | 2 | | | | | | | | | |
| 724 | 5 | | 5 | | | | | | | | | |
| 809 | 4 | | 3 | | | | | | 1 | | South & Central Delta | |
| 812 | 1 | | 1 | | | | | | | | | |
| 815 | 1 | | | | | | | | 1 | | | |
| 902 | 0 | | | | | | | | | | | |
| 906 | 0 | | | | | | | | | | | |
| 910 | 0 | | | | | | | | | | | |
| 912 | 0 | | | | | | | | | | | |
| 914 | 0 | | | | | | | | | | | |
| 915 | 0 | | | | | | | | | | | |
| 919 | 0 | | | | | | | | | | | |
| 920 | 0 | | | | | | | | | | | |
| 921 | 0 | | | | | | | | | | | |
| 922 | 0 | | | | | | | | | | | |
| 923 | 0 | | | | | | | | | | | |
| Totals: | 156 | 0 | 151 | 0 | 1 | 0 | 0 | 0 | 0 | 4 | 0 | |

*Two five minute tows



Agenda Item 9.

DOSS Estimates of Fish Distribution and Assessment of 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.

| Location | Yet to Enter Delta (Upstream of Knights Landing) | In the Delta | Exited the Delta (Past Chipps Island) |
|---|--|---------------------------------|---------------------------------------|
| <i>Wild young-of-year (YOY) winter-run Chinook salmon</i> | 0%-5% (Last week: same) | 65%-75% (Last week: 65%-80%) | 20%-30% (Last week: 20%-25%) |
| <i>Wild young-of-year (YOY) spring-run Chinook salmon</i> | 15%-25% (Last week: 20% - 30%) | 40%-70% (Last week: 40%-70%) | 25%-30% (Last week: 20%-25%) |
| <i>Hatchery winter-run Chinook salmon (released 2/2/17)</i> | 85%-95% (Last week: 100%) | 5%-15% (Last week: 0%) | 0% (Last week: same) |

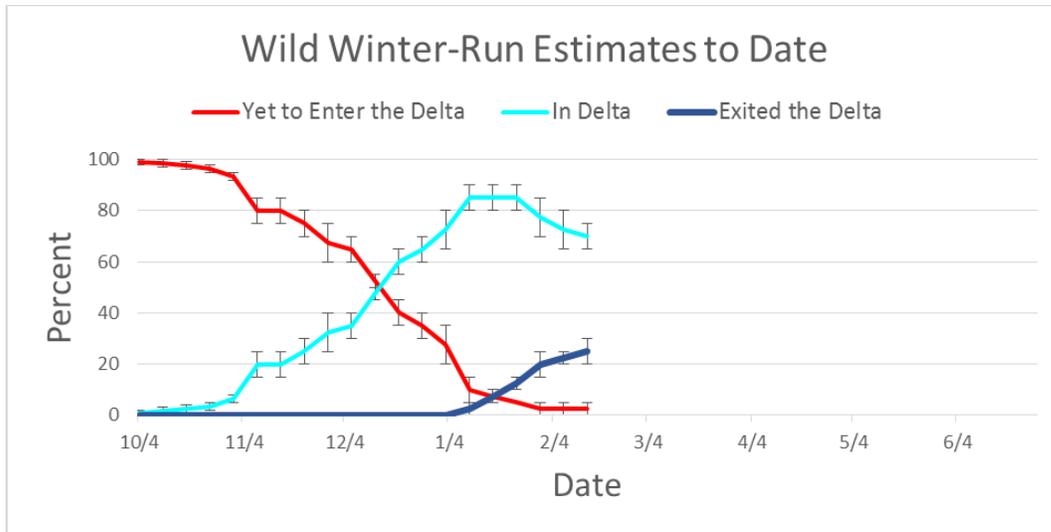
* DOSS acknowledges the limitations of the length-at-date criteria, particularly in distinguishing between young-of-year spring run Chinook and young-of-year fall-run Chinook. When reviewing spring-run catch in the monitoring data, DOSS considers that run misclassifications might arise from both large genetic fall-run falling into the spring-run sized class and small genetic spring-run falling into the fall-run size class.

Rationale for changes in distribution

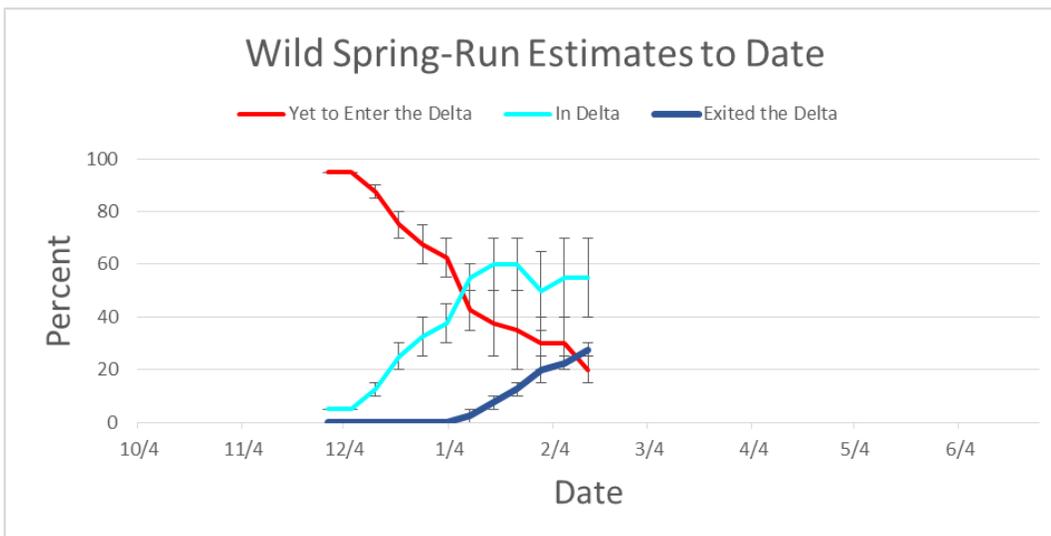
Wild winter-run Chinook: While only 2 juvenile winter-run-sized Chinook salmon were observed at Tisdale and 1 at Knights Landing upstream of the Delta, DOSS considered that the trap efficiency was likely lower at the recent high flows (because the traps are sampling a smaller fraction of the water passing each trapping location). Also, DOSS noted that with all weirs spilling, some winter-run Chinook may be entering the flood bypasses and not passing by some trapping locations. Because of the high flows and due to seasonal timing, DOSS estimated that some winter-run Chinook moved past Chipps Island, potentially rearing westward in Honker, Grizzly, Suisun and San Pablo Bays.

Wild spring-run Chinook: Over the past week, 2 juvenile spring-run-sized Chinook were observed at Tisdale, 7 at Knights Landing, and 4 at the beach seines and Sac trawl. When estimating the wild spring-run Chinook distribution, DOSS considered that trap efficiency was likely lower at the recent high flows (because the traps are sampling a smaller fraction of the water passing each trapping location) and that with all weirs spilling, some spring-run Chinook entered the flood bypasses and did not pass by some trapping locations. Because of the high flows and due to seasonal timing, DOSS estimated that some spring-run Chinook moved into the Delta, and a similar fraction exited past Chipps Island, potentially rearing westward in Honker, Grizzly, Suisun and San Pablo Bays.

Hatchery winter-run Chinook: 4 winter-run-sized adipose clipped Chinook were observed at Knights Landing over the past week (according to posted data through 2/12/17), and CDFW reported on the DOSS call that 2 more winter-run-sized adipose clipped Chinook were captured yesterday (2/13), indicating a portion of hatchery winter-run have moved into the Delta. None of the 569 acoustic-tagged winter-run Chinook released on 2/2/17 in Redding have yet been observed at any of the Sacramento-area receivers, but (a) high flows and turbidity may be limiting detections of acoustic-tagged fish, and (b) as for wild Chinook, some acoustic-tagged hatchery winter-run Chinook may be spilling into the Yolo Bypass and not passing the receivers in the Sacramento River near Sacramento. With these considerations in mind, DOSS estimated that 5-15% of hatchery WR were in the Delta even though 0% of the acoustic-tagged hatchery winter-run have been detected at the Sacramento-area receivers at the Tower Bridge and the I-80/Hwy50 Bridge.



WY 2017 wild winter-run distribution estimates to date.



WY 2017 wild spring-run distribution estimates to date.

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 into the 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:

- **Exposure Risk: HIGH**
 - Flow and turbidities from recent rains and reservoir releases, which are cues for salmonid movement, have been high since the weekend and are expected to remain high through the coming weekend.
 - Some fish are going into bypasses. Fish entering the Yolo Bypass will exit the bypass downstream of the Georgiana Slough junction, reducing entrainment risk into the interior Delta.
 - Overall, despite bypass overflow, the group assessed the exposure risk as high.
- **Routing Risk: LOW**
 - Continued high river flows are expected to mute the tidal effects at Georgiana Slough (reducing the risk of routing into Georgiana Slough).
 - Delta Cross Channel is closed.
- **Overall Entrainment Risk: MEDIUM**

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

- **Exposure Risk: MEDIUM-HIGH**
 - Have seen high salvage of unclipped Chinook, some portion of which are likely from the Sacramento basin.
 - Beginning in mid-January, have seen salmonid catch (fall-run-sized Chinook, no steelhead to date) at Mossdale.
- **OMR/Export Risk:**
 - OMR -2,500 cfs: LOW
 - OMR -3,500 cfs: MEDIUM
 - OMR -5,000 cfs: HIGH

- OMR -6,250 cfs⁶: incrementally HIGHER (given projected hydrology and high Vernalis flow)

Some members expect the relative risk of entrainment of an OMR limit of -6,250 compared to -5,000 cfs to further increase when Vernalis flows decrease.

- **Overall Entrainment Risk:**
 - OMR -2,500 cfs: LOW
 - OMR -3,500 cfs: LOW-MEDIUM (given projected hydrology and high Vernalis flow)
 - OMR -5,000 cfs: MEDIUM-HIGH (given projected hydrology and high Vernalis flow)
 - OMR -6,250 cfs⁶: incrementally higher within MEDIUM-HIGH (given projected hydrology and high Vernalis flow)

Considering the high Sacramento River and Vernalis flows forecasted through the weekend, and with the expectation that most ESA-listed salmonids will be entering the Delta from the Sacramento basin, most members agreed that overall entrainment risk into the export facilities is lower at most OMR levels than it would be under lower flow conditions. The overall entrainment risk was driven in large part by the MEDIUM-HIGH exposure risk and less so (given projected hydrology) by the OMR/Export Risk.

Considering projected hydrologic conditions, the difference between OMR levels of -5,000 and -6,250 represents an incrementally elevated overall entrainment risk to Sacramento Basin salmonid populations. This assessment is likely to change should export levels continue at the current levels and Vernalis flows decrease, at which point risk to Sacramento Basin salmonids will increase.

Agenda Item 10.

DOSS Advice to NMFS and WOMT: None

Agenda Item 11.

Next Meeting: The next DOSS conference call will be on **2/21/17 at 9am.**

⁶By request of management, DOSS also assessed risks at an OMR flow more negative than -5,000 cfs.

Attachment 1 - Genetics-based run assignment

Caution should be exercised when interpreting population assignment results, as the nuances of the statistical analysis used to generate the results may not be apparent. The mathematical error regarding the broad determination of winter-run versus non-winter-run is essentially zero. There is high confidence in the “Assignment” and probability shown in “PosProb1”, so that information could be viewed as “certain”. Regarding finer sub-divisions of population assignment, error can increase. The “Group” label is categorized by run type (or race); however, there is little genetic difference between fall and late-fall. It is more appropriate to collapse the information into the National Marine Fisheries Service’s designated Evolutionary Significant Units (ESU): 1) fall/late fall; 2) spring; and 3) winter. Regarding the probabilities themselves, a value greater than 0.80-0.85 is viewed as highly likely and is interpreted as the observed assignment was statistically greater to the group shown than to any other possible group. Similarly, values lower than 0.80 are statistically less certain.

For the results provided, assignment probabilities shown in “PosProb2” were low at the race level (i.e. fall or late fall), but were quite certain at the ESU level (i.e., fall and late fall). In addition, known introgression between Feather River spring-run and Feather River fall-run Chinook salmon may result in low assignment probabilities.

The “Best” label is a legacy term, and denotes the single reference collection – in the baseline used for assignment – to which the individual fish was assigned with the highest probability. The “Best” results are provided for personal interest only, as many of the reference collections are not genetically different.

| ID | SampleDate | ForkLength | Julian | Assignment | PosProb1 | Group | PosProb2 | Best | PosProb3 | Central_Valley_fa | Central_Valley_If | Central_Valley_s | Central_Valley_w | RaceByLength | Sample Locations |
|------------|------------|------------|--------|------------|----------|-----------|----------|-----------------|----------|-------------------|-------------------|------------------|------------------|--------------|------------------|
| C160079USR | 11/6/2016 | 42 | 129 | Winter | 1.000 | Winter | 1.000 | USacramentoRHwi | 1.000 | 0.000 | 0.000 | 0.000 | 1.000 | Winter | RBDD |
| C160080USR | 11/7/2016 | 41 | 130 | Winter | 1.000 | Winter | 1.000 | USacramentoRHwi | 1.000 | 0.000 | 0.000 | 0.000 | 1.000 | Winter | RBDD |
| C160151USR | 12/29/2016 | 51 | 182 | Winter | 1.000 | Winter | 1.000 | USacramentoRHwi | 1.000 | 0.000 | 0.000 | 0.000 | 1.000 | Spring | RBDD |
| C170001USR | 1/2/2017 | 48 | 186 | Non-winter | 1.000 | Fall | 0.951 | FeatherRHfa | 0.662 | 0.951 | 0.049 | 0.000 | 0.000 | Spring | RBDD |
| C160112SWP | 11/23/2016 | 628 | 146 | Non-winter | 1.000 | Fall | 0.778 | DeerCrfa | 0.594 | 0.778 | 0.222 | 0.000 | 0.000 | Adult | SWP |
| C160011SWP | 11/29/2016 | 545 | 152 | Non-winter | 1.000 | Fall | 0.976 | DeerCrfa | 0.825 | 0.976 | 0.024 | 0.000 | 0.000 | Adult | SWP |
| C160012SWP | 11/29/2016 | 590 | 152 | Non-winter | 1.000 | Fall | 0.789 | FeatherRHfa | 0.622 | 0.789 | 0.211 | 0.000 | 0.000 | Adult | SWP |
| C160013SWP | 12/2/2016 | 597 | 155 | Non-winter | 1.000 | Fall | 0.849 | FeatherRHfa | 0.824 | 0.849 | 0.151 | 0.000 | 0.000 | Adult | SWP |
| C160153CVP | 12/20/2016 | 160 | 173 | Non-winter | 1.000 | Fall | 0.562 | DeerCrfa | 0.504 | 0.562 | 0.438 | 0.000 | 0.000 | Late Fall | CVP |
| C160152CVP | 12/20/2016 | 185 | 173 | Non-winter | 1.000 | Fall | 0.714 | DeerCrfa | 0.700 | 0.714 | 0.286 | 0.000 | 0.000 | Late Fall | CVP |
| C160154CVP | 12/21/2016 | 138 | 174 | Non-Winter | 1.000 | Late Fall | 0.670 | USacramentoRlfa | 0.670 | 0.330 | 0.670 | 0.000 | 0.000 | Winter | CVP |
| C160113SWP | 12/21/2016 | 140 | 174 | Non-winter | 1.000 | Fall | 0.930 | FeatherRHfa | 0.687 | 0.930 | 0.070 | 0.000 | 0.000 | Winter | SWP |
| C160155CVP | 12/28/2016 | 95 | 181 | Non-winter | 1.000 | Fall | 0.516 | USacramentoRlfa | 0.484 | 0.516 | 0.484 | 0.000 | 0.000 | Winter | CVP |
| C170082SWP | 1/5/2017 | 164 | 190 | Non-Winter | 1.000 | Late Fall | 0.931 | USacramentoRlfa | 0.931 | 0.069 | 0.931 | 0.000 | 0.000 | Late Fall | SWP |
| C170001SWP | 1/9/2017 | 211 | 194 | Non-winter | 1.000 | Fall | 0.644 | DeerCrfa | 0.506 | 0.644 | 0.356 | 0.000 | 0.000 | Late Fall | SWP |
| C170086SWP | 1/12/2017 | 315 | 197 | Failed | - | - | - | - | - | - | - | - | - | Adult | SWP |