

Delta Operations for Salmonids and Sturgeon (DOSS) Group
Conference call: 1/30/2018 at 9:00 am.

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: Ken Kundargi, Bob Fujimura, Jason Julienne, Duane Linander

DWR: Farida Islam, Kevin Reece, Bryant Giorgi

NMFS: Kristin McCleery

Reclamation: Towns Burgess, Elissa Buttermore, Mike Hendrick, Don Portz, Tom Patton

SWRCB: Chris Kwan

USFWS: Craig Anderson, Felipe Carrillo

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/djfmj)
3. Current Operations
4. Smelt working group update
5. Fish Monitoring: RSTs/trawls/seines
6. Fish Monitoring: Salvage
7. Hatchery Releases
8. DOSS Estimates of Fish Distribution
9. DOSS Estimates of Fish Entrainment Risk
10. DOSS advice
11. Next DOSS meeting

Agenda Item 2.

RPA Implementation Review

Delta RPA Actions affecting operations during January:

Action IV.1.1 [Alerts that indicate the Delta Cross Channel (DCC) gate operations may be triggered soon] ¹:

- The First Alert is triggered if either the first component (river flows >95 cfs or the second component (>50% change in mean daily river flow) is met. The first alert was triggered every day this past week based on Mill Creek and Deer Creek flows. See table below for details.

¹ For details, see pages 60-61 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. Note that in October 2014, NMFS approved a modification of the first component of the first alert to a 95 cfs mean daily flow threshold in either Mill Creek or Deer Creek in lieu of operating the Mill and Deer Creek rotary screw traps.

| Mill Creek (MLM) | | | Deer Creek (DCV) | |
|------------------|-----------------------|---------------------------|-----------------------|---------------------------|
| Date | mean daily flow (cfs) | change in mean daily flow | mean daily flow (cfs) | change in mean daily flow |
| 1/23/2018 | 373 | -14% | 336 | -1% |
| 1/24/2018 | 462 | 24% | 362 | 8% |
| 1/25/2018 | 627 | 36% | 562 | 55% |
| 1/26/2018 | 467 | -26% | 468 | -17% |
| 1/27/2018 | 349 | -25% | 378 | -19% |
| 1/28/2018 | 301 | -14% | 337 | -11% |
| 1/29/2018 | 277 | -8% | 317 | -6% |

- Second Alert is triggered only if both Knights Landing temperatures are less than 56.3°F and Wilkins Slough flows are greater than 7,500 cfs.
 - The second alert was triggered every day this past week. See table below for details.

| Wilkins Slough (WLK) | | Knights Landing (KL) |
|----------------------|-----------------------|------------------------------|
| Date | Mean Daily Flow (cfs) | Daily water temperature (°F) |
| 1/23/2018 | 9,196 | 50 |
| 1/24/2018 | 10,882 | 48 |
| 1/25/2018 | 9,652 | 48 |
| 1/26/2018 | 11,145 | 48 |
| 1/27/2018 | 11,880 | 48 |
| 1/28/2018 | 10,693 | 48 |
| 1/29/2018 | 9,372 | 48 |

Action IV.1.2² (DCC gate operations):

- Gates will remain closed per operations described in RPA Action IV.1.2 starting 12/1/17.

Action IV.2.3³ (OMR Management):

- Implementation of this action in WY 2018 is from 1/1/18 through 6/15/18, and requires that Old and Middle River (OMR) flow be no more negative than -5,000 cfs. OMR flows are reported weekly with the OMR index and the tidally filtered USGS gauges at the 5-day and 14-day running averages.
- The official JPE letter was signed and should go out today (1/30). The letter confirms the minimum fish density triggers will be applied.

² 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

³ 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

Action IV.3⁴ (Reduce likelihood of entrainment or salvage at the export facilities, including alert that indicates that export operations may need to be altered):

- The third alert [November 1-February 28 Knights Landing Catch Index (KLCI) or Sacramento Catch Index (SCI) >10] was not triggered this past week.
- Since the action went into effect on 11/1/17, no salvage of listed salmonids has occurred and thus no salvage-based triggers that would require export reduction have been exceeded.

Agenda Item 3.

Current Operations (1/30/18)

| SWP | | CVP | |
|-----------------------------------|-------------------|-------------------------------------|------------|
| Exports (cfs) | | | |
| Clifton Court Forebay | 2,600* | Jones Pumping Plant | 3,500** |
| Reservoir Releases (cfs) | | | |
| Feather - Oroville | 1,750 | American - Nimbus | 3,000 |
| | | Sacramento - Keswick | 4,000 |
| | | Stanislaus - Goodwin | 600 |
| | | Trinity - Lewiston | 300 |
| Reservoir Storage (in TAF) | | | |
| San Luis (SWP) | 766 | San Luis (CVP) | 966 (full) |
| Oroville | 1,396 | Shasta | 3,338 |
| New Melones | 1,982 | Folsom | 583 |
| Delta Operations | | | |
| DCC | Closed | Sacramento River at Freeport (cfs) | 19,800 |
| Outflow Index (cfs) | ~18,800 | San Joaquin River at Vernalis (cfs) | 1,800 |
| E:I | 29% (14-day avg.) | X2 | 74 km |

*SWP exports will increase to 3,400 cfs tomorrow (1/31).

**CVP exports will decrease by 1 unit to 2,700 cfs tomorrow (1/31).

Approximate OMR as of 1/27/18:

| | USGS gauges (cfs) | Index (cfs) |
|--------|-------------------|-------------|
| Daily | -5,000 | -5,000 |
| 5-day | -5,100 | -5,000 |
| 14-day | -4,900 | -5,000 |

Approximate OMR as of 1/29/18:

| | Index (cfs) |
|-------|-------------|
| Daily | -5,000 |

⁴ For details, see pages 79-80 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

| | |
|--------|--------|
| 5-day | -5,000 |
| 14-day | -5,000 |

Factors controlling Delta exports:

- 1/23-1/30: -5,000 cfs OMR limit per NMFS BiOp RPA Action IV.2.3

Weather Forecast

Dry weather is expected across the Sacramento Valley with above normal temperatures Saturday through Tuesday.

Agenda Item 4.

Smelt Working Group Update

The Smelt Working Group met on Monday, 12/29/17 at 10 am. Anderson (USFWS) provided a summary during the DOSS call. Chen (USFWS) provided the following Smelt Working Group meeting summary by email:

The Smelt Working Group reviewed current Delta conditions, survey data, current water project operations, and forecasted weather. Current weather conditions are overcast, and no precipitation is forecasted over the next few weeks. The air temperature is expected to increase in the coming weeks, which would likely in turn increase water temperature. Based on Delta conditions, the forecasted weather, and the lack of recent detections of Delta smelt from surveys within the entrainment risk area, the Group concluded that the risk for Delta smelt and longfin smelt entrainment is low.

The Group does not believe that a recommendation under Action 1 or Action 2 (adult pre-spawning Delta smelt) is necessary to protect Delta smelt at this time. The Group will continue to monitor Delta smelt survey and salvage data, Delta conditions, and this week’s forecasted weather. The Group will meet again on Monday, 2/5/18 at 10 am.

Agenda Item 5.

Fish Monitoring: The following table presents fish monitoring data summarized over the past week. Empty cells indicate zero catches at those locations with sample dates shown.

| Location | GCID RST | Tisdale RST ^A | Knights Landing RST ^B | Beach Seines ^C | Sacramento Trawl ^C | Chippis Is. Midwater Trawl ^C | Mossdale Kodiak Trawl ^C |
|-------------|---------------------------|--------------------------|----------------------------------|---------------------------|-------------------------------|---|------------------------------------|
| Sample Date | 1/23-1/30 | 1/22-1/29 | 1/22-1/29 | 1/22-1/26 | 1/21-1/27 | 1/21-1/27 | 1/22, 1/24, 1/26 |
| Chinook | | | | | | | |
| FR Chinook | 18 juveniles | 16 | 26 | 221 | 30 | | |
| SR Chinook | | | | 12 | | | |
| WR Chinook | 19 juveniles 11 smolts | 2 | 3 | 5 | 1 | 1 | |
| LFR Chinook | 3 smolts | | 1 | | 1 | 1 | |

| | | | | | | | |
|-----------------------------|---------|----------------|---------------|--|----|----|--|
| Chinook (ad-clip) | 386 LFR | 3 WR* 7 LFR | 1 WR 1 LFR | | 5 | 36 | |
| Steelhead (wild) | 1 | 1 | | | 8 | | |
| Steelhead (ad-clip) | 50 | 6 | | | 19 | 1 | |
| Green Sturgeon | | | | | | | |
| Flows (avg. cfs) | 1,241 | 9,707 | 10,358 | | | | |
| W. Temp. (avg. °F) | 50.3 | 50 | 48.3 | | | | |
| Turbidity (avg. NTU) | 16.3 | 19.0 | 18.0 | | | | |

^A Tisdale RST sampling period was from 1/22 at 9:15 am to 1/29 at 9:00 am. *The 3 marked winter-run were Greene/Fisher table winter-run size range but are assumed to be late-fall run since there have been no winter-run releases as yet this season.

^B Knights Landing RST sampling period was from 1/22 at 10:30 am to 1/29 at 11:00 am.

^C Data reported in the 1/21 to 1/27 DJFMP sampling summary.

Red Bluff Diversion Dam (RBDD)

USFWS biweekly report (1/15/18-1/28/18) for preliminary estimates of passage by brood-year and run for unmarked juvenile Chinook salmon captured by rotary screw traps at RBDD included:

| Run and Species | Biweekly Total | Brood Year Total (90% CI) |
|-----------------------------|-----------------------|----------------------------------|
| Winter-run Chinook (BY2017) | 17,795* | 457,157 (316,396-597,919) |
| Spring-run Chinook (BY2017) | 3,777** | 133,643 (95,715-171,571) |

*Biweekly catch increased by 10,994 fish from previous biweekly total of 6,801.

**Biweekly catch increased by 2,850 fish from previous biweekly total of 927.

Agenda Item 6.

Fish Monitoring: Salvage⁵

Fujimura (CDFW) provided a salvage summary. No listed fish species have been observed in salvage since the start of the current water year on 10/1/17.

Five ad-clipped hatchery steelhead were salvaged at CVP (1 on 1/23 and 4 on 1/24).

Five late-fall-run Chinook salmon were salvaged at CVP on 1/23.

An outage occurred at the Tracy Fish Collection Facility starting on 1/24, and primarily on 1/25 for over 12 hours. Normal salvage operation still occurred.

⁵ 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: January 22-January 28, 2018

Prepared by Bob Fujimura on January 29, 2018 15:33

Preliminary Results -Subject to Revision

| Criteria | 22-Jan | 23-Jan | 24-Jan | 25-Jan | 26-Jan | 27-Jan | 28-Jan | Trend | |
|------------------------|--------|--------|--------|--------|--------|--------|--------|-------|-------|
| Loss Densities | | | | | | | | | |
| Wild older juvenile CS | 0 | 0 | 0 | 0 | 0 | 0 | 0 | → | 0 |
| Wild steelhead | 0 | 0 | 0 | 0 | 0 | 0 | 0 | → | 0 |
| Exports | | | | | | | | | |
| SWP daily export | 5,474 | 5,478 | 6,081 | 5,516 | 5,910 | 5,450 | 5,274 | → | 5,598 |
| CVP daily export | 7,000 | 6,992 | 7,005 | 7,021 | 7,018 | 7,016 | 7,018 | → | 7,010 |
| SWP reduced counts | 0% | 0% | 0% | 0% | 0% | 0% | 0% | → | 0% |
| CVP reduced counts | 0% | 0% | 0% | 50% | 0% | 0% | 0% | ↘ | 7% |

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

Tan highlighted date indicate TFCF hoist failure; normal salvage was not affected but no fish monitoring for 12 hours.

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 | 0 | 0 | → | 0 | 0 |
| Spring Run | 0 | 0 | → | 0 | 0 |
| Late Fall Run | 0 | 0 | → | 0 | 0 |
| Fall Run | 0 | 0 | → | 0 | 0 |
| Unclassified | 0 | 0 | → | 0 | 0 |
| Total | 0 | 0 | | 0 | 0 |
| Hatchery | | | | | |
| Winter Run | 0 | 0 | → | 0 | 0 |
| Spring Run | 0 | 0 | → | 8 | 6 |
| Late Fall Run | 5 | 3 | ↘ | 5 | 3 |
| Fall Run | 0 | 0 | → | 0 | 0 |
| Unclassified | 0 | 0 | → | 1 | NC |
| Total | 5 | 3 | | 14 | 9 |

Trend = weekly loss per race; Salvage = estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time

NC = cannot be calculated; hatchery salmon salvage and loss estimates have been corrected using CWT readings when available

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 | 0 | 0 | → | 0 | 0 |
| Hatchery | 5 | 3 | ↘ | 13 | 9 |
| Total | 5 | 3 | | 13 | 9 |

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

Generated by Bob Fujimura on January 29, 2018

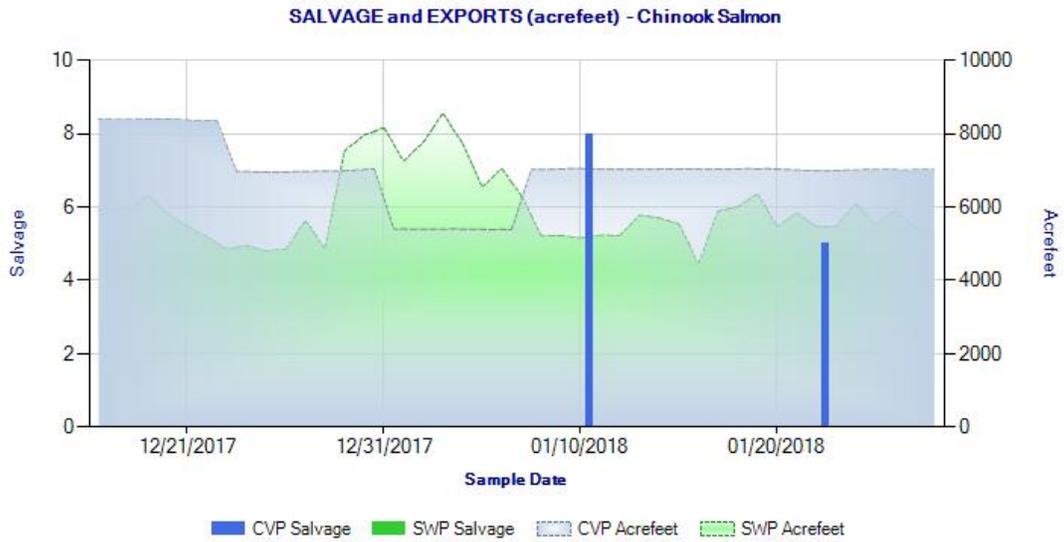


Figure 1. Daily salvage of Chinook Salmon (all races) and water exports from the state and federal fish salvage facilities during December 17 through January 28, 2018. Graph obtained from the DFG salvage monitoring web page: <http://www.dfg.ca.gov/delta/apps/salvage/SalvageExportCalendar.aspx>.

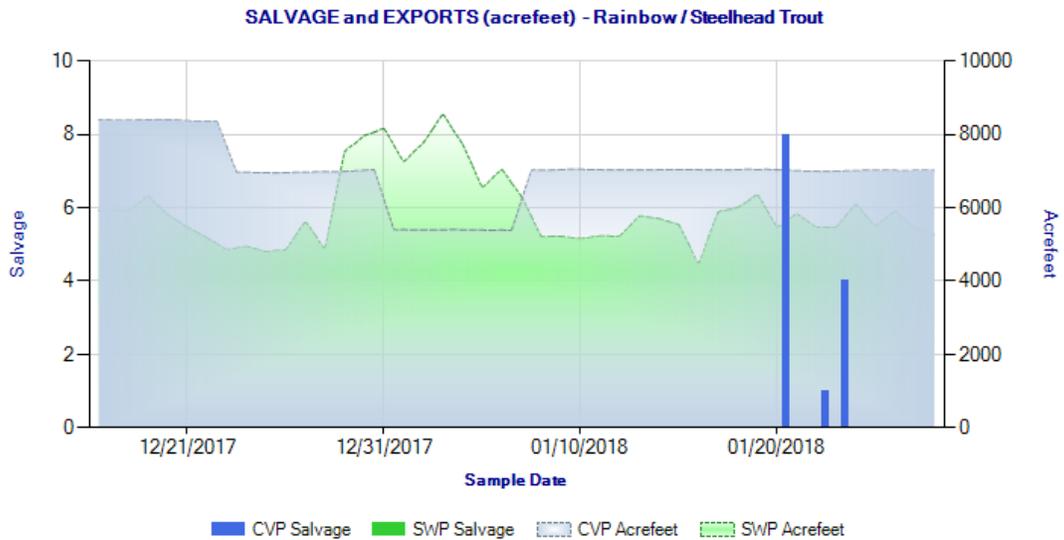


Figure 2. Daily salvage of Rainbow/Steelhead and water exports from the state and federal fish salvage facilities during December 17 through January 28, 2018. Graph obtained from the DFG salvage monitoring web page: <http://www.dfg.ca.gov/delta/apps/salvage/SalvageExportCalendar.aspx>.

Agenda Item 7.

Hatchery Releases

On 1/25/2018, the third spring-run surrogate group of approximately 85,000 brood year (BY) 2017 late-fall Chinook salmon were released from Coleman National Fish Hatchery (CNFH) into Battle Creek (all marked with an adipose fin clip and CWT).

On 1/26/2018, the Department of Fish and Wildlife released approximately 49,549 BY 2017 spring-run Chinook salmon from the San Joaquin River Restoration Program’s Salmon Conservation and Rearing Facility into the San Joaquin River. This release consisted of marked (adipose fin clip and CWT) fry that were released at the Fremont Ford Bridge.

Agenda Item 8.

DOSS Estimates of Fish Distribution

DOSS estimates of the current distribution of listed Chinook and steelhead, as a percentage of the population, are based on recent monitoring data and historical migration timing patterns.

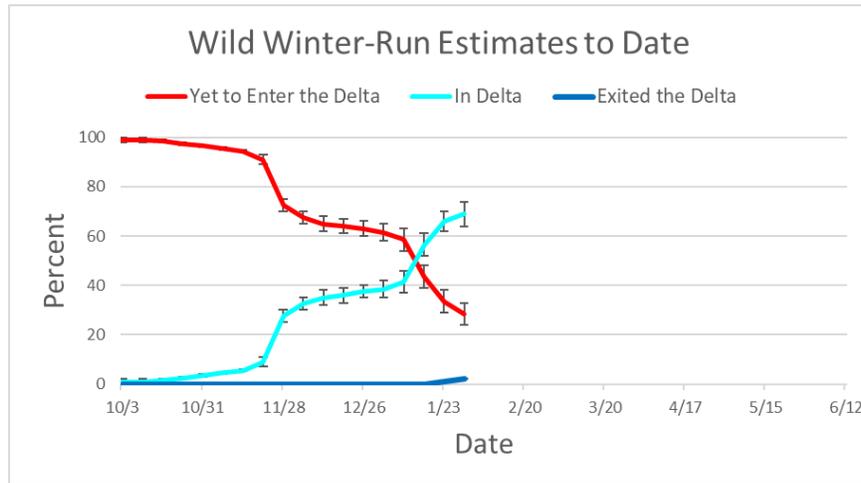
| Location | Yet to Enter Delta (Upstream of Knights Landing) | In the Delta | Exited the Delta (Past Chippis Island) |
|---|---|--------------------------------|---|
| <i>Wild young-of-year winter-run Chinook salmon</i> | 24-33% (Last week: 29-38%) | 64-74% (Last week: 61-70%) | 2% (Last week: ~1%) |
| <i>Wild young-of-year spring-run Chinook salmon</i> | 50-68% (Last week: 53-71%) | 32--50% (Last week: 29-47%) | 0% (Last week: 0%) |

Rationale for changes in distribution

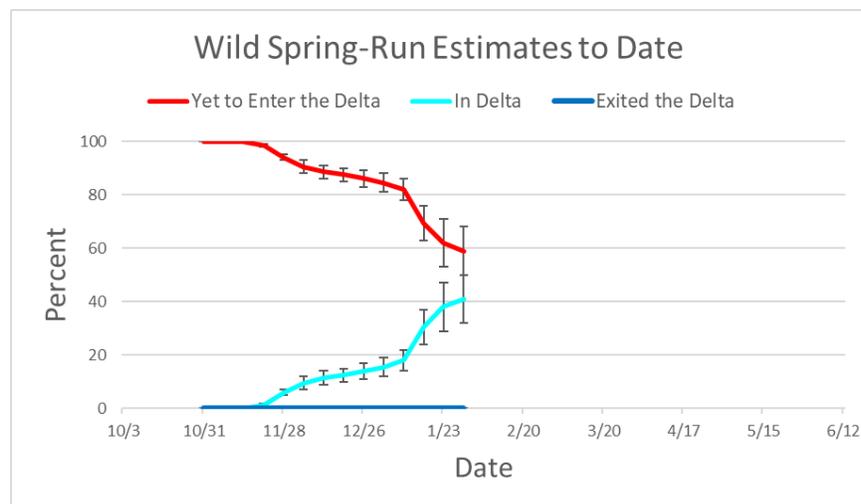
Wild winter-run Chinook: Over the past week, 30 juvenile winter-run-sized fish were observed at GCID, 2 at Tisdale, 3 at Knights Landing (RSTs), 5 at the beach seine locations, 1 at Sac Trawl, and 1 at Chippis Island trawl. Since flows and turbidity have increased, more fish were observed at monitoring locations, and we saw an increase at Red Bluff Diversion Dam, DOSS estimated that an additional 5% of the winter-run population has moved downstream into the Delta during the past week. Since 1 more winter-run was observed at Chippis Island trawl, DOSS estimated an additional 1% of the population has exited the Delta over the past week (cumulative total for WY18 ~ 2%).

Wild spring-run Chinook: 12 spring-run-sized fish were observed at the beach seine locations, and at no other monitoring locations this past week. Since flows and turbidity have increased, fish were observed over the past week at monitoring locations in the lower Sacramento River, and we saw an increase in spring-run observed at Red Bluff Diversion Dam, DOSS estimated that an additional 3% of the spring-run population has moved into the Delta. The majority of spring-run are still considered to be rearing upriver. There is also the potential that some of the fish classified as spring-run by the length-at-date criteria may actually be late emerging and slow growing winter-run Chinook salmon. Cooler river water temperatures this year may have delayed spawning and slowed the emergence and growth of winter-run fry in the upper Sacramento River, and thus these fish would fall into the size criteria for spring-run at this time

of year. Likewise, some spring-run may fall into the fall-run length at date size criteria due to slow growth in cooler waters.



WY 2018 wild winter-run distribution estimates to date.



WY 2018 wild spring-run distribution estimates to date.

Agenda Item 9.

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: MEDIUM**
 - Increased flows and turbidities from recent storms have stimulated fish movement.
 - Approximately 64-74% of the winter-run population is downstream of Knights Landing at this time, a few winter-run have been seen in the lower Sacramento River section between Sacramento and DCC.
 - Approximately 32-50% of spring-run population is in the Delta.
 - Surrogate spring-run Chinook salmon hatchery releases of late-fall run Chinook salmon are in the system. The last release occurred on 1/25/18. CWTs from captured clipped Chinook salmon are being read from fish collected during monitoring.
 - Wild Chinook salmon and steelhead as well as clipped Chinook salmon and steelhead have been observed in the Chipps Island trawls.
 - Wild and clipped Chinook salmon have been observed in beach seines from the North Delta and Liberty Island regions.
 - Wild and clipped Chinook salmon as well as clipped steelhead have been observed in the EDSM efforts.
- **Routing Risk: MEDIUM**
 - River flows not high enough to mute tidal influence at Georgiana Slough and Three Mile Slough allowing redirection of fish into these route on flood tides.
 - 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**

- Clipped steelhead were observed in salvage on 1/21/18- 1/24/18, presumably from earlier hatchery releases from CNFH.
- Continuing to see Chinook salmon and steelhead in lower Sacramento River and western Delta monitoring efforts (Chippis Island and in the river confluence region).
- **OMR/Export Risk:**
 - OMR -2,500 cfs: LOW
 - OMR -3,500 cfs: LOW
 - OMR -5,000 cfs: LOW-MEDIUM
 - OMR -6,250 cfs⁶: MEDIUM
 - OMR -7,500 cfs⁶: MEDIUM-HIGH (incrementally higher risk if Vernalis flows decrease)
 - OMR -9,000 cfs⁶: HIGH (Full export capacity, footprint of export effects extend into western Delta and lower San Joaquin River). Different DOSS members ranked the risk as either a medium or a high risk.)
- **Overall Entrainment Risk:**
 - OMR -2,500 cfs: LOW-MEDIUM
 - OMR -3,500 cfs: LOW-MEDIUM
 - OMR -5,000 cfs: MEDIUM
 - OMR -6,250 cfs⁶: MEDIUM (but higher than -5,000 cfs OMR)
 - OMR -7,500 cfs⁶: MEDIUM-HIGH
 - OMR -9,000 cfs⁶: HIGH

These assessments are based on current hydrology and fish distributions. Should more fish from the Sacramento or San Joaquin basins be detected at monitoring locations in the Delta, the risk of entrainment into the interior Delta or at the SWP/CVP facilities will increase.

Agenda Item 10.

DOSS Advice to WOMT and NMFS: None.

Agenda Item 11.

Next Meeting: The next DOSS conference call will be on **2/6/2018 at 9 am.**

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