Delta Operations for Salmonids and Sturgeon (DOSS) Group
Conference call: 12/23/2019 at 2:00 p.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 (CVP) and the State Water Project (SWP) on salmonids and green sturgeon. DOSS will work with other technical teams. DOSS notes and advice can be found here: CCV Water Operations DOSS page.

CDFW: Ken Kundargi, Duane Linander, Chris McKibbon, Page Uttley, Morgan Kilgour, Lauren Damon
DWR: Bryant Giorgi, Kevin Reece, Farida Islam
NMFS: Jeff Stuart, Kristin Begun
Reclamation: Tom Patton, Suzanne Manugian, Elissa Buttemore
SWRCB: Chris Carr, Stanley Mubako
Tracy Fish Collection Facility: Rene Reyes, Brandon Wu (and Chris Carr)

Agenda Items:

1. Agenda review and introductions
2. RPA Implementation review (For the DOSS Dashboard, click on the "Triggers & Indices" tab at: Bay Delta Live)
3. Current Operations
4. Smelt Working Group
5. Fish Monitoring: RSTs/trawls/seines
6. Fish Monitoring: Salvage
7. DOSS Estimates of Fish Distribution
8. Risk of Entrainment
9. Rapid Genetic Protocol Discussion
10. DOSS Advice
11. Next DOSS Meeting

Agenda Item 2.
RPA Implementation Review

Delta RPA Actions affecting operations during December:

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

- The First Alert has two components. Capture of yearling-sized spring-run Chinook salmon at the mouths of natal tributaries between October and April indicates that emigration from the tributaries has started or is occurring. As an environmental surrogate to the capture of the yearling-sized spring-run Chinook salmon, which are difficult to capture in the rotary screw traps, tributary flow increases are used to signal conditions

[1] For details, see pages 60-61 in Enclosure 2 of the 2011 Amendments to the 2009 RPA document. 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.

conducive to emigration. The First Alert is triggered if either the first component (greater than 95 cfs flow threshold) or second component (greater than 50% change in mean daily flow) are exceeded. The First Alert was triggered (yellow highlights) this past week due to flows greater than 95 cfs.

	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
12/17/2019	179	-12%	189	-13%
12/18/2019	169	-6%	176	-7%
12/19/2019	172	2%	173	-1%
12/20/2019	176	2%	173	0%
12/21/2019	171	-3%	169	-2%
12/22/2019	225	32%	238	41%

- The Second Alert is triggered only if **both** Wilkins Slough flows are greater than 7,500 cfs and Knights Landing temperature is less than 56.3°F. The second alert is in effect beginning 10/1/2019, and was triggered every day this past week.

	Wilkins Slough (WLK)	Knights Landing (KL)
Date	Mean Daily Flow (cfs)	Daily water temperature (°F)
12/17/2019	9,157	50.6
12/18/2019	8,350	49.5
12/19/2019	7,847	48.8
12/20/2019	7,651	48.3
12/21/2019	8,204	48.8
12/22/2019	8,371	49.0

Action IV.1.2[2] (DCC gate operations):

- DCC gates will remain closed per operations described in RPA Action IV.1.2 starting 12/1/2019 and are expected to remain closed until mid-May.

Action IV.3[3] (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 11/1/2019, no salvage-based triggers that would require export reduction have been exceeded.

Agenda Item 3.
Current Operations (12/23/2019)

[2] For details, see pages 62-66 in Enclosure 2 of the 2011 Amendments to the 2009 RPA document.
[3] For details, see pages 79-80 in Enclosure 2 of the 2011 Amendments to the 2009 RPA document.

SWP		CVP	
Exports (cfs)			
Clifton Court Forebay	7,300*	Jones Pumping Plant	4,200
Reservoir Releases (cfs)			
Feather - Oroville	2300**	American - Nimbus	2,500
		Sacramento - Keswick	7,000
		Stanislaus - Goodwin	800
		Trinity - Lewiston	300
Reservoir Storage (TAF)			
San Luis (SWP)	807	San Luis (CVP)	352
Oroville	2,044	Shasta	3,314
New Melones	1,975	Folsom	520
Delta Operations			
DCC	Closed	Sacramento River at Freeport (cfs)	16,800
Outflow Index (cfs)	~7,000	San Joaquin River at Vernalis (cfs)	2,300
E:I	~43% (14-day avg.)	X2	81 km

* SWP exports are likely to remain around 7,300 cfs through 1/1/2020.
** Oroville releases are scheduled to decrease tomorrow (12/24/2019) to 2,100 cfs.

Factors controlling Delta exports:

- 12/17/2019-12/23/2019: US Army Corps permits and available physical capacity.

Approximate OMRs as of 12/20/2019:

	USGS gauges (cfs)	Index (cfs)
Daily	-8,800	-9,000
5-day	-8,800	-9,100
14-day	-7,800	-8,000

Approximate OMRs as of 12/22/2019:

	Index (cfs)
Daily	-9,500
5-day	-9,100
14-day	-8,200

Weather Forecast
A few showers linger over the mountains, but most of the Central Valley will be dry early this week. Another weather system will bring a chance of showers to the Sacramento region on Christmas followed by dry weather this weekend.

Agenda Item 4.

Smelt Working Group
The Smelt Working Group met today, 12/23/2019. The Working Group reviewed current Delta conditions, survey data, expected exports, and forecasted weather. The SWG indicated that the precipitation forecasted for Wednesday would be minor, and a "first flush" event is unlikely to occur this week. Field surveys have detected Delta Smelt in the lower Sacramento River this week. Turbidity levels are low and steady. Current OMR index values of -9,472 cfs are expected to remain steady for the week and these highly negative flows in the OMR corridor were of concern to the group. The SWG concluded that there was no evidence of fish in the entrainment zone and not enough information to warrant advice.

The Working Group does not believe that a recommendation under Action 1 (adult pre-spawning Delta Smelt) is necessary to protect Delta Smelt at this time. The Working Group will continue to monitor Delta Smelt survey and salvage data and Delta conditions. The group will meet again on Monday, December 30, 2019, at 1000 hours.

Agenda Item 5.

Fish Monitoring: The following table presents fish monitoring data summarized over the past week. Unless otherwise noted, reported races are based on fork length (length-at-date).

Location	GCID RST[A]	Tisdale RST[B]	Knights Landing RST[C]	Beach Seines[D]	Sacramento Trawl[D]	Chipps Is. Midwater Trawl[D]	Mossdale Kodiak Trawl[D]
Sample Date		12/16-12/22	12/16-12/22	12/16-12/18	12/16-12/17	12/16-12/17, 12/19	
FR Chinook		2	3	32		1	
SR Chinook		1	1	19	1		
WR Chinook		7	9	6	1		
LFR Chinook						22	
Chinook (ad-clip)		1 FR 1 LFR			5	133	
Steelhead (wild)		1		5			
Steelhead (ad-clip)							
Green Sturgeon							
Flows (avg. cfs)		7,453	8,269				
W. Temp. (avg. °F)		49	49.2				
Turbidity (avg. NTU)		7.9	12.28				

[A] GCID RST removed from bypass channel on 12/1/2019 due to high flows and heavy debris, and for repairs.

[B] Tisdale RST sampling period was from 12/16/2019 at 10:00 am to 12/22/2019 at 9:00 am.
[C] Knights Landing RST sampling period was from 12/16/2019 at 10:30 am to 12/22/2019 at 11:00 am. Cone effort was 50%.
[D] DJFMP data from Bay Delta Live.

Juvenile Green Sturgeon Monitoring Summary for DOSS; 12/23/2019 Sampling Season Summary

- 2019 Sampling Season Summary: Eight juvenile green sturgeon and 3 juvenile white sturgeon tagged to over 31 sampling events; catch per unit effort (CPUE) presented as number of juvenile sturgeon tagged per sampling event (table below).

CPUE as juvenile sturgeon tagged per sampling event, 2015 through 2019 sampling seasons.

2015		**2016**		**2017**		**2018**		**2019**	
Sampling events		Sampling events		Sampling events		Sampling events		Sampling events	
33		81		44		34		31	
Number tagged		Number tagged		Number tagged		Number tagged		Number tagged	
Green	White	Green	White	Green	White	Green	White	Green	White
1	0	7	11	7	0	40	0	8	3
CPUE		**CPUE**		**CPUE**		**CPUE**		**CPUE**	
0.03	0	0.09	0.14	0.16	0	1.18	0	0.26	0.1

Real-Time Monitoring detections at sampling site in main channel Sacramento River northwest of Sherman Lake; 12/17/2019 and 12/19/2019

- One juvenile green sturgeon tagged on 12/12/2019 detected on 12/17/2019 and 12/19/2019 (A69-1602-12230).
- One juvenile white sturgeon tagged on 8/6/2019 detected on 12/17/2019 (A69-1602-12229).
- Four adult white sturgeon tagged by USFWS Lodi staff in the San Joaquin River detected:
    - 1 tagged on 3/11/2014 detected on 12/17/2019 and 12/19/2019 (A69-9001-25741);
    - 1 tagged on 4/3/2014 detected on 12/17/2019 and 12/19/2019 (A69-9001-27462);
    - 2 tagged on 3/31/2016 detected on 12/17/2019 and 12/19/2019 (A69-9001-19545 and A69-9001-19546).

CDFW Lower American River Carcass Survey

Reporting for survey period 12/16/2019-12/20/2019:

- 3,408 observed carcasses
    - 552 females

        - 200 unclipped
        - 352 clipped
        - 552 female carcasses evaluated for spawn condition:
            - 7/552 (10%) prespawn mortalities
            - 57/552 (8%) partially spawned
            - 413/552 (75%) spawned
            - 75/552 were too deteriorated to determine spawning condition
    - 462 males
        - 148 unclipped
        - 314 clipped
    - 188 Jaw Tag Recaptures
    - 2,206 carcasses too deteriorated to determine sex
- Temperatures at Fair Oaks (USGS gage 11446500, ~0.25 mile downstream of Hazel Ave) during the survey period:
    - Minimum: 52.5°F
    - Mean: 52.8°F
    - Maximum: 53.2°F

Hatchery Releases (Received after the conclusion of the call):
On 12/5/2019, the California Department of Fish and Wildlife (CDFW) released approximately 9,600 brood year 2018 spring-run Chinook salmon from the San Joaquin River Restoration Program's (SJRRP) Salmon Conservation and Research Facility (SCARF) into the San Joaquin River. This release consisted of marked, Passive Integrated Transponder (PIT), adipose fin clip, and coded wire tag (CWT) fish.

On 12/12/2019, the CDFW began rotary screw trap (RST) efficiency tests using brood year 2019 spring-run Chinook salmon originating from the SJRRP's SCARF. Releases occurred upstream of two RST locations (Owl Hollow and Scout Island) within Reach 1 of the SJRRP Restoration Area. Releases consisted of 600 marked (adipose fin clip, half-length CWT) fish.

Agenda Item 6.
Fish Monitoring: Salvage
Damon (CDFW) reported Spring Kodiak Trawl data for 12/16-19/2019: 11 CHN and steelhead were observed in monitoring.

Salvage through 12/22:
Chinook:
At CVP: 84 clipped hatchery Chinook salmon were observed in salvage last week (loss - ~70 fish). The seasonal totals of all Chinook salmon salvaged for WY20 (all at the CVP) are 196 adipose fin clipped (loss= 133.4) and 12 non-clipped (loss=8.65).
No salmonids were observed at the SWP last week and no salmonids have been salvaged at the SWP for the WY20.

Steelhead

No steelhead were observed in salvage last week at either facility. Seasonal total = 4 clipped fish (loss 2.72), all at the CVP. No unclipped fish have been observed at either facility for WY20.

Operations
The SWP continues to reduce counts to 10 minutes/2 hours of exports due to heavy vegetation in the holding and counting tanks.

No reduced counts occurred at the CVP.

Kundargi (CDFW) brought up discussion from last week on PIT tagged fish that were salvaged. CDFW requested that a change in protocol happen if possible, to have PIT tagged fish released instead of sacrificed. Reyes (Tracy Fish Collection Facility) said they did not receive a formal request to change protocol, but they are aware of the concern and are working on revising protocol so the SJRRP fish will not be euthanized. The change in protocol will be implemented today, so that these fish will be released after collecting data.

Islam (DWR) informed the group that the two fish from spring-run Chinook salmon surrogate group 1 has a total loss of 5.2 fish, and she will keep tracking loss. Updated tables will be sent out by close of business on Fridays.

Linander (CDFW) informed the group that hatchery Chinook salmon losses are now posted on SacPAS, and shows which codes have been salvaged this WY.

Agenda Item 7.
DOSS Estimates of Fish Distribution
DOSS estimates of the current distribution of listed Chinook salmon, 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)
Young-of-year (YOY) winter-run Chinook salmon	50-65% (Last week: 55-70%)	35-50% (Last week: 30-45%)	0% (Last week: same)
Young-of-year (YOY) spring-run Chinook salmon	80-85% (Last week: 87-90%)	15-20% (Last week: 10-13%)	0% (Last week: same)

Rationale for changes in distribution
Wild winter-run Chinook salmon:
Over 3.9 million BY 2019 winter-run Chinook salmon have passed RBDD this year and approximately 6,300 BY19 winter-run Chinook salmon have been captured by the GCID RSTs since 8/1/2019. GCID raised cones on 12/1/19 due to heavy debris and high flows. Operations are expected to resume when conditions abate). In the last week, 7 length-at-date winter-run Chinook salmon were captured at Tisdale, 9 at Knights Landing, 6 at the beach seines, and 1 in the Sacramento trawl. Since a few more winter-run Chinook salmon were observed in

monitoring over the past week, and due to seasonal timing, DOSS estimates that 35-50% of the winter-run population has entered the Delta.

Wild spring-run Chinook salmon:
One length-at-date spring-run Chinook salmon was observed at Tisdale, 1 at Knights Landing, 19 in the beach seines, and 1 in the Sacramento trawl this past week. Since a few more spring-run Chinook salmon were observed in monitoring this past week, and due to seasonal timing, DOSS estimates that 15-20% of the spring-run Chinook salmon cohort has moved into the Delta.

Agenda Item 8.
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 exports and more negative OMRs)
  - Approximately 35-50% of juvenile winter-run Chinook salmon estimated to be in the Delta.
  - Approximately 15-20% of juvenile spring-run Chinook salmon estimated to be in the Delta.
  - California Central Valley steelhead have been observed in monitoring efforts in the northern Delta region
  - Expected storm this weekend to increase river flows.
  - Anticipate outmigration event to coincide with increased flow.

- **Routing Risk:** LOW
  - DCC is closed.
  - Flows are predicted to be high enough to mute tidal effects around Georgiana Slough.
- **Overall Entrainment Risk:** LOW-MEDIUM

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

- **Exposure Risk:** LOW-MEDIUM
  - Listed Chinook salmon from the Sacramento River basin have been observed in multiple monitoring sites in the lower Sacramento River and northern Delta.
  - Flows are expected to increase this week due to precipitation.
  - Salvage is expected to increase this week compared to last week, with a high exports, a more negative OMR which expands the zone of entrainment, and greater numbers of fish in the Delta system.

- **OMR/Export Risk:**
  - OMR -2,500 cfs: LOW
  - OMR -3,500 cfs: LOW
  - OMR -5,000 cfs: MEDIUM
  - OMR -6,250 cfs: MEDIUM-HIGH
  - OMR -7,500 cfs: HIGH
  - OMR -9,000 cfs: HIGH

- **Overall Entrainment Risk:**
  - OMR -2,500 cfs: LOW
  - OMR -3,500 cfs: LOW
  - OMR -5,000 cfs: LOW-MEDIUM
  - OMR -6,250 cfs: MEDIUM-HIGH
  - OMR -7,500 cfs: MEDIUM-HIGH
  - OMR -9,000 cfs: HIGH

These assessments are based on anticipated and current hydrology and fish distributions for the next week.

Agenda Item 9.
Rapid Genetic Protocol Discussion
Buttermore: reclamation currently has contract with Cramer Fish Sciences to conduct juvenile Chinook salmon analysis at the Delta fish collection facilities. Genetic analysis protocol has occurred since 2016. Reclamation would like to have genetic analysis start 1/1/2020 for this WY. Buttermore will send out the protocol to the group. The protocol allows Reclamation to rapidly genotype unclipped Chinook salmon when a RPA action trigger is exceeded (under RPA Action IV.2.3). Buttermore asked for DOSS input.

Reece (DWR) asked if genetic analysis could begin on 1/2/2020 since staff have already scheduled leave time over the holiday. Staff have been informed the protocol has been initiated and will be ready on 1/2/2020. Stuart pointed out that any fish salvaged on 1/1/2020 would be sampled the next day, 1/2/2020. So there should be no staffing issues.

WR BY19 JPE discussion
Stuart (NMFS) discussed the updated JPE table provided by O'Farrell on 12/20/2019 which includes updated survival information and may result in a JPE-based trigger lower than 8 fish/TAF based on genetic assessments and using the 1% of JPE threshold genetically verified winter-run Chinook salmon. Begun (NMFS) is drafting the JPE letter this year, and will calculate the estimated JPE based on the recent table.

Agenda Item 10.
DOSS Advice to WOMT and NMFS:
None.

Agenda Item 11.
Next Meeting: The next DOSS conference call will be on **12/31/2019 at 9 pm**.