CDFW ITP Completeness Review Comments and Responses

CDFW Comments Transmitted December 27, 2019

Action Items from January 10, 2020 conference call indicated in RED.
DWR Responses Updated on Jan. 11, 2020 in BLUE. Additional information for Barker Slough Pumping Plant sediment and aquatic weed removal provided on February 3, 2020 (Gray Highlight).

1. **Project Description** – Barker Slough Pumping Plant: The description of proposed operations of the Barker Slough Pumping Plant is less detailed than in the previous ITP issued in 2009 which described typical seasonal diversion rates in the winter of 40 cfs. As currently written, it appears that the Project includes operations at Barker Slough up to 175 cfs at all times. Please submit additional information to clarify whether this was the intent or provide more clearly defined operations for which you are requesting take coverage. Please also clarify whether the operations proposed at Barker Slough are consistent with modeling assumptions that depict hydrology in the area and associated entrainment risk.

   Response: The description in the ITP application is consistent with the modeling assumptions used to evaluate hydrology in the vicinity of the Barker Slough Pumping Plant. However, diversion rates would vary seasonally. Daily diversion data will be provided separately.

   The ITP application (p 3-40) describes the following limitations on the proposed operations that would avoid or minimize potential for entrainment of larval Longfin Smelt:

   > *DWR personnel in coordination with CDFW staff will review weekly the abundance and distribution survey data and other pertinent biological factors that influence the entrainment risk and detection of larval Longfin Smelt at Station 716. When conditions warrant it, BSPP's maximum 7-day average will not exceed 60 cfs from January 15 through March 31 within 5 days. During the 5-day period, the rate of diversion at BSPP will not increase. This restriction will be removed when larval Longfin Smelt are no longer detected at Station 716.*

   ACTION: Provide CDEC data to CDFW. See addendum below.

   ADDENDUM: The CDEC data for Barker Slough Pumping Plant diversions are summarized in two exhibits below.

Exhibit 1. Daily diversion at Barker Slough Pumping Plant from 2009-2020.

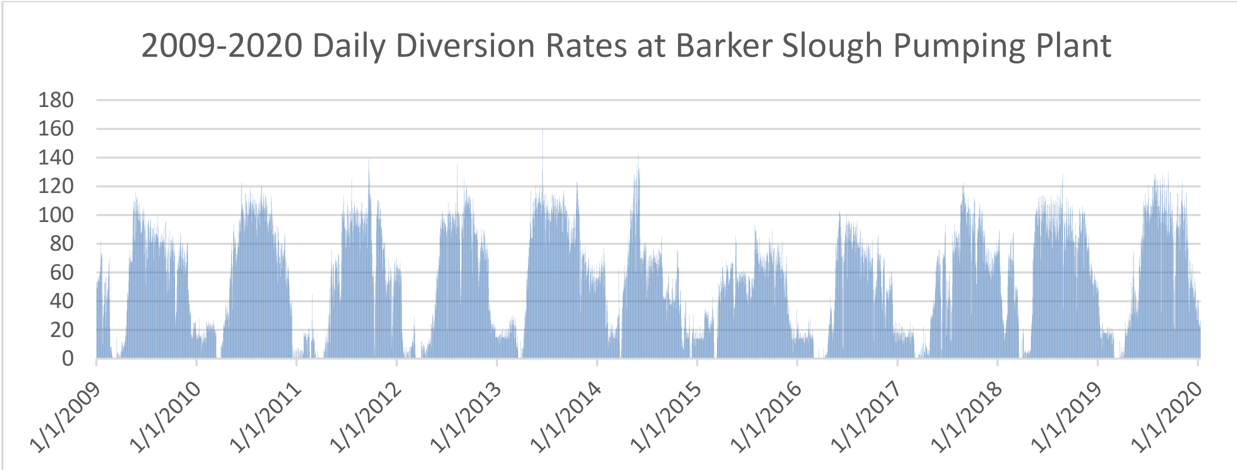
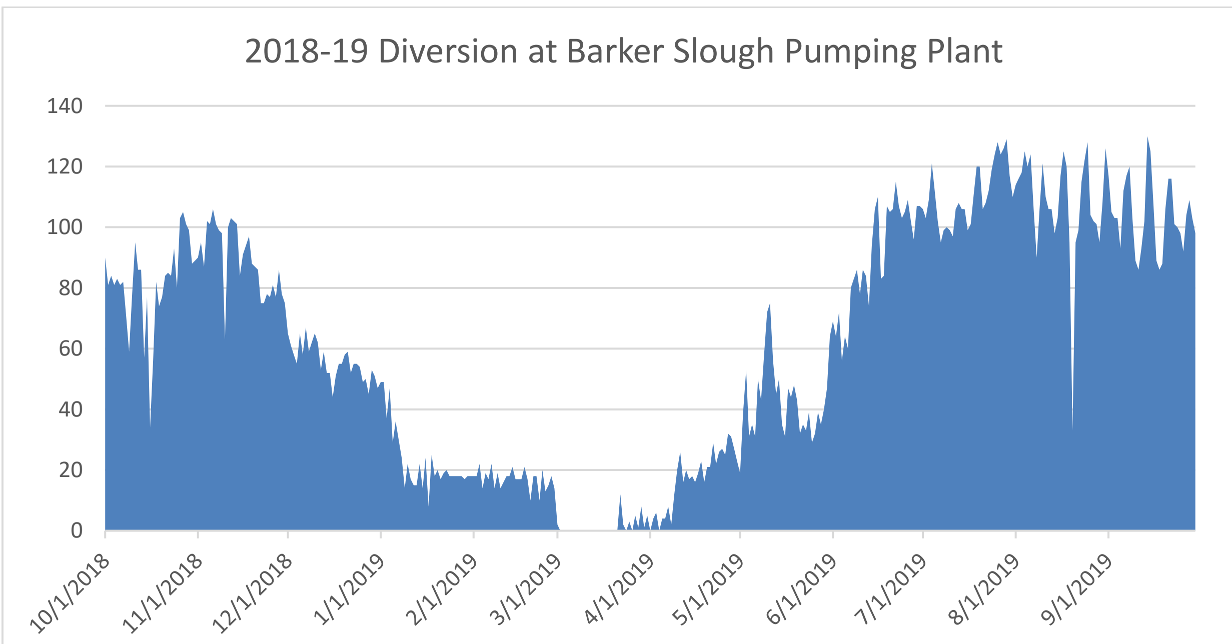


Exhibit 2. Daily diversion at Barker Slough Pumping Plant for Water Year 2018-2019



ACTION: DWR provided additional details regarding model assumptions for operation of BSPP during meeting on January 16, 2020.

2. **Project Description** – Table 3.3-c: Please clarify whether take authorization is being sought in this ITP application for all of the studies listed in Table 3.3-c. The application includes varying levels of detail describing each study. The ongoing studies proposed for Clifton Court Forebay and the Skinner Fish Facility are likely sufficiently well defined as ongoing activities to be included in the request for take authorization in this ITP application. However, the other studies listed are not currently sufficiently well-defined to be included in the Project Description as Covered Activities in the current ITP application.

Response. DWR anticipates that the Longfin Smelt Science Program would be permitted separately under the IEP approvals. The only other studies included in Table 3.3-c that DWR is requesting to cover under the ITP are the cultured fish studies to support establishment of a Delta fish hatchery. Additional details for these studies are provided below based on expanded text from Section 3.3.3.14 (p. 3-38).

Section 3.3.3.14 – The Delta Smelt (*Hypomesus transpacificus*) is currently in severe decline within its native range in the Sacramento-San Joaquin Delta. Delta Smelt have declined to such low numbers that it is difficult to detect them in traditional surveys, and it is possible that the species cannot sustain itself without additional recovery actions. In an effort to conserve the species, a refuge population has been maintained at the UC Davis FCCL in Byron, CA since 2006 (a smaller population exists as a backup to the FCCL at Livingston Stone Hatchery in Shasta Lake, CA). The refuge population provides fish for research purposes, but more importantly, is a reservoir of Delta Smelt genetic diversity that has been specifically managed for potential wild population supplementation or reintroduction.

Currently, FCCL fish have not been released into the Delta, except as part of a predation study in a South Delta fish facility (Castillo et al. 2012). Yet under the present circumstances, there is a need to at least have an emergency plan to guide possible release of refuge fish into the wild. Logic suggests that the easiest and most effective course of action at present may be to supplement the wild population before it goes extinct. Unfortunately, little is known about the most effective way to release Delta Smelt into the Delta for the purpose of recovering the species.

A related issue is that the low numbers of wild Delta Smelt means that it is difficult to evaluate the effects of different management actions. Hence, there is an interested in potentially using cultured fish as a surrogate. The Castillo et al. (2012) example demonstrates that cultured Delta Smelt could be a tool to answer science and management questions. However, more is needed to determine the best way to use culture Delta Smelt in field experiments.

Beginning in 2017, DWR has facilitated studies with the overarching goal of determining the best methods to manage Delta Smelt releases from the refuge population. The intent is to maximize survival, retention of genetic diversity, and minimize the risk to the wild population. A first step was the organization of a public workshop that identified some of the major scientific uncertainties and to guide future studies (Lessard et al. 2018). This workshop has led to DWR's collaborative work with UC Davis, USFWS, CDFW, and Reclamation to conduct initial investigations. The current work plan includes work on genetics, pathology, behavior, a Hatchery and Genetic Management Plan, and test use of hatchery fish in experimental enclosures placed in the wild. Ultimately, the goal of this work is to develop an adaptive population supplementation plan that will assemble current knowledge about Delta Smelt, describe successful supplementation/reintroduction approaches for other fish species, identify research priorities, recommend monitoring approaches for evaluating supplementation strategies, and detail facility upgrade requirements for the refuge population.

The previous background work led to a successful pilot study in 2019 to test the use of caged hatchery Delta Smelt in different parts of the Bay-Delta. Separate trials in winter, summer, and fall showed that the cages were an effective tool to study the responses of hatchery fish.

DWR is proposing to continue collaborative laboratory and field work on cultured fish. Since previous field work on hatchery Smelt required the project team to secure CESA coverage for this project, DRW is requesting coverage under the SWP ITP to allow continued laboratory and field research. As noted above, some of this work on cultured fish could also be useful in the design and evaluation of different management approaches such as flow actions and tidal wetlands restoration projects. In addition, it is an essential tool to consider possible approaches to future supplementation strategies. The proposed DWR effort would be guided by a newly-formed hatchery advisory team, the Culture and Supplementation of Smelt (CASS) team. This multi-agency group (CDFW, USFWS, Reclamation, DWR) is currently led by CDFW. CASS has recently approved a charter that will create several sub-teams that will provide guidance on science, regulatory issues, and facilities.

For 2020 it is anticipated that the primary research activities will be similar to the 2019-deployment of custom smelt cages in multiple habitats (channel, tidal wetlands) and geographic areas (Suisun, Sacramento River, North Delta), genetic analysis of the wild and hatchery population, pathology, and behavioral studies. The general approach would be similar to the pilot 2019 effort, which showed excellent fish survival in cage deployments during winter, summer, and fall. These studies are intended to support flow actions as part of the Adaptive Management Plan (see below). The specific details of the work will be subject to input and review by the agency hatchery advisory group.

DWR is requesting take to cover the scientific research activities using cultured fish, particularly the cage studies described above. No construction will occur as part of this proposal. Similarly, none of these studies are intended to directly augment the smelt population, nor are they intended to promote supplementation as an alternative to other conservation measures. Instead, cultured fish may be a future tool to help make other management actions more effective and easier to evaluate (e.g., flow, habitat restoration). Depending on study results, future decisions to proceed with supplementation would be subject to separate reviews under CESA, FESA, and CEQA.

3. **Project Description** - Section 3.3.3.1: Please note that there is not sufficient detail provided in the ITP application currently to authorize take for the following proposed Delta smelt food actions: Roaring River Distribution System reoperation, North Delta Food Subsidies, and Colusa Basin Drain Projects. Please clarify whether take of listed species is anticipated to occur as a result of these actions. If take is anticipated to occur please clarify whether that take authorization is being sought as a part of this ITP application, or in a separate subsequent application.

   Response: DWR is not requesting take authorization for the North Delta Food Subsidies – Colusa Basin Drain Project or the Roaring River Distribution System Reoperations. The implementation of the North Delta Food Subsidies – Colusa Basin Drain Project is designed to avoid adverse effects on listed species and no take is anticipated.

DWR is pursuing the Roaring River Distribution System Reoperations as part of the adaptive management planning effort and take is not requested under the SWP ITP. This effort remains a programmatic concept that would have a separate environmental review.

4. **Page 4-1:** The ITP application notes that authorization for take associated with maintenance activities including exterior levee repair at Suisun Marsh facilities, embankment repairs at Clifton Court Forebay, and sediment and aquatic weed removal at the Barker Slough pumping plant. In our initial review of the ITP application and Draft Environmental Impact Report (DEIR) we did not see detailed descriptions of these activities or associated analyses of take of listed species, including potentially listed terrestrial species. We suggest either adding detailed descriptions of each activity with associated effects analyses in both the ITP application and DEIR or remove them from the Project Description. For example, please add clear descriptions of the type of work to be conducted, the frequency of that work, and the anticipated timing within each year with potential commitments to work windows to minimize take of listed species.

   Response: DWR is not requesting a take permit for exterior levee repairs at Suisun Marsh facilities or embankment repairs at Clifton Court Forebay. However, the proposed project would include sediment removal and aquatic weed removal at Barker Slough Pumping Plant and take is requested for these activities.

   The details of sediment removal and aquatic weed removal at the Barker Slough Pumping Plant are described in Section 3.3.9.2 (Sediment Removal) and Section 3.3.9.3 (Aquatic Weed Removal) on Page 3-40. The text from these sections is pasted below for CDFW review and consideration.

   > ***3.3.9.2 Sediment Removal***
   > *Sediment accumulated on the concrete apron in front of the fish screen and in the pump wells behind the fish screen would be removed by suction dredge. Removal of sediment from within the pump wells would occur as needed, year-round.*
   >
   > *Removal of sediment from the front apron would occur during summer and early fall months and during the annual NBA shutdown in March. The potential for take of Delta Smelt associated with sediment removal from the front apron is low because water temperatures in Barker Slough are higher during the summer and early fall period when the activity would typically occur. The NBA is annually taken off-line for one to two-weeks for routine maintenance and repairs, and the BSPP is non-operational during this period.*
   >
   > *Sediment would be tested and disposed at a suitable upland location or existing landfill.*

   ACTION: Clarify specific date range for activities (e.g. July 1 through October 15) Suggested adding temperature criteria. (e.g. 25C) for conducting work. Brooke also requested frequency of conducting work – Chris noted that it is typically once each year. A diagram would be helpful to clarify where the work is happening. See addendum below.

   ADDENDUM:
   The text and exhibits below describe the operation of the Barker Slough Pumping Plant in more detail below and illustrate the layout and vicinity of the facility.

Facility Operation
Barker Slough Pumping Plant has nine pumps. A plan view diagram of the pumping facility is provided as Exhibit 3 (below).

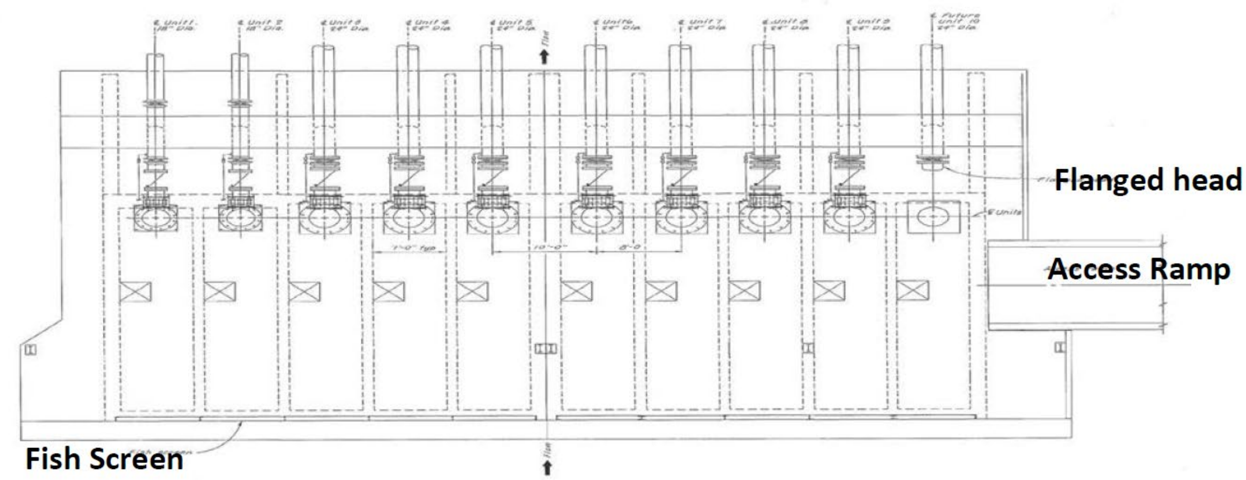


Exhibit 3. Plan view of Barker Slough Pumping Plant intakes and screens.
An aerial view of the pumping plant is provided below as Exhibit 4.

Exhibit 4. Aerial view of Barker Slough Pumping Plant.

Each of the pumps are individually screened with a positive barrier fish screen consisting of a series of flat, stainless steel, wedge-wire panels with a slot width of 3/32 inches. The screen is designed to prevent entrainment of fish larger than 25 millimeters (mm). Fish entrainment is defined as fish being drawn into or transported out of their normal habitat by the flow of water. Fish can be entrained in water diversions when they are unable to swim against the flow of the water caused by the pumps. However, when the screens are pulled up for cleaning, which allows the potential for fish to move freely into and out of the intake bays, the pumps are not operating.

The first two bays have smaller pump units (nominally 14 cubic feet per second (cfs)), and seven bays have larger pump units (nominally 28 cfs) (Figures 3 & 4). The last bay does not have a pump. The theoretical maximum pipeline capacity is 175 cfs, but currently the normal pumping rate is between 0 cfs and 130 cfs because the maximum pipeline capacity cannot be reached due to biofilm accumulation in the pipe. Operations are demand driven and pumping rate varies seasonally. Based on historical pumping, higher pumping generally occurs in the fall and summer as illustrated in Exhibit 1 and Exhibit 2 above. The screens are cleaned once a month by Delta Field Division (DFD) using a truck mounted crane to lift the screens up and a high-pressure hose from the back side of the screens. The screens in front of each bay are entirely submerged and are more than 23 feet below the top of the concrete platform (Figure 2). Each fish screen is 7 feet wide by 10 feet long and is lowered into position along vertical metal slots anchored to the façade of the intake structure.

The screen configuration is designed to exclude fish larger than about 25 mm from being entrained. The two smaller pump units are designed for a screen approach velocity of about 0.2 feet per second (fps) at the screen face, whereas the larger pump units are designed for a screen approach velocity of about 0.4 fps.

The timing and duration of sediment and aquatic weed removal is summarized the Table 1 below and described in more detail in the following sections.

Table 1. Timing and duration of Sediment and Weed Removal at BSPP

Activity	Dates	Frequency	Duration
Aquatic weed removal[1]	July 1—30	Weekly	5 hours
Aquatic weed removal[1]	Aug. 1—Sep. 30	Daily	5-8 hours +
Aquatic weed removal[1]	Oct. 1—Nov. 15	Weekly	5 hours
Aquatic weed removal[1]	Nov. 16—June 30	Monthly	4 hours
Sediment removal (suction dredging)	March or October	Annually	2-3 days (in water work) 7-10 days (entire project, including land-based mobilization)

Note:
1. Weed removal is conducted concurrently with fish screen cleaning

Sediment Removal Timing and Duration
The timing and duration of sediment removal is summarized in Table 1 and described in more detail below. Sediment removal is conducted on the concrete apron in front of the fish screens in the location shown on Exhibit 5. This activity would be conducted in March or October when water temperatures are greater than 25°C. If sediment removal is conducted during periods when the water temperature is less than 25°C, a CDFW-approved biologist will be present during the sediment removal.

ACTION: Specify temperature threshold for work and reference monitoring for vegetation removal during spring.

ADDENDUM: **Aquatic Weed Removal Timing and Duration**

The timing and duration of aquatic weed removal is summarized in Table 1 and described in more detail below. Aquatic weed removal would be conducted in the area shown on Exhibit 5. This activity would generally be conducted when water temperatures are greater than 25°C. When the water temperature is less than 25°C, a CDFW-approved biological monitor will be present during the activity.

The ITP application submitted to CDFW in December 2019 describes avoidance and minimization measures for aquatic weed removal at the Skinner Fish Facility (p 3-40, 3-41, and 3-48). These measures would also be implemented at the Barker Slough Pumping Plant.

> ***3.3.9.3 Aquatic Weed Removal***
> *Aquatic weed removal system consists of grappling hooks attached by chains to an aluminum frame. A boom truck, staged on the platform in front of the BSPP pumps, will lower the grappling system into the water to retrieve the accumulated aquatic vegetation. The removed aquatic weeds will be transported to two aggregate base spoil sites located near the pumping plant.*
>
> *Removal of aquatic weeds from the BSPP fish screens would typically occur during summer and fall months when aquatic weed production is highest. The potential for take of Delta Smelt associated with aquatic weed removal from the front apron is low because water temperatures in Barker Slough are higher during the summer and early fall period when the activity would typically occur. Floating aquatic vegetation, i.e., water hyacinth, may need to be removed during spring months if water hyacinth becomes entrained into Barker Slough and accumulates in front of BSPP fish screens.*

Exhibits 6 and 7 show the approach used to clean the fish screens and remove accumulated aquatic vegetation.

0 50 100 Feet

N

Map Citations:
Aerial: ESRI World Imagery

Date:
1/23/2020

Prepared By:
Todd Percival, DWR

- Exhibit 5 -
Site and Vicinity Map

Barker Slough Pumping Plant
Pond Weed Disposal and Dredging

Dixon, CA
Lat. N 38.2763°
Long. W 121.7970°

Legend

Weed Removal and Dredging

Exhibit 6. Photo of Crane and Hook Used to Lift Fish Screens for Cleaning

Exhibit 7. Photo of Fish Screen Cleaning Concurrent with Aquatic Weed Removal

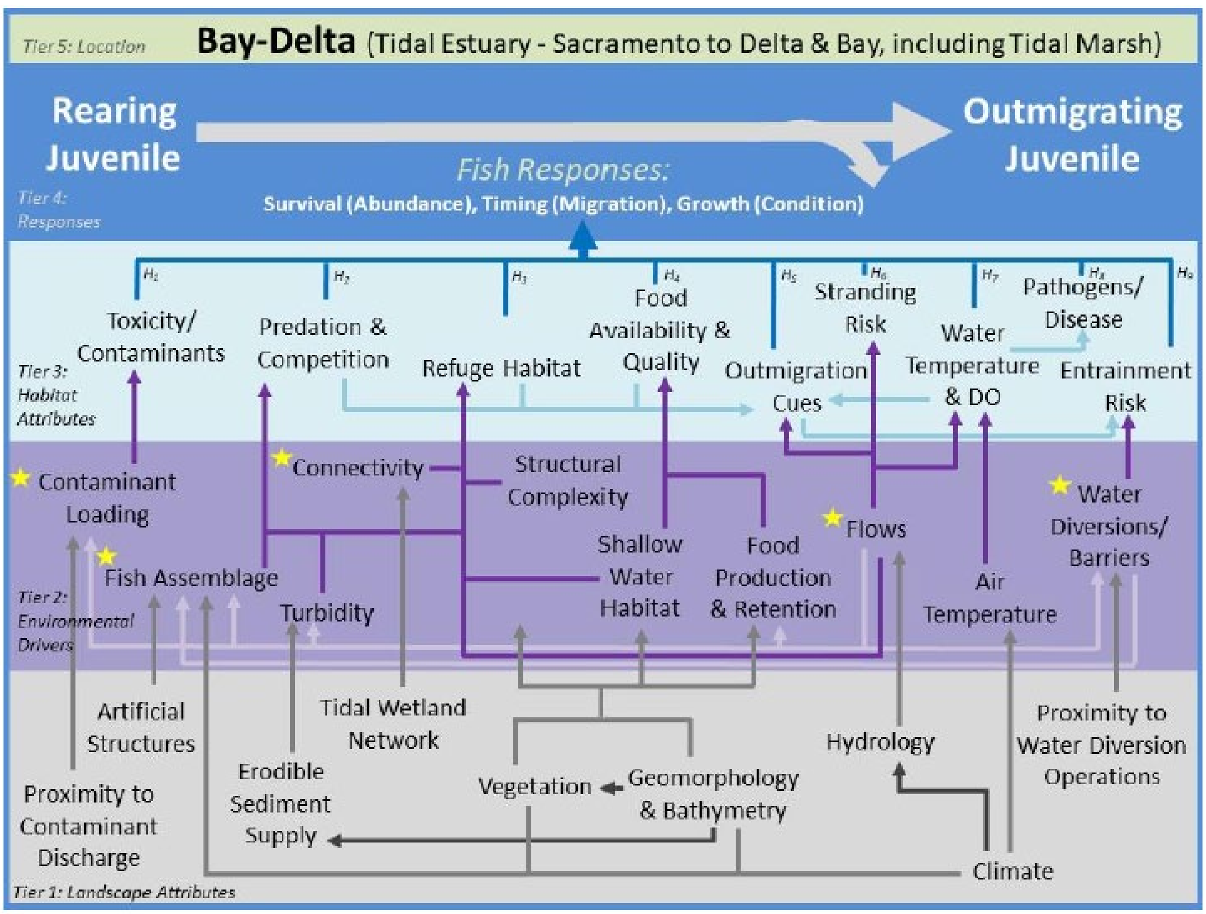
5. **Sections 4.2.3 and 4.2.4**: Section 2.3.3 states "Although the Delta was historically used for rearing, it appears that Winter-run Chinook Salmon now use the Delta primarily as a migration corridor to Suisun Bay and Marsh (Hassrick, pers. comm)." Additionally, the salmonid effects analyses do not generally analyze impacts of the Project on juveniles rearing in the Delta. Instead the analyses focus on impacts to juveniles migrating through the Delta. Please include an analysis of impacts to rearing juvenile salmonids in addition to outmigrating juveniles to fully capture potential take and impacts of the taking as a result of SWP operations.

Response: DWR has prepared additional information that evaluates rearing habitat for Winter-run Chinook Salmon using the approach utilized to evaluate the Waterfix project.

Background for Juvenile Salmonid Rearing in Delta

The ITP Application (p.2-21) noted that "Although the Delta was historically used for rearing, it appears that Winter-run Chinook Salmon now use the Delta primarily as a migration corridor to Suisun Bay and Marsh (Hassrick, pers. comm)." This statement was based primarily on relatively short residence times within the Delta for acoustically tagged juvenile Winter-run Chinook Salmon of 80-127 mm (Hassrick et al. 2014, Hassrick et al. 2016). However, there is some uncertainty with respect to rearing in the Delta: for example, Phillis et al. (2018) estimated from isotopic evidence that around 6–20% of returning Winter-run Chinook Salmon adults had reared in the Delta. Moreover, del Rosario et al. (2013) looked at apparent migration rates of winter-run sized fish at different points in the system and concluded that there was evidence of substantial Delta rearing, perhaps 1-3 months.

Based on this evidence, a recent conceptual model for the rearing to migrating life stage of Winter-run Chinook Salmon in the Bay-Delta hypothesizes that changes in flow could interact with shallow water habitat availability in the Bay-Delta to affect the availability of refuge habitat and survival (Figure 1). As noted by the authors of this conceptual model, information regarding Winter-run Chinook Salmon use of Delta habitats is limited because of routine sampling limitations (Windell et al. 2017, p.19).



Source: Windell et al. (2017). Note: Hypotheses referenced by the "H-number" are identified in the Windell et al. (2017) conceptual model 4 narrative. Management actions are denoted by stars and are described in Table 1 of Windell et al. (2017).

Figure 1. Conceptual Model of Drivers Affecting the Transition of Sacramento River Winter-Run Chinook Salmon from Rearing Juvenile to Outmigrating Juvenile in the Bay-Delta.

Previous Analyses of Rearing Habitat

The California WaterFix (CWF) project included analyses that can be used to inform the effects analysis of the Proposed Project. These analyses included an assessment of reduction in juvenile salmonid rearing habitat at restored wetland and riparian benches in the north Delta as a result of diversions by the proposed north Delta intakes (see methods in ICF International 2016, Appendix 5.D, beginning p.5-268). The analysis found that the estimated reduction in water level (stage) in the Sacramento River from the proposed diversions could give somewhat reduced access to riparian bench habitats[1], which are at relatively higher elevations, but would be expected to give little difference in access to wetland benches, which are at relatively lower elevations (ICF International 2016, p.5-179 to p.5-184).

The National Marine Fisheries Service Winter-Run Chinook Salmon Life Cycle Model (WRLCM) was also used to assess potential CWF effects (NMFS 2017). This model addresses Delta rearing habitat capacity through consideration of channel type (high quality: blind channels; low quality: mainstem river, distributaries, open water), cover (high quality: vegetated; low quality: not vegetated), and water depth (high quality: >0.2 meters, ≤ 1.5 meters; low quality: ≤ 0.2 meters, >1.5 meters) (Hendrix et al. 2014). The model did not suggest that changes in Delta rearing capacity would have appreciable effects on the species: for example, a sensitivity analysis of an additional 11,000 acres of restored tidal habitat in the Delta, with resulting increase in habitat capacity, gave little difference in cohort replacement rate (NMFS 2017, p.807–810). As noted by NMFS (2017, p.810), "…the proposed Delta habitat restoration did not improve the cohort replacement rate under this scenario because the current low abundance of the winter-run population is not limited by Delta rearing habitat. As the population abundance increases because of recovery action implementation (such as newly reintroduced populations in Battle Creek and upper Sacramento River – above Shasta Reservoir) the availability of additional tidal Delta rearing habitats will become more important for the species."

Results of the WRLCM for the Reinitiation of Consultation on the Long-Term Operation of the Central Valley Project and the State Water Project found limited effects of the Proposed Action (PA) compared to the Current Operations Scenario (COS; NMFS 2019). Although there have been refinements to the model since the CWF analysis, the method of assessing habitat capacity in the Delta remains the same (see NMFS 2019, Appendix A). Overall this suggested limited potential for effects of changes in rearing habitat within the Delta as a result of differences in operations between the PA and COS scenarios.

Implications for Proposed Project Operational Effects

The analyses of rearing habitat (bench inundation and WRLCM rearing habitat capacity) described above are largely driven by Sacramento River flow into the Delta. This suggests that a qualitative assessment of differences in Freeport flow for the Proposed Project (PP) relative to Existing Conditions provides an indication of potential changes to juvenile salmonid rearing habitat as a result of differences in operations. CalSim modeling results for Freeport flow

[1] The analysis was conducted using bench inundation indices, which accounted for inundation duration and the suitability of the inundation based on water depth.

generally suggest little difference between PP and Existing during the winter-spring juvenile salmonid rearing period (ITP Application, Appendix B, Attachment 2-2, Table 1-1, and Figures 1-1 through 1-6). Some reductions in rearing habitat could occur under the PP during late fall (November) as a result of lower Freeport flow, which is caused by the PP not including the USFWS (2008) fall X2 action flows. However, based on results of the WRLCM model for the Reinitiation of Consultation on the Long-Term Operation of the Central Valley Project and the State Water Project, such differences would be expected to have limited population-level effects on juvenile salmonids (NMFS 2019).

Rearing habitat availability for juvenile salmonids in the Delta is also affected by Yolo Bypass inundation (e.g., Takata et al. 2017). Based on modeled operations, there would be minimal differences in Yolo Bypass flows between the PP and Existing scenarios (ITP Application, Appendix B, Attachment 2-2, Table 3-1, and Figures 3-1 through 3-6). In addition, as noted in the ITP Application, p.5-5, construction of the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project is anticipated to be completed by December 2022, which will contribute, along with tidal habitat restoration, to minimizing and mitigating potential PP effects.

References

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6. **Head of Old River Barrier:** Section 3.3.8 states that "DWR is not proposing to install Head of Old River Barrier as a part of this consultation." However, if the Head of Old River Barrier seasonal installation is ultimately adopted as an alternative in the Final Environmental Impact Report DWR would need to modify its ITP application to seek take coverage if necessary for that component of the Project.

   Response: Comment noted.

7. Section 4.1: Please note that many of the CalSim II model outputs are dated August 2019, before the Project Description in its current form was developed. We appreciate that DWR is conducting new CalSim II runs and associated modeling and anticipate receiving the updated modeling files and results by January 15th, 2020. We suggest also posting these additional modeling outputs to the ITP application along with the application itself as an update to the document package.

   Response: DWR has provided results of CalSim II modeling of Alternative 2B. Additional biological modeling results were presented to CDFW on January 31, 2020.

   ACTION: DWR will provide the data from the results of biological modeling of Alternative 2B when the modeling appendices are available in early February.

8. Section 7.2 Monitoring Plan: Please provide a more comprehensive and consolidated description of the monitoring activities in the ITP application. Although Section 3.3.4.1 may provide some of that detail, we request a consolidated and comprehensive writeup of the proposed monitoring to support Project implementation.

   Response: Additional details regarding the proposed monitoring activities presented in Section 7.1 and Section 7.2 of the ITP are provided below.

7.1 Continuation of Existing Monitoring

Existing monitoring programs through the Interagency Ecological Program (IEP[2]) and FWS (Enhanced Delta Smelt Monitoring[3] [EDSM] program) includes monitoring to track the status of listed species of fish, and also monitoring to ascertain performance of minimization measures associated with operations of the South Delta export facilities and their fish salvage programs. Existing monitoring programs and proposed modifications to existing IEP programs will facilitate tracking status of listed species of fish and evaluating effectiveness of minimization measures. Incidental take associated with the IEP monitoring programs is authorized via ESA Section 10(a)(1)(A) Research and Enhancement Permits and state FGC Section 2081(a) permits. Monitoring to track performance of the South Delta export facilities and their fish salvage programs is authorized through the existing biological opinions (NMFS 2009 [Section 13.4]; USFWS 2008). Use of scientific collection permits constitutes a conservative approach to take authorization associated with monitoring activities because such permits need periodic renewal, at which time methodology can be updated to ensure that incidental take is minimized consistent with available knowledge and techniques. Thus, it is expected that continuation of existing monitoring would receive take authorization either through issuance of scientific collection permits, or through an alternative consultation pathway.

ACTION: Fix link in footnote for IEP website

ADDENDUM: Hyperlink is corrected below.

Monitoring for the ITP will be centered around a core set of long-term IEP monitoring elements summarized below in Table 8-1. Under the ITP, DWR would provide continued support for each of these elements at our current level of cost-share with USBR (50%). Note that the budgets and scope for IEP elements will change over time in response to management needs, input from periodic scientific reviews, innovation, and inflation. Some of the key expected changes to support management are summarized below. These elements are in addition to the EDSM program, which is funded by USBR.

7.1.1 Proposed Modifications to IEP Sampling Programs

As noted above, IEP's sampling program will continue to evolve to support specific management needs. Some of the specific changes will include the following. Budgets for each are provided in Table 8-1

Changes to Longfin Smelt Sampling Program: Through IEP's science management plan review process (IEP 2014), DWR will undertake a review of existing IEP fish monitoring programs to propose modifications to CDFW SLS and 20 mm programs given new information showing that longfin smelt have a more robust distribution, both temporally (i.e., spawning window) and spatially (i.e., habitat and regions) than what is monitored by these programs (MacWilliams et al. 2016; Grimaldo et al. 2017; Lewis et al. 2019; Grimaldo et al. submitted manuscript). This review and associated monitoring changes will be completed within one year of ITP issuance.

Longfin Smelt Science Program: As described previously, there are substantial uncertainties about the biology and management of longfin smelt. Efforts over the last several years under the Longfin Settlement Agreements have helped to address this gap. DWR therefore proposes

[2] This program is described and data are archived at https://water.ca.gov/Programs/Environmental-Services/Interagency-Ecological-Program/Data-Portal.

[3] This program is described and data are archived at https://www.fws.gov/lodi/juvenile_fish_monitoring_program/jfmp_index.htm

to continue applied work on longfin distribution, abundance, and limiting factors as part of a new Longfin Smelt Science Program that will continue for the duration of the ITP. This program will be developed by DWR and DFW with the input and guidance of IEP.

Longfin Smelt Life Cycle Model: One of the key gaps for longfin smelt management is the need for a life cycle model to help understand the effects of different management actions, and to evaluate potential impacts of different stressors including entrainment. DWR proposes to fund the development of a new longfin smelt life cycle model to support management of that species.

Facilities: As part of the mitigation program, the construction of RVERS is included, which should improve IEP's sampling program. This facility has been permitted through a separate state and federal environmental review process.

Adaptive Management: The proposed project includes an Adaptive Management Plan that will be developed in conjunction with DFW and other partners. It is expected that the Adaptive Management Plan will require substantial additional IEP resources to support the required evaluations. The specific level of support remains to be determined and will likely vary substantially depending on the adaptive management actions conducted each year. Based on recent experience with pilot North Delta Food Web and Suisun Marsh Salinity Control Gate flow actions, it is anticipated that the required annual cost for monitoring and adaptive management support would be approximately $2 million/year.

7.2 Monitoring Addressing Habitat Restoration Sites

DWR will develop monitoring plans to assess environmental characteristics of restored habitat (e.g., salinity and zooplankton abundance) and evaluate the benefit to listed fish, lower trophic consumers, water quality, and effects on listed botanical and wildlife species. Aquatic monitoring will focus on regional and site-specific habitat characteristics associated with listed fish species. The cost to implement tidal wetland habitat monitoring is presented in Table 8-1.

Monitoring plans will be developed as part of each restoration action that will include both pre- and post-project monitoring requirements. These plans will be independently reviewed and evaluated by technical teams or a science panel. Monitoring will rely as much as possible on data from existing regional monitoring efforts under the IEP. In addition, site-specific monitoring data will be collected within each project site prior to restoration action. Expansion of long-term Delta-wide monitoring efforts will assist with the fulfillment of monitoring requirements.

9. **Section 8.1:** Please provide a comprehensive cost accounting for the minimization, mitigation, and monitoring activities, including the IEP programs associated with the Project and ITP application.

   Response: The costs of the IEP Core Long-Term Monitoring Elements are presented in Table 8-1 below based on the elements described in Section 7.1 and Section 7.2 of the ITP. DWR is committed to funding their respective share of the proposed elements listed below.

   ACTION: Clarify the relationship between Table 8-1 in the ITP application and the IEP monitoring elements table provided in the response to comments. Update the table below to include the entire list of IEP monitoring elements.

ADDENDUM: Table 8-1 in the ITP application submitted in December 2019 summarizes the list of mitigation measures that DWR is funding. Table 8-2, below, summarizes the complete list of IEP elements that DWR is committed to funding.

Table 8-2: IEP Core Long-Term Monitoring Elements

Title	Principal Investigator	Total Cost	DWR Cost
Fall Midwater Trawl (FMWT)	White, CDFW	$677,000	$338,500
Summer Townet Survey (STN)	Malinich, CDFW	$677,000	$338,500
Est and Marine Fish Survey (Bay Study)	Hieb, CDFW	$732,000	$366,000
Bay Shrimp and Crab Surveys (Bay Study)	Hieb, CDFW	$204,000	$102,000
Delta Flows Network	Ruhl, USGS	$833,000	$416,500
20mm Delta Smelt Survey (20mm)	Tempel, CDFW	$730,000	$365,000
Juvenile Salmon Monitoring (DJFMP)	Johnson, USFWS	$2,825,000	$1,412,500
Coleman Late Fall Run Tagging	Niemela, USFWS	$231,000	$115,500
Mossdale Spring Trawl (Mossdale)	Tsao, CDFW	$129,000	$64,500
Environmental Monitoring Program	Lesmeister, DWR	$4,800,000	$2,400,000
Central Valley Juvenile Salmon and Steelhead Monitoring (Knights Landing)	Julienne, CFDW	$568,000	$284,000
Upper Estuary Zooplankton Sampling	Hieb, CDFW	$534,000	$267,000
Spring Kodiak Trawl (SKT)	Damon, CDFW	$450,000	$225,000
UCD Suisun Marsh Fish Monitoring	Durand, UCD	$250,000	$125,000
Smelt Larval Sampling (SLS)	Damon, CDFW	$330,000	$165,000
Operation of Thermograph Stations	Parker, USGS	$53,000	$26,500
Juvenile Salmon Emigration Real Time Monitoring (DJFMP)	Mahardja, USFWS	$173,000	$86,500
Tidal Wetland Monitoring	Contreras, CDFW	$1,092,000	$546,000

Title	Principal Investigator	Total Cost	DWR Cost
Yolo Bypass Fish Monitoring Program (YBFMP)	Schreier, DWR	$802,000	$401,000
Resident Fishes Survey (DJFMP)	Mahardja, USFWS	$317,000	$158,500

Note: List based on key monitoring programs in the draft 2020 work plan. The current PI and budgets for each are shown, but will change in the future based on personnel, project scope, periodic reviews, and inflation.

CDFW Information Requests
February 4, 2020

The following information was requested in the January 13, 2020 letter addressed to Dean Messer to assist CDFW in their review of the ITP application.

REQUEST 1. ***It is our understanding that SWP facilities such as those associated with the Delta-Mendota Canal/California Aqueduct lntertie facility may be used in the export of water on behalf of the Central Valley Project. Please provide an explanation of such operations and their extent, and months in which SWP facilities may be used to export or wheel water for the Central Valley Project. Providing data from the past ten years would be a helpful way to demonstrate these operations.***

RESPONSE:
Water Code section 1810 requires that the SWP must provide access to unused conveyance capacity to another water user if requested when certain conditions are met, including that use does not impact the SWP or violate any other laws. The CVP regularly uses the SWP facilities through 1) direct export at Banks Pumping Plant using Joint Point of Diversion (JPOD) provisions in D-1641, or 2) through the use of the Delta-Mendota Canal/California Aqueduct Intertie (DCI) and pumping water directly into the California Aqueduct (CA) for conveyance to CVP storage and/or water users.

With JPOD, water is pumped out of the Delta at the SWP export facility (Banks Pumping Plant) with the CVP label on the water. JPOD when used by CVP, is generally used to export stored water supplies in the summer and fall but can occur anytime there is open capacity and can include periods of excess conditions when SWP is constrained by other project limitations. Figure 1 shows the average volume of JPOD used by CVP in 2009 to 2018.

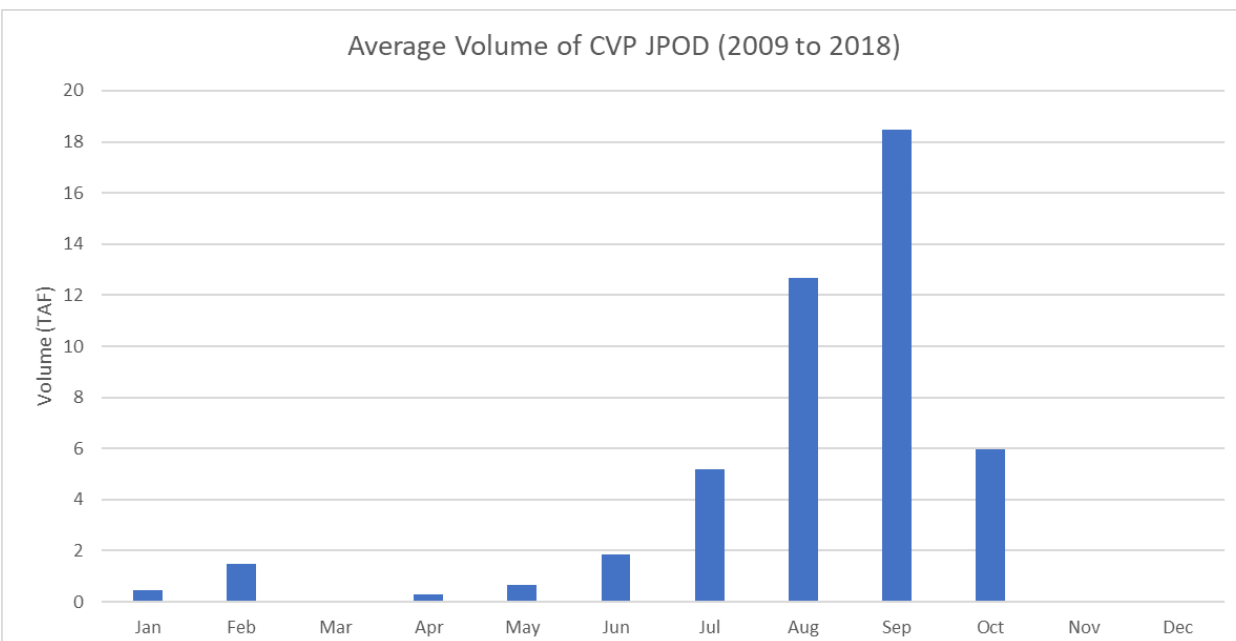

FIGURE 1: AVERAGE VOLUME OF CVP JPOD FROM 2009 TO 2018

With DCI operation, water is pumped out of the Delta at the CVP export facility (Jones Pumping Plant). The DCI is a Reclamation facility that is co-operated by the CVP and SWP and provides the ability to move water from the Delta Mendota Canal (DMC) to the CA. The facility provides up to 900 cfs gravity flow from the CA to the DMC and up to 467 cfs pumping capacity from the DMC to the CA. Though the DCI provides the capability to convey water in both directions, the primary use has been pumping water from the DMC to the CA. The DCI helps to offset loss of canal capacity due to subsidence on the upper DMC which has impacted the CVP's ability to utilize the full design capacity of the Jones Pumping Plant. The Jones Pumping Plant has for the most part been limited to about 3,600 cfs without the use of the DCI. Due to continued subsidence, the frequency of DCI use has increased. Figure 2 shows the average volume that the CVP pumped using the DCI.

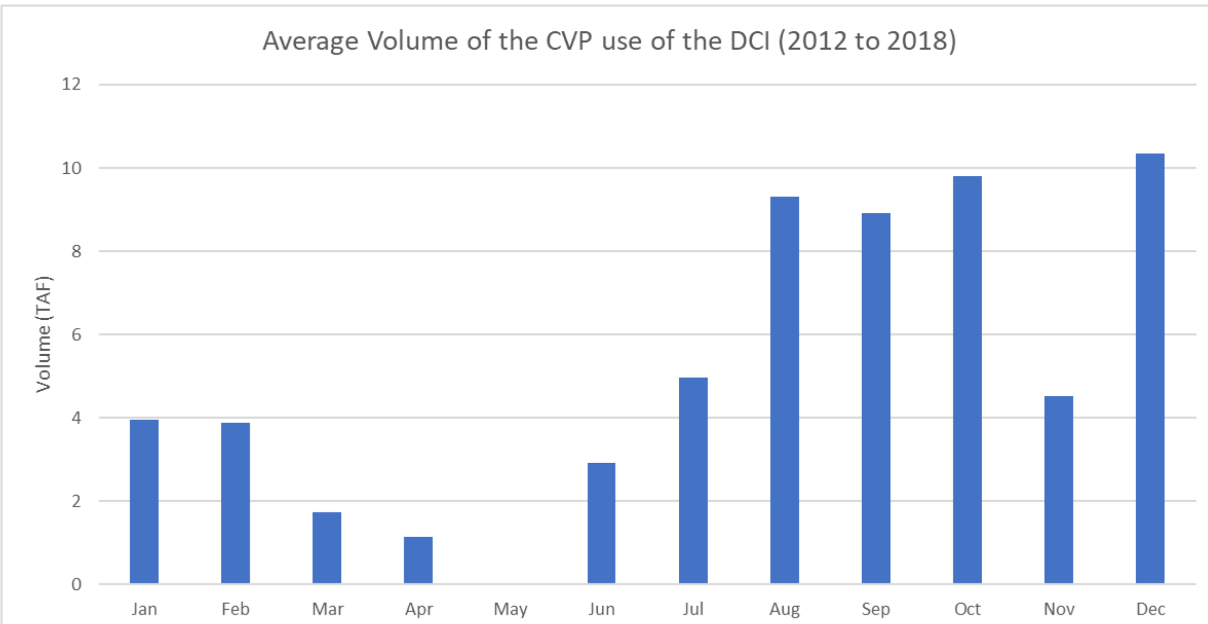

FIGURE 2: AVERAGE VOLUME OF CVP USE OF THE DCI FROM JULY 2012 TO DECEMBER 2018

REQUEST 2. *The Skinner Fish Facility operations portion of the Project Description does not include a description of the release sites for salvaged fish that will be used during ongoing operations of the SWP. Please provide this description.*

RESPONSE:
During normal operations, salvaged fish are transported approximately 30 km (18.6 mi) and released at one of six SWP and CVP release sites near the confluence of the Sacramento and San Joaquin Rivers. Up to present day, most fish hauls from the SDFPF have been released at either the SWP Horseshoe Bend Release Site or the SWP Curtis Landing Release Site on an alternating basis. In 2018, two new SWP release sites were constructed on Sherman Island (SWP Little Baja and SWP Manzo Ranch), and as a measure to reduce predation, DWR plans to re-operate the release site rotation schedule to incorporate the two new release sites, the two CVP release sites at Emmaton and Antioch, and the SWP Curtis Landing Release Site. The SWP Horseshoe Bend Release Site is planned to be decommissioned from regular use due to age and lack of interagency operability.

SWP Horseshoe Bend Release Site

The SWP Horseshoe Bend release site is located within Horseshoe Bend on Sherman Island, approximately 11 km (6.8 mi) downstream of the city of Rio Vista along highway 160. The release facility consists of two 30.5-cm (12-in) diameter steel pipes. One pipe is approximately 54.3 m (178 ft) long and is used for the release of fish and includes a short (~3 m) length of PVC pipe with a PIT tag detection array. The other pipe houses a submersible pump which feeds flushing water at 0.005 m3/s (0.18 cfs) into the release pipe through a four-inlet manifold. The pipelines are fixed to the top of the Sherman Island levee and are supported by a series of steel piles extending into the channel. The end of the release pipeline extends 2 m (6 ft) beyond the last set of piles and is suspended 1.8 m (6 ft) above the channel bottom to prevent blockage due to sediment buildup. At the mean high-water level, the pipe is submerged 3.7 m (12 ft). The site is planned to be decommissioned upon operation of new SWP release sites at Little Baja and Manzo Ranch due to dated infrastructure and site constraints on refurbishment.

SWP Curtis Landing Release Site

The SWP Curtis Landing release site is on the San Joaquin River side of Sherman Island, immediately upstream of the Antioch Bridge. The site was demolished and rebuilt in 2015 with a new design based on Collection, Handling, Transport, and Release site studies conducted in 2007-2008 and engineering studies incorporating removal and minimization of in water structures, a new fish release system including a steel platform supported on driven piles, fish release pipe, water intake pump with associated piping, overhead downspout, pump flow control system, site lighting, and other fish friendly features. The release facility consists of two stainless steel pipes. One pipe is 30.5-cm (12-in) in diameter, approximately 18.3 m (60ft) long, and is used for the release of fish and includes a PVC section (~3 m) with a PIT tag detection array. The other pipe, a water intake pipe, is 40.6-cm (16-in) in diameter and houses a submersible pump which feeds flushing water at 0.1 m3/s (3.5 cfs) into the release pipe through a dual-inlet manifold. The water intake pipe also includes a retrievable self-cleaning cylindrical fish screen. The pipelines are pile supported in the Sherman Island levee prism by a series of steel piles. The end of the release pipeline extends 2.1 m (7 ft) beyond the last set of piles and is suspended approximately 1.8 m (6 ft) above the channel bottom to prevent blockage due to sediment buildup. At the mean high-water level, the pipe is submerged approximately 5.5 m (18 ft).

The design of the Curtis Landing release site has been utilized as a template for the design of new fish release sites including the SWP sites at Little Baja and Manzo Ranch and proposed new or refurbished CVP release sites.

SWP Little Baja and Manzo Ranch Release Sites

The SWP Little Baja and Manzo Ranch release sites are located on the Sacramento River side of Sherman Island, approximately 0.8 km (0.5 mi) and 1.6 km (1 mi) upstream of the Sherman Island County Park, respectively. The two sites were built simultaneously in 2018 with designs based on SWP Curtis Landing and engineering studies of the new sites. Each site is built with a series of piles extending approximately 75 feet into the river channel, and the end of the release pipeline extends 2.1 m (7 ft) beyond the last set of piles and is suspended approximately 1.2 m (4 ft) above the channel bottom to prevent blockage due to sediment buildup. At the mean high-water level, the pipe is submerged approximately 4.37 m (14.35 ft) and 3.96 m (13 ft) at Little Baja and Manzo Ranch, respectively. Both sites incorporate the same 0.1 m3/s (3.5 cfs) pipe flushing and overhead washdown system, fish screen, and other design elements utilized at Curtis Landing.

REQUEST 3. ***Please provide a clear explanation of how the cumulative loss thresholds for both wild and hatchery-origin winter-run Chinook salmon were calculated. Specifically:***

A) Did DWR use water years or brood years used to calculate the cumulative threshold values?
B) Please provide the annual loss numbers used for each year and incorporated into the calculation (for example, in 2010 = 1656, 2011 = 4360, etc.), and the source of the data.

C) The application states, "the cumulative loss threshold (measured as the 2010-2018 average multiplied by 10 years) ... "

i) Please explain how the average cumulative loss is calculated. We interpret the term "cumulative" as a sum of years within a specific time span.

ii) Why did DWR multiply by 1 O years if the calculation included only 9 years total?
iii) Provide the equation (in a basic mathematical format) used to obtain the threshold numbers of 8,738 for wild winter-run and 5,356 hatchery-origin winter-run.

RESPONSE:
Pending further discussion with the Bureau of Reclamation

REQUEST 4. ***Please provide an analysis of Project impacts to adult winter- and spring-run chinook salmon, including migration delays, straying, routing, and entrainment.***

RESPONSE:
Adult salmonid straying was reviewed in detail by Lasko et al. (2014). They provided the following overview, which considers both a general background as well as information specific to the Central Valley:

> *"Nearly all species of salmon and trout (family Salmonidae) spawn in fresh water, and many have at least facultative anadromous life histories (Quinn 1997, Quinn 2005, Railsback et al. 2014). Homing, the behavior of adult salmonids returning to spawn in their natal stream, is a major part of the anadromous life history (Quinn et al. 2000, Beacham et al. 2002, Keefer et al. 2008). Homing serves to genetically isolate populations of the same species spawning in different waterways, thus allowing for eventual adaptation to local conditions (Quinn et al. 2000, Beacham et al. 2002, Keefer et al. 2008). This could include evolved compatibility to natal habitat conditions via adaptations for temperature tolerance or resistance to pathogens in the stream, as locally adapted salmonids are generally far more successful at spawning than occasional strays (Quinn 2005). Overall estimates for natal area fidelity via homing in Pacific salmon (Oncorhynchus spp.) are 80%–100%, based primarily on hatchery data (Quinn 1997). Imprinting, or olfactory learning, of anadromous salmonids to their natal stream appears to occur before and during the parr-smolt transformation, as well as during emigration, although to a lesser extent during earlier life stages in some Pacific salmon of hatchery origin (Dittman et al. 1994, Dittman and Quinn 1996, Quinn 1997, Dittman et al.1996, Lema and Nevitt 2004, Yamamoto et al. 2010)."*
>
> "*The term "straying," as used in this paper, refers to anadromous salmonids that either intentionally or unintentionally return to and spawn in a non-natal stream. Anadromous salmonids that spawn in a river or stream other than the one of their origin exhibit the "truest"*

sense of straying (Quinn et al. 1991), which Keefer et al. (2008) referred to as permanent straying. It is not known why some anadromous salmonids stray and the explanation is likely complex. The tendency to home or stray may be genetically inherited, and the pattern and stability of anadromous salmonid distributions may be a reflection of ecological constraints on the fish (Quinn 2005). Straying may occur in response to environmental conditions, or in response to disturbance events that prevent the fish from reaching or spawning in their natal stream (Quinn 2005, Waples et al. 2009). Anadromous salmonids may also wander, explore new habitats for suitability, follow schools of conspecifics from other rivers, or opportunistically spawn in another stream with favorable conditions (Jonsson et al. 2003, Keefer et al. 2008). Furthermore, anadromous salmonids may be distracted by odors or flows from a river they are migrating past, or simply get lost or confused by some combination of cues that they encounter during their upriver migration. Straying can be adaptive through rapid colonization of newly available habitat after events such as landslides, forest fires, or low flows and high temperatures resulting from drought or ice melt and glacial recession (Quinn 1997, Moyle 2002, Quinn 2005, Waples et al. 2009). Straying likely results in gene flow between different populations in the system (Quinn 2005). Strays might be the only successful spawners following a major climatic or catastrophic event, such as the eruption Fall 2014 of Mount St. Helens which rendered natal streams inaccessible or unsuitable for spawning (Quinn 2005). In effect, straying can provide a kind of insurance in space from these types of events (Thorpe 1994)."

"There is great variability in salmon straying rates from year to year and between populations, by size and age (Quinn and Fresh 1984), and across species (Quinn 1997). Salmonids of hatchery origin appear to stray at a higher rate than salmonids that are of natural origin, and straying also appears to increase with increased hatchery selection (Jonsson et al. 2003). It may be that this bias towards greater straying by salmonids of hatchery origin is due to fewer studies of straying behavior in wild populations (Quinn 1997). Straying may increase when salmonids of hatchery origin are released away from their natal hatchery, and may also increase with greater release distance from the hatchery (Newman 2008). Different rivers seem to vary in their attractiveness to Pacific salmon strays, possibly because of flow or temperature variations from year to year (Quinn et al. 1991, Carmichael 1997, Crateau 1997, Phillips et al. 2000), and strays might choose a river resembling their natal stream (Quinn et al. 1991). There also appears to be considerable variation in the amount of straying based on location, and straying can occur both upstream and downstream from an individual's natal stream. Johnson et al. (1990) found only a rough correlation between straying rate and release distance from the natal stream."

Lasko et al. (2014) found that straying of hatchery-reared Late fall-run Chinook Salmon from the Coleman National Fish Hatchery into the American River increased relative to proximity of release location to the mouth of the American River and with respect to downstream releases in general; no salmon released in the vicinity of the Coleman National Fish Hatchery were recovered in the lower American River. The straying issue was also examined in detail by Sturrock et al. (2019), who found that transport distance was strongly associated with straying rate (averaging 0–9% vs. 7–89% for salmon released on site vs. in the bay upstream of Golden Gate Bridge, respectively), increasing the effects of hatchery releases on natural spawners. Hence, it appears that hatchery management has a relatively strong effect on straying throughout Central Valley.

The Proposed Project does not change hatchery release strategy, which based on the above information appears to be the main driver of straying risk in the Central Valley.

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REQUEST 5. ***OMR Flexibility during Delta Excess Flow Conditions: Please add detail to the Project Description to better explain the OMR limit during OMR flex operations. Does the Project Description include a hard limit to OMR of -6,250 cfs at any time, or would OM Rs more negative than -6,250 cfs be allowed as long as the 5-day average equals or is less negative than -6,250 cfs?***

RESPONSE:
The Incidental Take Permit (ITP) application describes the OMR Flexibility as being limited to -6,250 cfs on a 5-day running average. Average in this case is referring to the 5-day mean of the daily OMR index (the OMR index is described in Section 3.3.1 of the ITP Application). The intent is to target the OMR flow objective based on the OMR Index on a daily basis, but because of inexactness of flow forecasts and operations, it is anticipated that there could be individual days that are slightly more negative than -6,250 cfs. The use of the 5-day average OMR index for compliance purposes will allow for the minor operations adjustments necessary to compensate for daily inaccuracies.

REQUEST 6. ***Please provide additional information specifying the date each year when salmonid loss at the South Delta facilities would begin to be counted as a part of the annual loss threshold. Winter-run are known to be present in the Delta in November, possibly earlier in years with early pulse flows, and are observed in salvage prior to January 1.***

RESPONSE:
DWR is requesting more information to respond to this question.

REQUEST 7. ***At our meeting on January 6, 2019, DWR committed to preparing SCHISM modeling analyses to characterize Delta smelt habitat attributes in Suisun Marsh***

RESPONSE:
DWR met with CDFW on 1/30 to review SCHISM modeling